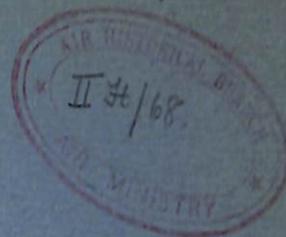


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COASTAL COMMAND REVIEW

March, 1943

No. 11

HEADQUARTERS,
COASTAL COMMAND
ROYAL AIR FORCE

COASTAL COMMAND REVIEW

No. 11—March, 1943

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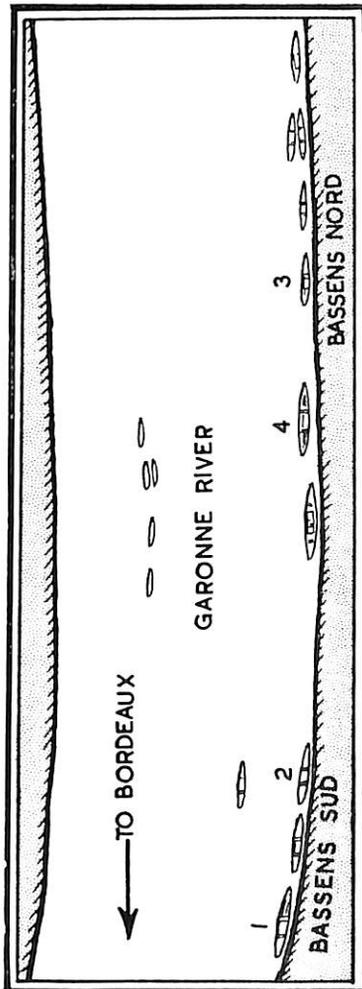
CHARTS

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2	Disposition of Enemy Convoys	<i>Page 11</i>

This book is secret. No quotations may be made without the authority of the Chief Intelligence Officer, Headquarters, Coastal Command.

" While this book is, of necessity, issued as secret, and no part of it must be communicated to anyone outside the Services, it is intended for the information of all officers but principally of all members of aircrews, under conditions of security approved by the Commanding Officer. The whole purpose of producing it would be frustrated if it were relegated to the interior of an official safe."

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



The activities of blockade runners have often been mentioned in this Review. It will be remembered that Bordeaux has been the terminal of this traffic. This photograph shows a number of these vessels at the quays of Bassens, a few miles North of Bordeaux. At Bassens Sud lie (1) Elsa Essberger, encountered by Coastal Command aircraft just over a year ago, when this traffic was just beginning. This photograph confirms what had been a suspicion—that she is seriously damaged last November by Mosquito aircraft of No. 2 Group Bomber Command. A big hole is visible where her poop should have been. At (2) lies the Tannetfels, which arrived in Bordeaux last November after a successful voyage to and from the East. Since unloading, she has been inactive. At Bassens Nord lie ships that may well have loaded. At (3) is a ship that resembles (but is not) the Guadeloupe, a fruit ship. It appears to have been modified to act as a supply ship or auxiliary of some sort. At (4) lies the Himalaya, which later on set out for the East, and was seen four times on 29/30th March by aircraft of 279, 224, 119, and 10 O.T.U. on her way through the Bay of Biscay. She appears to have taken freight and subsequently returned to La Pallice.

COASTAL COMMAND REVIEW

EDITORIAL—MARCH, 1943

The rising trend in the U-Boat war noted in last month's Review has continued on an increasing scale in March. There has been a total of 127 sightings by purely A/S type of aircraft, resulting in 75 attacks. Seven sightings were made by Transit, P.R.U. or Beaufighters. The percentage of attacks to sightings remains approximately constant at 56.4 per cent. which must be considered as satisfactory in view of the tactical limitations imposed by existing weapons and the development of counter-measures by U-Boats against detection.

There have also been eight sightings by aircraft not engaged in anti-submarine duties. The number of attacks on U-Boats analysed in this number is limited by the delay in receiving the amplified reports.

In the protection of trade, mention only can be made of two severe and protracted battles, in which convoys HX 228 and SC 121, and convoys HX 229 and SC 122 were involved. It is hoped to include a full study and analysis of these two operations in a later issue, when the full stories have been received.

The war against enemy shipping during March has been unproductive.

The weather has been abnormal for the time of year. For the first three weeks dry, anti-cyclonic conditions persisted south of 55° N. Over Scotland, the weather has been mainly fair, but a series of depressions moving across Iceland brought stormy weather to our north-west seaboard, except during the period 18th to 26th. In the last week of the month, a slow change in conditions occurred, and the drought over England, which had lasted since 17th February, broke on 23rd March. The last days were very unsettled, after the establishment of stormy south-westerly weather.

Conditions for photography were in general reasonably good until 26th, after which they became impossible everywhere.

The unusually fine spell of weather has been reflected in the flying activity of the Command. A total of 3,737 sorties involving 23,117 hours flying, were carried out, as compared with 3,151 sorties of 19,440 hours in February, and these figures are approximately twice those for March 1942, when 2,036 sorties and 10,319 hours were effected.

By tasks, the sorties were divided as follows:—

	<i>March</i>	<i>February</i>
(a) Anti-Submarine Patrols	1,367	1,226
(b) Convoy Escort	557	477
(c) Anti-Shipping Patrols	434	370
(d) Interceptor Patrols	227	130
(e) Photographic Reconnaissance	307	300
(f) Meteorological Flights	461	403
(g) Air/Sea Rescues	384	245

From the above, we see that—

(a) and (b). The effort on anti-submarine work generally shows a marked increase, (a) being 11.2 per cent. and (b) nearly 17 per cent. higher. Also it should be noticed that the ratio of sightings to flying hours is considerably higher.

(c) The results of the increased effort against enemy shipping (17.5 per cent. higher) are disappointing. Out of a total of 434 sorties, only 10 aircraft found and attacked 12 ships and 3 fishing vessels. It has not been possible to advance any claims of damage.

(d) Interceptor patrols were increased by 75 per cent. but here again the results are rather negative in character. Out of 227 sorties, only 22 enemy aircraft were engaged by 24 of our own aircraft, 3 being claimed as destroyed, 5 damaged and 14 being reported as inconclusive.

(e) The effort on photographic reconnaissance was almost constant, the increase being only 2.3 per cent.

(f) Meteorological reconnaissance showed an increase, as anticipated; it amounted to 14.2 per cent.

(g) Air/sea rescue reflects the increased activities of all Home Commands by a rise in effort of 77 per cent. The percentage of success is, unfortunately, somewhat lower, due to some extent to the fact that an unusually large number of cases arose where no S.O.S. or position in the sea was received.

The following organization changes have occurred :—

- 1st. No. 405 Squadron returned to Bomber Command.
- 4th. No. 502 Squadron from St. Eval to Holmsley South.
- 6th. No. 303 F.T.U. from Stornoway to Talbenny.
- 11th. No. 833 (F.A.A.) Squadron, Thorney Island to St. Eval.
Moves of No. 1 and No. 6 O.T.U.s completed.
- 18th. No. 86 Squadron from Thorney Island to Aldergrove.
- 23th. No. 836 (F.A.A.) Squadron from Thorney Island to Ballykelly.
No. 59 Squadron moving from Chivenor to Thorney Island.
No. 811 (F.A.A.) Squadron located at Ballykelly.
No. 308 F.T.U. forming at Pembroke Dock.
No. 404 Squadron moving from Chivenor to Tain.
No. 407 Squadron moving from Skitten to Chivenor.
No. 220 Squadron moving from Aldergrove to Benbecula.
No. 1403 (Met.) Flight has formed at Gibraltar.
- No. 521 Squadron has ceased to exist, having split into two flights. No. 1409 Flight, which is being transferred to Bomber Command, and No. 1401 Flight, the original number before assuming Squadron status, which remains at Bircham Newton.

Maghaberry airfield has been allotted as the satellite for Long Kesh.

Corrigendum

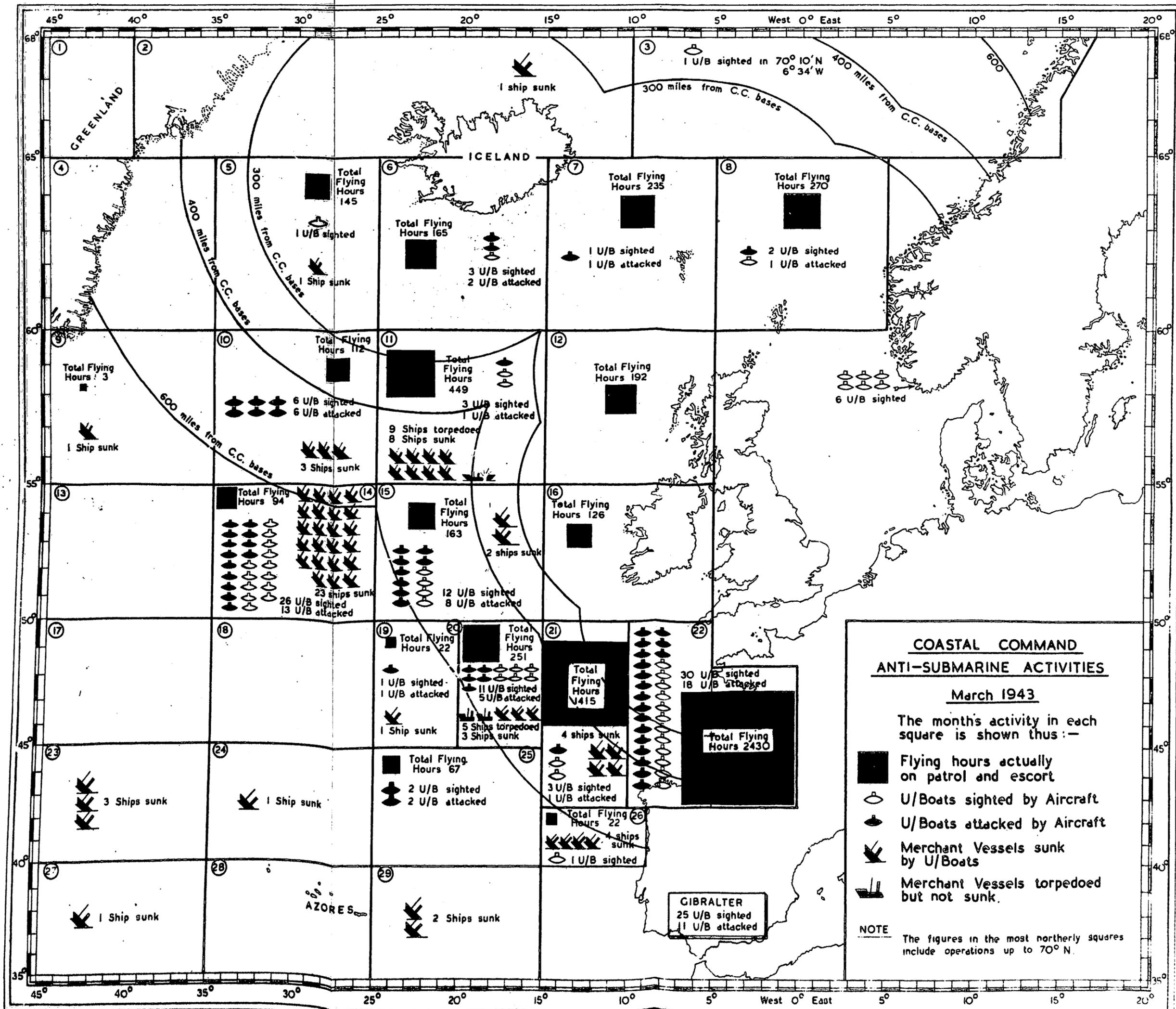
On page 1 of No. 10 of the Review, owing to an error, the figures for photographic reconnaissance, meteorological flights and air/sea rescue became transposed. They should therefore read :—

	<i>February.</i>	<i>January.</i>
Photographic reconnaissance	300	265
Meteorological flights	403	420
Air/Sea rescue	245	180

The conclusions under (e) and (f) are therefore incorrect and should read :—

(e) For 50 per cent. read "over 25 per cent."

(f) The effort on air/sea rescue shows a marked rise of nearly 50 per cent., with improved results, 86 lives having been saved.



I.—ANTI-SUBMARINE SECTION

Anti-Submarine Operations in March, 1943

(See Chart opposite)

In March altogether 134 U-Boats were sighted and 70 attacked by depth-charges, by Coastal Command, including Gibraltar. This number of attacks has only once been surpassed in this war, in November, 1942, when 88 attacks were made, most of which were near Gibraltar, during the beginning of "Torch."

Twenty-five of these sightings, followed by 11 attacks, were made by aircraft operating from Gibraltar. The Bay of Biscay area has given results considerably higher than for recent months. Forty-two sightings and 24 attacks have been made on anti-submarine patrols (compare 32 sightings and 15 attacks in February) and another six sightings (three attacks) by aircraft protecting convoys. Of the sightings on A/S patrol in the Bay no less than 28, followed by 16 attacks, were made between dusk on the 20th and dawn on the 28th. This high result was partly due to an unusually large U-Boat traffic, but also, to a large extent, to the renewed success of the Searchlight Wellingtons whose night attacks have once again forced U-Boats to surface more by day. In the latter half of the month 172 Squadron made 11 sightings and seven attacks—an average of one sighting every four sorties.

Of the remaining sightings and attacks the majority (51 sightings, 28 attacks) were made by air support to convoys. The improved weather and the large number of U-Boats operating have resulted in several large-scale engagements between convoys and packs of U-Boats. Air counter-attack on these packs has given very striking results, both in the number of U-Boats attacked and in their resulting inability to attack the convoys.

Among such operations the most important was on the Convoys HX.229 and SC.122, routed close together, during the 17th/21st of the month. It is believed that up to 20-30 U-Boats in all were involved. The air operations led to 32 sightings and 19 attacks. During the 16th, U-Boats collected round the convoys, then roughly 900 miles from the nearest air bases on either side of the Atlantic. Thirteen ships were sunk in the night of the 16th/17th. On the 17th, V.L.R. Liberators of 86 and 120 Squadrons were escorting the convoys. SC.122 was covered from 0950 to 1215 by a Liberator of 86 Squadron which sighted two U-Boats and attacked both of them. Another Liberator of 120 Squadron was with the convoy from 1445 to 1715, sighting two U-Boats, one of which was attacked. Meanwhile HX.229 had been attacked in the early afternoon before air escort arrived, and two further ships were sunk. The convoy was escorted by two V.L.R. Liber-

ators, from 1745 to 2200. One of them (of 120 Squadron) sighted six U-Boats. Two of these were seen together, and one attacked at 2005. Another batch of three were sighted, one of which was attacked with one depth-charge, at 2047, and a final sighting was made at 2056 and attacked with machine-gun. During the night of the 17th/18th two further ships were lost from SC.122.

During the 18th, four Liberators were sent to HX.229. None of them met the convoy (then in about 53° N., 28° W.). Three U-Boats were sighted by these aircraft, one of which was attacked. In the absence of this intended air cover the U-Boats sank a further two ships in the early afternoon.

SC.122 was meanwhile escorted by five other Liberators of 120 Squadron, from 1138 to 2209, continuously, except for about an hour's gap just after 1230 hours. All these aircraft were successfully homed on, and between them sighted six U-Boats, four of which were attacked with depth-charges. No ships were sunk in the daytime, though one was sunk in the subsequent night.

During the 19th, both convoys were escorted almost continuously—HX.229 from 0905 to 2104 (seven sorties) and SC.122 from 0800 to 2130 (four sorties). Six of these sorties were by Fortresses of 220 and 206 Squadrons and six by Liberators of 86 and 120 Squadrons. An A/S sweep was carried out round the two convoys by five Sunderlands. In all, seven U-Boats were sighted, of which six were attacked with depth-charges. No ships were sunk except a straggler from HX.229, and none in the night of the 19th/20th.

During the 20th the U-Boats appear to have kept near the convoys, which were again escorted by Fortresses from early morning till late evening. Sweeps by 10 Sunderlands resulted in six sightings, four of which were attacked. No further losses occurred, and sweeps by three Fortresses and a Sunderland on the 20th gave no sightings.

This operation shows clearly how, although the pack held on to the 20th, the air support made their operations unsuccessful after the 18th. Also, how large-scale operations against these big packs give a very large return in sightings.

In all, during the days 17th-21st March, 54 sorties gave 32 sightings and 21 depth-charge attacks.

Other heavily attacked convoys have also come within air range, though the attacks and counter-attacks have not been on so large a scale. The following table shows briefly the results obtained per sortie (escorts and sweeps together):—

Convoy.	Dates.	Sorties.	U-Boats sighted.	U-Boats attacked with depth charges.
XX 2	5-7th	7	1	0
SC 121	8-11th	25	5	2
HX 228	11-13th	18	6	2
OS 44	12th	6	0	0
HX 229	17-21st	54	32	21
SC 122				
SL 126	28th-31st	13	2	1
	—	123	46	26

Averaging 1 sighting every 3 sorties.

SHIPPING PROTECTION

The following table shows the amount of shipping passing through the Coastal Command area and the air protection given to it:—

<i>Type of Shipping.</i>	<i>Number of Sailings.</i>	<i>Number Protected.</i>
Convoys and Naval Forces	63	48
Independents	78	2

This protection was given by 354 sorties, divided as follows:—

<i>Type of Shipping.</i>	<i>Escorts.</i>			<i>Sweeps round Convoy Tracks.</i>
	<i>Met.</i>	<i>Failed to meet.</i>		
Convoys and Naval Forces	159	45	148	
Independents	2	0		

Analysis of Operations

This table analyses U-Boat sightings in terms of the different types of duty engaged in by aircraft, and the average duration of the sorties in the area of operations:—

	All A/S Escorts.	Offensive Operations.			Chance.	Coastal Command Total on Anti-Submarine Work.
		Around Convoy Tracks.	Bay of Biscay.	Elsewhere (Atlantic and North Passage).		
U-Boat:—						
Sighted	38	13	42	8	8	101
Attacked	21	7	24	7	0	59
Sorties	206	148	690	202	—	1,246
Average Number sorties per sighting.	5	11	16	25	—	12
Hours actually on patrol ..	590	759	4,120	804	—	6,273
Average duration of sorties actually on patrol.	Hours. 2½	Hours. 5	Hours. 6	Hours. 4	—	Hours. 5

U-BOAT SIGHTINGS AND ATTACKS BY SQUADRONS AND STATIONS**U.K. and ICELAND****(1) Aircraft on Anti-Submarine Work**

		<i>U-Boats seen.</i>	<i>U-Boats attacked.</i>
59 Fortresses	Chivenor	5	2
502 Halifaxes	Holmesley South and St. Eval	7	3
No. 1 U.S.A.A.F. (Liberators)	St. Eval	1	1
58 Halifaxes	Holmesley South and St. Eval	1	1
172 S/L Wellingtons ..	Chivenor	12	7
10 O.T.U. Whitleys ..	St. Eval	13	9
311 (Czech) Wellingtons ..	Talbenny	3	2
304 (Polish) Wellingtons ..	Talbenny	2	2
224 Liberators	Beaulieu	4	1
201 Sunderlands	Castle Archdale	5	3
86 Liberators	Aldergrove	4	3
120 Liberators	Aldergrove and Iceland ..	27	13
220 Fortresses	Benbecula	3	2
206 Fortresses	Benbecula	6	4
228 Sunderlands	Castle Archdale	1	1
423 Sunderlands	Castle Archdale	5	3
612 Whitleys	Wick	2	2
		<u>101</u>	<u>59</u>

(2) Aircraft not on Anti-Submarine Work

255 Beaufighters (Anti-Shipping)	Leuchars	3	0
455 Hampdens (anti-shipping)	Leuchars	1	0
190 Catalinas (Recco.)	Sullom Voe	1	0
P.R.U.		3	0
		<u>8</u>	<u>0</u>

FROM GIBRALTAR**(1) Aircraft on Anti-Submarine Work**

		<i>U-Boats seen.</i>	<i>U-Boats attacked.</i>
233	Hudsons	9	7
48	Hudsons	5	4
210	Catalinas	3	0
202	Sunderlands	3	0
179	S/L Wellingtons	3	0
1404	Met. Flight	1	0
	Transit aircraft	1	0
		—	—
		25	11
		—	—

Recent Attacks on Submarines

The following accounts are of attacks on enemy submarines which were made in February; they were not assessed in time to be printed in the last number of the Review.

Two Attacks near Gibraltar

At 1555 hours on 24th February, **Catalina D/202**, camouflaged white underneath, was on A/S patrol, flying on track 090°, at 5,000 ft., in weather 4/10 cloud, base 2,000 ft., sea calm, visibility 20 miles. The aircraft was carrying out baiting tactics on a U-Boat previously sighted at 1411 hours, in position 38° 50' N., 16° 37' W., course 360°, 12 knots. A U-Boat was sighted in the act of surfacing, at 1545 hours, bearing 029° T, distant 16 miles, in position 38° 58' N., 16° 34' W., course 360°, 12 knots. The U-Boat was German type, with a gun forward of the conning-tower and two periscopes which were visible above the bridge screen. The aircraft manoeuvred to get the sun immediately astern and then turned to port and approached down sun, in a long dive, finally attacking from the U-Boat's port quarter at 30° to track, releasing from 20 ft., six Mark XI Torpex depth-charges, set to shallow depth, spaced actually 34 ft., while the U-Boat was still visible. The bows were just under water and the conning-tower and stern were on the surface.

Just before release, it was noticed that the U-Boat had commenced a gradual turn to port. Front blister and tunnel gunners fired and hit the U-Boat as the aircraft passed over. The position of the observed hits was on the base and just aft of the conning-tower, on deck. Evidence states that the stick straddled and the explosions completely obliterated the U-Boat. When the spray had subsided, the U-Boat had disappeared and, about eight minutes after the attack, large bubbles of air began appearing, just ahead of the position of the attack. These bubbles were in gouts at first. Then they became continuous. They were still rising to the surface 150 yards ahead of the position of attack, 45 minutes after. Photographs were taken. The aircraft remained for as long as possible and then set course for base at 2002 hours.

Result

A very good approach, making full use of the sun and from the visual evidence, an excellent attack. The photographs do not show the precise position of the stick in relation to the U-Boat, but other photographs show the area of oil bubbles 30 minutes after the attack. All this evidence indicates that damage was inflicted on the U-Boat, though to what degree it is impossible to assess precisely.

At 1403 hours, on 12th February, **Hudson F/48**, camouflaged white underneath, was on A/S patrol, flying on track 288°, at 3,500 ft., in weather nil cloud, sea moderate, visibility 30 miles, when it sighted the wake, and later a U-Boat on the surface, bearing Red 28°, distant 8 miles, in position

37° 32' N., 11° 56' W., course 290°, 10 knots. Owing to the speed of the U-Boat, a description was impossible, but it is believed that it was of German type. The impression was that the conning-tower was stepped at the back. The aircraft turned to port and dived to attack. When about 400 yards away, the aircraft turned to starboard to approach up-track. The aircraft opened fire with the front guns and by this time the U-Boat had begun to dive. The final attack was made up-track, releasing from 30 ft., four Mark XI Torpex depth-charges, set to shallow depth, spaced actually 45 ft., while the U-Boat's stern was still visible. The aircraft tracked immediately over the stern and the rear gunner fired at it. The rear gunner estimates that 100 ft. of the stern was still visible at the time of the explosion.

Evidence states that the depth-charges exploded, No. 1 close alongside the conning-tower, on the port side, and Nos. 2, 3 and 4 along the track of the U-Boat, slightly to port. The rear gunner's impression was that the stern was pushed up by the force of the first explosion as, at the time of the attack, only 20 ft. of the stern was visible. The aircraft circled over the area and an oil patch, 200 yards in diameter, was observed. The oil was multi-coloured, with pieces of wood floating in it.

The aircraft remained in the vicinity for 40 minutes, but nothing further was seen. S/E was on, but no contact was obtained.

Result

A good look-out and excellent approach from 3,500 ft., in nil cloud, making good use of the sun to surprise the U-Boat. Finally a very good attack with two depth-charges, close alongside. Photograph No. 950 confirms this and shows one depth-charge to have skidded a long way out from the line of drop. The nearest depth-charge appears to be ricocheting out of place along the line of drop. The after-effect of large oil patch, with small pieces of wood floating in it, indicated considerable damage.

"An Excellent Attack"

At 1204 hours, on 15th February, **Liberator III S/120**, V.L.R. camouflaged white underneath, was on an A/S sweep, flying on track 001° at 3,000 ft., in weather 10/10 cloud, base 2,500 ft., sea moderate, visibility 5-10 miles, when it sighted a U-Boat on the surface, bearing 030° Green, distant 7-8 miles, in position 55° 45' N., 31° 09' W., course 260°, 8 knots. The U-Boat appeared to be a German of the 517-ton type with gun forward of conning-tower, mottled brown and grey camouflage. The aircraft attacked from the U-Boat's port bow at an angle of 40° to track,

releasing from 70 ft., six Mark XI Torpex depth-charges, set to shallow depth, spaced 36 ft. The conning-tower and stern were still visible above the surface. Evidence states that the depth-charges straddled the U-Boat just abaft of the conning-tower, with the centre of the stick on the port side. (Four to port, one on, and one to starboard.) After the explosion of the depth-charges, oil and air bubbles were seen. The oil was heavy and it formed a streaked patch, 150-200 ft. in diameter. Wreckage was also seen in the form of a dark, cylindrical, dome-headed object, of which about 2 ft. was showing in the oil patch; and a rectangular, box-like object, black, and 6 ft. by 4 ft., together with numerous small pieces of dark-coloured debris.

The aircraft remained in the area for 10 minutes and then sighted one M/V, *Shooting Star*, in position 56° 56' N., 30° 60' W., course 270°, 10 knots. Details of the attack were reported to the M/V by V/S. At 1348 hours, the aircraft sighted another M/V, the *Sydney Star*, in position 56° 17' N., 30° 33' W., course 215°, 10 knots. Details of the attack were reported also to this M/V, by V/S. The position of the U-Boat was 210° 15 miles from *Shooting Star* and 235° 37 miles from the *Sydney Star*.

Analysis

The excellent photograph confirms the position of entry of the depth-charges and shows in the air, just above the U-Boat's after-deck, an object which may be No. 5 depth-charge, having bounced off the hull. No. 4, and possibly No. 3, should have been lethal if the 35 ft. advance under water and the 19 ft. lethal radius are upheld.

Result

Excellent attack. The after results indicate severe damage or possible destruction. The good and very valuable photograph confirms the visual evidence of position of entry. This successful attack undoubtedly saved "Shooting Star" from later trouble.

"Serious Damage or Destruction"

At 0150 hours, on 19th February, **Searchlight Wellington B/172**, camouflaged white, was on A/S patrol, flying on track 131° at 1,000 ft., in weather 10/10 cloud, base 2,000 ft., sea smooth, visibility 10 miles, with moon glow, when it obtained S/E contact three points on the port bow, range 4 miles. The aircraft homed on and the captain sighted a wake, dead ahead, 2 miles distant. At 1 mile a U-Boat was identified in position 47° 03' N., 05° 56' W., course 080°, 10 knots. The U-Boat was on the surface. It was a German

of the 517-ton type, with one gun forward of the conning-tower and at least one gun on the platform aft of the conning-tower. All the guns were manned. The aircraft lost height to 200 ft. and at $\frac{1}{4}$ mile, switched on the searchlight.

The U-Boat was taken completely by surprise. About three men were seen by the A.A. gun on the platform, at the after end of the conning-tower. There were about three men in the conning-tower and three were clustered about the gun forward of the conning-tower. The men were all cowering in the glare of the searchlight and they did not open fire on the aircraft. The aircraft attacked from the U-Boat's starboard quarter, at 20° to track, releasing from 50 ft., at 150 miles per hour; four Mark XI Torpex depth-charges, set to shallow depth, spaced 36 ft. apart, while the U-Boat was still fully surfaced. The depth-charges were aimed half-way between the conning-tower and the bow. Evidence states that one of the depth-charges was seen to explode at an estimated distance of 20 ft. from the port quarter of the U-Boat. A second explosion, which was larger than the others, was seen just ahead of the conning-tower close to the port side of the U-Boat. A third explosion was seen close to the port bow. The U-Boat was seen to be turning to port when the depth-charges exploded and the S/E operator from the astro hatch saw the large, dark explosion just ahead of the conning-tower on the port side. Three flame floats were dropped with the depth-charges and they were seen to ignite. The centre one, or something else on the U-Boat, flared up several times, bright green and orange, illuminating the conning-tower clearly, while the aircraft was circling at 2-2 $\frac{1}{2}$ miles distant. The U-Boat then appeared to be absolutely stationary in relation to the flame floats. The aircraft circled over the scene of the attack three minutes later, but the conning-tower had disappeared. Three minutes after the attack, an oil patch, 25 yards in diameter, and possible air bubbles, were seen in the glow of the moon. The aircraft circled until 0255 hours when the oil patch was seen to have spread to 100 yards diameter. The pilot then climbed to 3,000 ft., to assist the W/T operator to get off signals which were not being acknowledged. Nothing further was seen and at 0256 hours, the aircraft set course to west and did not return to the scene of the attack. No camera was carried.

Result

An excellent attack. The evidence indicates serious damage or destruction of the U-Boat.

Attacks in March

The reports which follow are of attacks made and assessed early in March. Further reports of operations during this month will be printed in the next number of the Review.

At 0209 hours on 3rd March, **Searchlight Wellington B/172**, camouflaged white, was on A/S patrol, flying on track 133° at 500 ft., in weather 5/10 cloud, base 2,000 ft., sea moderate, visibility 2-4 miles, with a haze over the sea, when it got an S/E contact 8° to starboard, range 6 miles. The aircraft homed, losing height gradually and at $\frac{1}{2}$ mile, at 400 ft., switched on the searchlight which illuminated a U-Boat on the surface, dead ahead, in position 47° 07' N., 04° 28' W., course 085°, 12-15 knots.

The U-Boat appeared to be long and narrow. It was thought to be a 740-ton type. A gun was

seen behind the conning-tower with a gun shield, apparently of steel, around it. When the aircraft was $\frac{1}{4}$ mile distant, at 250 ft., the U-Boat began to dive. The aircraft altered course to 128° and attacked from the U-Boat's port quarter at an angle of 45° to track, releasing from 60 ft., four Mark XI Torpex depth-charges, set to shallow depth, spaced 36 ft. apart, while the conning-tower and stern were still visible, with the deck awash. As the aircraft passed over, the rear gunner observed two blue flashes, one on either side of the conning-tower. These flashes enabled him to fire 100 rounds into the conning-tower.

The flashes were confirmed by the navigator from the astro-dome.

Evidence states that the depth-charges exploded, Nos. 1 and 2, or 2 and 3, straddling the conning tower. The aircraft circled the flame floats, which had been dropped with the stick, and after 5-10 minutes, the searchlight was switched on. However, the haze caused reflection and nothing could be seen except white caps. After 20 minutes, the aircraft continued patrol.

Result

A very well-executed attack and on the visual evidence, at least serious damage should have been inflicted on the U-Boat. It is not possible to assess what degree of damage owing to the impossibility of obtaining precise after results at night.

Damage to Fuel Tanks

At 0928 hours on 7th March, **Fortress IIa J/220**, camouflaged white underneath, was on an A/S sweep, flying on track 270°, at 2,500 ft., just after dawn. Weather was 10/10 cloud, base 3,000-1,500 ft., sea rough. Visibility 5 miles. A bow wave was sighted bearing Red 60°, distant 5 miles. The aircraft continued on its course, losing height. It then altered course to port, to approach. The U-Boat was sighted, 2½ miles distant, with decks awash, in position 57° 14' N., 26° 30' W., course 260°, 12 knots. A gun was observed forward of the conning-tower. The aircraft attacked from the U-Boat's starboard beam, releasing from 80 ft., seven Mark XI Torpex depth-charges, set to shallow depth, spaced 36-40 ft. apart, about 10 seconds after the U-Boat had disappeared. Evidence states that the depth-charges straddled the U-Boat's track, four being to starboard, one on line of advance, and two to port, about 200 ft. ahead of the swirl. As the last depth-charge plume was subsiding, a dark object, possibly the stern of the U-Boat, appeared near the edge of the depth-charge explosion mark, nearest the swirl. This object disappeared after 5 seconds. About 45 seconds after the attack, iridescent oil, apparently diesel, appeared from the centre of the depth-charge explosion mark, also thick black treacly oil, not depth-charge scum. Oil spread to an area twice the size of the explosion mark 10 minutes after attack.

The aircraft dropped markers and left the scene for 15 minutes. On return, nothing further was seen, apart from large numbers of sea gulls. The aircraft remained for 5 minutes then, and having reached P.L.E., sea markers were dropped and the aircraft set course for base.

Analysis

Interval 10 seconds plus 2 seconds take-off plus 3 seconds to reach depth equals 15 seconds. During this time, conning-tower advanced 150 ft. ahead of apex of swirls.

Result

A very good attack. The method of estimating distance by using the explosion mark as a yard stick is preferred. It is known fairly accurately that as the spray is finally subsiding, the depth-charge explosion mark is 120 yards across. If the edge was about 40 ft. from the apex of the swirl, the stick was about 200-220 ft. ahead of the apex. From the other visual evidence the stick obviously straddled and this puts the explosions across the U-Boat somewhere between the conning-tower and the bow, and after the time interval of 15 seconds, would explode above the hull and so force it down, causing

the tail to break surface where, in fact, three members of the crew saw an object appear momentarily. The amount of oil seen afterwards in a rough sea indicates extensive damage to fuel tanks. But it is impossible to state with certainty how much the pressure hull was damaged.

"Should have finished it off"

At 1014 hours, on 19th March, **Fortress IIa M/220**, camouflaged white, was on A/S escort to SC.122. It met the convoy at 0956 hours. While carrying out patrol as ordered by the Senior Naval Officer and flying on track 224° at 5,000 ft., in weather 6/10 cloud, base 1,000 ft., sea calm, visibility 25 miles, when it sighted a U-Boat on the surface, 20° on port bow, 8 miles distant. It was in position 53° 55' N., 23° 51' W., course 330°, 15 knots. This position was 224° 16 miles from SC.122. The S/E was switched off. The U-Boat was of the 500 ton type, with slatted deck. One gun was observed forward. Retracted periscope. A railing was seen around the back of the conning tower. The aircraft approached to attack from astern, but the U-Boat altered course hard to starboard and the final attack was made from the U-Boat's starboard beam, releasing from 50 ft., four Mark XI Torpex depth-charges, shallow setting, spaced 80 ft. actual, from 3-5 seconds after the U-Boat had disappeared. Evidence states that the depth-charges straddled the U-Boat's track about 100 ft. ahead of the swirl. About 1 minute after the attack, diesel oil began to gush to the surface, followed within 15 seconds by the U-Boat. The U-Boat surfaced with decks awash, with no forward movement.

The aircraft was too close to release the remaining depth-charges and had to make a further circuit, attacking again up U-Boat's track, releasing from 80 ft., three Mark XI Torpex depth-charges, same settings, just as the conning-tower was disappearing. Evidence states that the first depth-charge was seen to fall on the slight swirl which was left by the conning-tower. The remainder fell along the track. The flow of oil increased considerably until it covered an area about 150-200 yards in diameter.

The aircraft remained in the area for 10 minutes and then succeeded in establishing R/T contact with the Senior Naval Officer and reported the attack. The Senior Naval Officer detailed a corvette to investigate in the position of the attack. The aircraft then resumed escort duties.

Analysis

Interval of 4 seconds plus 2 seconds take-off plus 3 seconds to reach depth equals 9 seconds. During this time, conning-tower advanced 90 ft. ahead of the apex of the swirl. Photograph 1628 discloses that the stick exploded 150 ft. ahead of the apex of the swirl. No. 1630 confirms a straddle, so that the stick exploded across the U-Boat, between the conning-tower and bows and lethal for depth.

In the second attack, the photographs merely show the explosion at the head of an apparent wake (No. 1591). So the visual evidence that the first depth-charge fell on the slight conning-tower swirl is taken as accurate. This also should be lethal for plan and depth.

Result

A first-class attack which brought the U-Boat up in a damaged condition, followed by another accurate attack which should have finished it off.

Trade Protection

Another Point of View

Following up the performance of our convoy escorts leads to strange conclusions. A recent long-range effort in a Liberator may be cited as a good example of how luck will sometimes play into the navigator's hands.

The flight was something of an epic, being of 17 hours' duration and the convoy was at extreme range from base. Careful analysis of the flight shows the following rather meagre observations which summarise the Navigator's activities during that long time. He obtained:—

20 drifts by day .. A rate of one every 27 minutes.

7 drifts by night .. A rate of one drift for every 67 minutes.

5 three-course winds by day. A rate of one every 108 minutes.

None at all by night.

7 estimates of wind, 5 no better than guesses.

2 Astro position lines which were not used.

Moreover, no air plot was kept, the Navigator track crawling, and no attempt was made to check any of the courses by Astro compass. His log was kept on the old Form 441 which ceased to be used by the Royal Air Force two years ago and there was no attempt to prepare a flight plan, although the position of a cold front lying for hundreds of miles along his track would have made such a plan highly valuable. To give the Navigator credit, he kept a very neat log and, let it be remembered, was confined to the very restricted Navigator's station in his aircraft.

Notwithstanding the mediocre quality of navigation, the convoy was met in a position alleged to be 50 miles south of where it should have been according to the Form "White." There is, however, every reason to believe that the convoy was in fact not south, but north of its official

position, because after leaving for home a good deal went wrong with the progress of the aircraft. After some time on the homeward journey, the aircraft was diverted to St. Eval and course was immediately set. After a short while, the A.S.V. indicated "land ahead" and this transpired to be Dunmore Head, which was 80 miles north of the track. From this point, the aircraft flew down D/F bearings from St. Eval and arrived there to the exact minute the Navigator had estimated some three hours earlier.

No doubt this crew felt particularly pleased with its fine performance. A convoy had been met after other aircraft had failed to do so, and everyone had endured considerable physical hardship. It is only from careful sifting of the evidence that we are forced to conclude that luck played a very large part in the whole proceedings.

The result of this meeting might have been very serious. The plot of the convoy's position for the succeeding day was changed to conform with that given by the aircraft, and had the convoy been homeward bound, this would have undoubtedly led to other aircraft failing to escort the convoy on the days that followed. The moral of the analysis, therefore, is that what on the surface appears to be good may well prove to be most misleading where navigation is concerned. Escorts to convoys at extreme range are so important that very special care is necessary, particularly from the Navigator. Ordinary track crawling procedure and an average show of energy is not good enough. The life of this country and the successful prosecution of the war depends upon convoys reaching this country with the least possible losses, and the Captains and Navigators of our long-range aircraft have a very serious responsibility to bear, which must on no account be lightly undertaken.

Depth-Charge Stick Spacing

A recent decision to increase the stick spacing for the 250-lb., Mark XI Torpex filled depth-charge has no doubt been received with mixed feelings by the crews who are to use depth-charges. It will, therefore, be explained here why the decision was made. The following explanation as to the reasons for making this decision may therefore be of interest and help.

Forty-three attacks on U-Boats made using the 36-ft. spacing during the period August, 1942, to February, 1943 were carefully analysed, all by means of photographs taken at the time of the attack. It was discovered that owing to errors in range, 18 sticks overshot completely and four sticks undershot completely.

Based on this analysis, the odds against straddling a U-Boat (when near enough to the surface to be vulnerable to the 25-ft. depth setting) with a stick of six depth-charges spaced at 36 ft., proved to be roughly four to one against in beam attacks, three to one against in attacks close to track, if misses due to errors in line are also included.

These unfavourable odds were then carefully balanced against the chances of missing a U-Boat in the gaps of the "lethality" of a stick spaced greater than 36 ft.

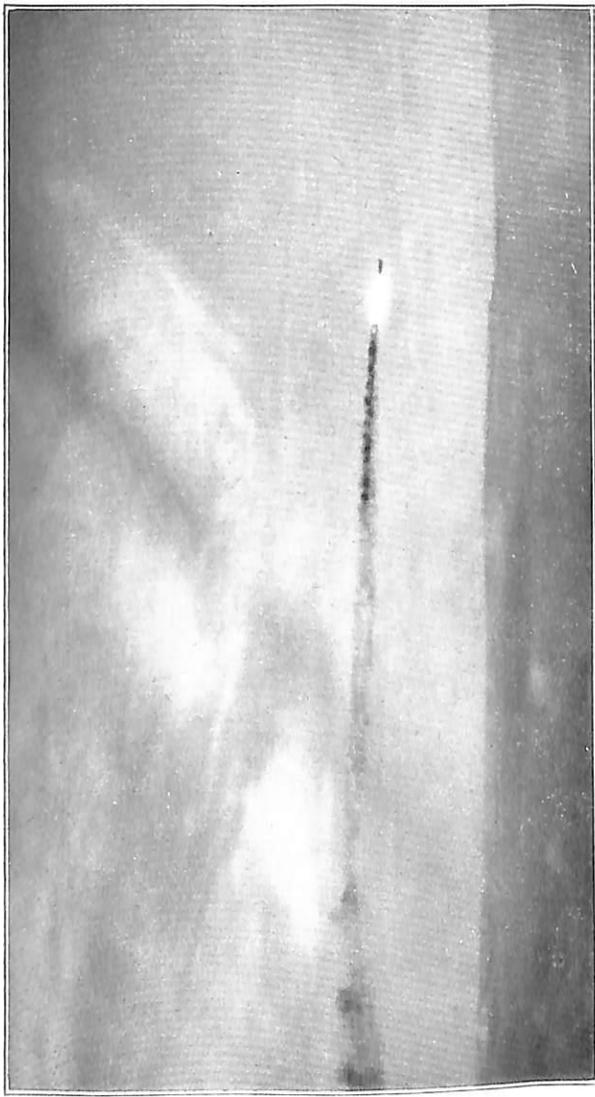
The balance was obtained at the 100 ft. spacing. The calculations showed that this spacing gave almost as good a chance of a kill as for the 36-ft. spacing in a beam attack and in an up or down the track attack, a 35 per cent. better chance. Between the up/down track and beam attack the increased chance of success with the 100-ft. spacing varies from the 35 per cent. figure to about evens. There is, therefore, absolutely no doubt that, the 100-ft. spacing is better than the 36 ft.

The need to attack from as near up or down track as possible remains. In fact, there is no gap in the lethality of the 100-ft. spaced stick if the attack is delivered from between 30° either side of the bow or stern of the U-Boat. It is, however, much more important to get the attack in before the U-Boat submerges appreciably than to deliver the attack from this restricted direction.

The feeling in the mind of the Captain of aircraft that however well he places his stick he has no better chance of killing than the next man, is probably inevitable. But the foregoing remarks may help him to adopt a more favourable attitude.



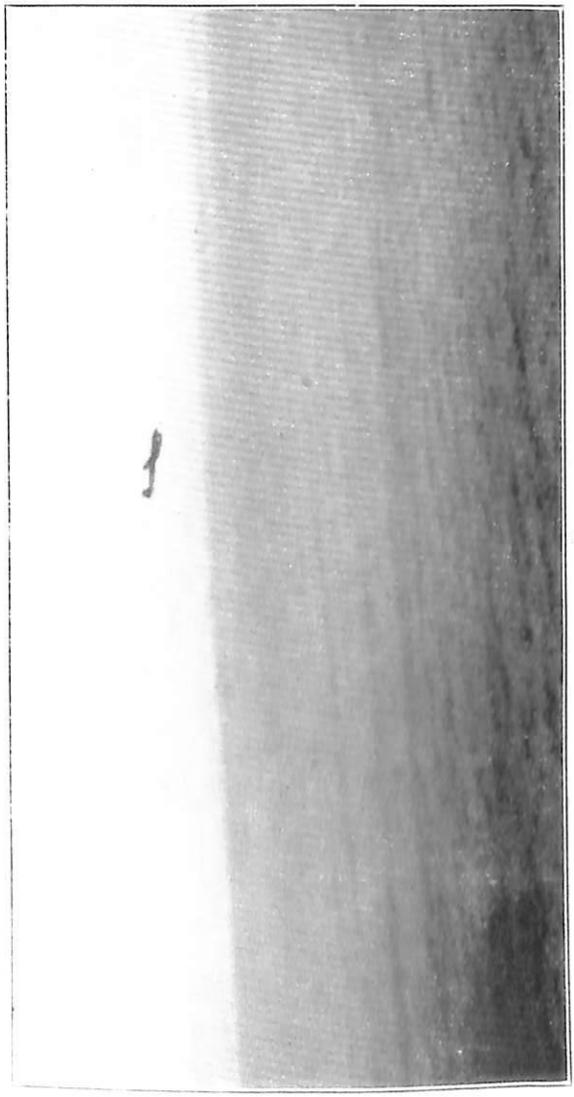
A



B



A



B

Photographs taken during successful combats by 248 Squadron. Those at the top of the page show two stages in the destruction of a Ju.88. Those at the bottom of the page show a burning F. W. 200 diving towards the sea.



517 ton class of U-Boat.



A bad overshoot disclosed by the camera.

II.—OTHER OPERATIONAL FLYING

Combats with Aircraft

Aircraft O of 202 Catalina Squadron (flying at 1,500 ft.) on anti-submarine escort to a convoy sighted a F.W. Kurier approaching the convoy at a low level from the east. The Catalina set course and intercepted the enemy aircraft when it was still about 2 miles away from the convoy. It dived across the enemy's bows, endeavouring to bring it under fire of the front and blister guns. After firing 20 rounds, the front guns jammed and the Catalina turned to starboard to bring the port blister gun to bear. Fire was again opened at 400 yards across the bows and was concentrated on the enemy aircraft's starboard engines. Machine-gun fire was returned from the enemy aircraft's two upper turrets and the Kurier turned from the convoy and took the offensive. A mixed combat then ensued for about 10 minutes. Being more manoeuvrable than the Kurier the Catalina was able to evade the fire from the front guns and managed to get in one long burst of .5 into the Kurier from the port blister. The enemy aircraft made one more feeble attack and then made off towards the east. Height at which the action took place varied from 150 to 1,500 ft. At this moment another Kurier was seen diving from 3,000 ft. towards the port quarter of the convoy. The Catalina again went to intercept and, encountering a far more persistent attack, used the same tactics. In view of the persistence of the second Kurier's attack, the Catalina was forced on the defensive and had to dive to sea level with the Kurier on its tail. One hundred and fifty rounds of .5 were fired at the enemy aircraft at a range of 200 yards. To better his position, the pilot of the Catalina jettisoned one depth-charge which caused the Kurier to turn sharply to avoid the explosion. Owing to the lack of continuous feed of ammunition, it was not possible to take advantage of close range when the enemy aircraft took evasive action from the depth-charge explosion. The Kurier then broke off the engagement and set course towards the east and was not seen again.

During both combats the speed of the Catalina varied between 90 and 180 knots at a height of 50 to 1,500 ft., and the ranges varied between 200 and 800 yards. Neither of the Kuriers succeeded in reaching the convoy.

Aircraft U and R of 248 Beaufighter Squadron were engaged on fighter patrol when a F.W.200 was sighted 10 miles on the starboard bow, flying at 100 ft. U/248 turned to intercept, followed by R, and carried out a beam attack, developing into

a quarter attack on the port side of the enemy aircraft. U opened fire at a range of 600 yards, firing the whole time and closing to 200 yards, by which time the enemy aircraft burst into flames at the front of the fuselage, also the engines were smoking with flickering flames, which soon spread and began to burn furiously. What appeared to be cannon fire was returned from the top front turret and from the side guns amidships. Aircraft U received slight damage.

Aircraft R, flying in line astern with aircraft U, observed many hits and a large petrol fire was started amidships. The Kurier was still climbing slowly and when it reached about 300 ft., aircraft U broke away. Aircraft R then began an attack from dead astern, opening fire at 600 yards. Hits were observed on the fuselage. When aircraft R had reduced the range about 300 yards, the F.W. began to descend. Aircraft R throttled back to stay behind. Three airmen were then seen to jump from the aircraft, but their parachutes did not open. The aircraft then flattened out slightly, hit the water and completely disintegrated. No return fire was met during aircraft R's attack, and it was assumed therefore that the tail gunner was one of the three airmen seen jumping from the aircraft.

Aircraft P/612 Whitley Squadron was on anti-submarine patrol when it sighted a Blohm and Voss 138 circling a flame float which had been dropped by P/612 to make a U-Boat attack. P/612 was orbiting at 5,000 ft., clearing messages to base re the U-boat attack. The enemy aircraft had then climbed sufficiently to open fire with cannon at 1,000 yards range, from astern and slightly below P/612. The enemy aircraft broke off to port without closing and then carried out attacks on the port quarter. P/612 carried out evasive action by diving turns to port and returned fire when the range had closed to 400 yards. The enemy aircraft then carried out three attacks from the starboard quarter and the same evasive action of diving turns towards the enemy aircraft was made in each case. The enemy aircraft always opened fire with cannon at extreme range, but used only machine-guns when the range had been closed. All the enemy fire, estimated as one cannon and two machine-guns, appeared to come from above the cockpit. No tracers were seen from the machine guns; only the muzzle flashes. Numerous hits by the gunners of P/612 were seen on the cockpit and the centre engine of the enemy aircraft.

Black smoke was seen issuing from the centre engine after the second attack. It was still visible when the enemy aircraft broke off the combat.

The action was carried out at 5,000 ft. P/612 received one cannon strike on the starboard mainplane and about half a dozen machine-gun strikes, apparently from spent bullets.

Four Beaufighters, U, W, T and X, of 248 Squadron were on patrol in the Bay of Biscay, flying at 50 ft. on a course of 194° T., when a Ju.88 was sighted on a course of 300° at 4,000 ft. Aircraft U climbed to position himself astern of the enemy aircraft, coming out of the sun. When the range had closed to 1,000 yards, the enemy aircraft sighted U/248 and made for cloud. Just before the enemy aircraft reached cloud, the range still being 700 to 800 yards, aircraft U fired a burst with cannon only. Owing to a faulty firing switch, the cannons failed to fire. U/248 broke away to starboard and tested the machine-guns.

T/248 followed U and when U/248 broke away to test his machine-guns, aircraft T carried out an astern attack and gave the enemy aircraft a burst of machine-gun fire, observing hits on the

port tailplane. Return fire was met from the top turret of the Ju.88 and aircraft T was hit three times.

W/248 now carried out an attack from 300 yards dead astern, opening fire with a two-seconds' burst of cannon. Hits were registered on the engines and cockpit. A further burst was delivered from dead astern, at 150 yards. The port engine of the enemy aircraft burst into flames immediately. The Ju.88 banked steeply to port, the whole aircraft being ablaze as it dived towards the sea. Accurate return fire was observed and aircraft W suffered damage to windscreen, climb and dive indicator, instrument panel, a fracture of the cable to the port petrol cock, and broken pitch control lever. The air intake was shot away on the starboard engine, starboard aileron and starboard engine oil feed. The pilot received minor injuries from splinters.

Aircraft U found that his machine-guns were in order, so he carried out a starboard beam attack with the intention of destroying the enemy aircraft completely and to take photographs of it with the G.45 camera. These are reproduced on Plate 2. The enemy aircraft broke up and crashed into the sea.

Dinghies : Ours and Theirs

Mention was made in last month's *Coastal Command Review* of the "Q" type sailing dinghy (see opposite illustration) which is now coming into the service.

This craft is designed to replace the J, Mark III, round raft which accommodates a crew of seven, under normal circumstances. Like the round raft, the "Q" type is contained in a blow out stowage, together with all the necessary gear for sailing and paddling. It is automatically inflated by means of an immersion switch within the airframe. Manual releases are also placed at convenient positions. The dinghy may also be contained in a valise.

This dinghy is 16 ft. long, pointed bow and rounded stern. It is equipped with a telescopic mast in two sections, 16 ft. high. The lowest sections of the mast plug through a hole in the floor forming the leading edge of the canvas keel. It has a 5 ft. 6 in. beam, the mast is stepped 5 ft. 10 in. aft of the bow and the sailing area, comprised of a foresail and mainsail, is approximately 54 sq. ft. It is steered by means of a canvas rudder stretched over a dural frame.

Inside the buoyancy chamber are a series of loose diaphragms which blow across and seal the gap in the event of the chamber being holed.

The G.A.A.F. have used sailing dinghies for some considerable time, but a comparison of a

captured German sailing dinghy with the "Q" type show ours in a very favourable light.

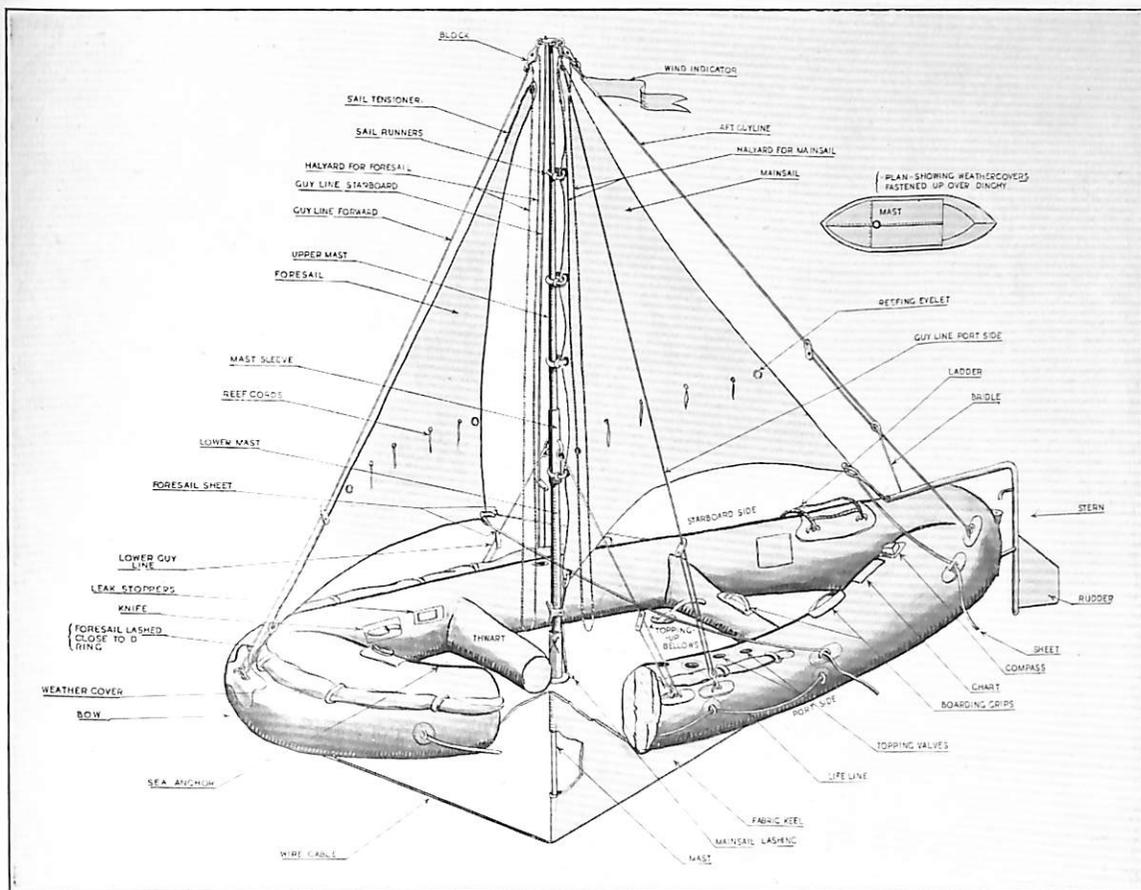
In the first place the German dinghy (see opposite illustration) can sail only with the wind. The "Q" type I, owing to its sails, keel and rudder, can sail within 4 to 5 points of the wind. Care must be taken not to sail too close to the wind. Otherwise all forward motion will be lost. Another point in its favour is that it is practically non-capsizable. The German dinghy would go over quite easily. Instructions for rigging and sailing the "Q" are contained in the pocket of the dinghy. These are written in the simplest terms so that any novice should be able to understand them. Charts and a compass are also provided.

Sailing is not black magic, but an application of pure common sense. The theory of flight and the theory of sail are similar. Wings are aerofoils and so are sails.

Those who know their "Hunting the Snark" will remember that it is only people of the calibre of the captain of the ship who found the art so difficult.

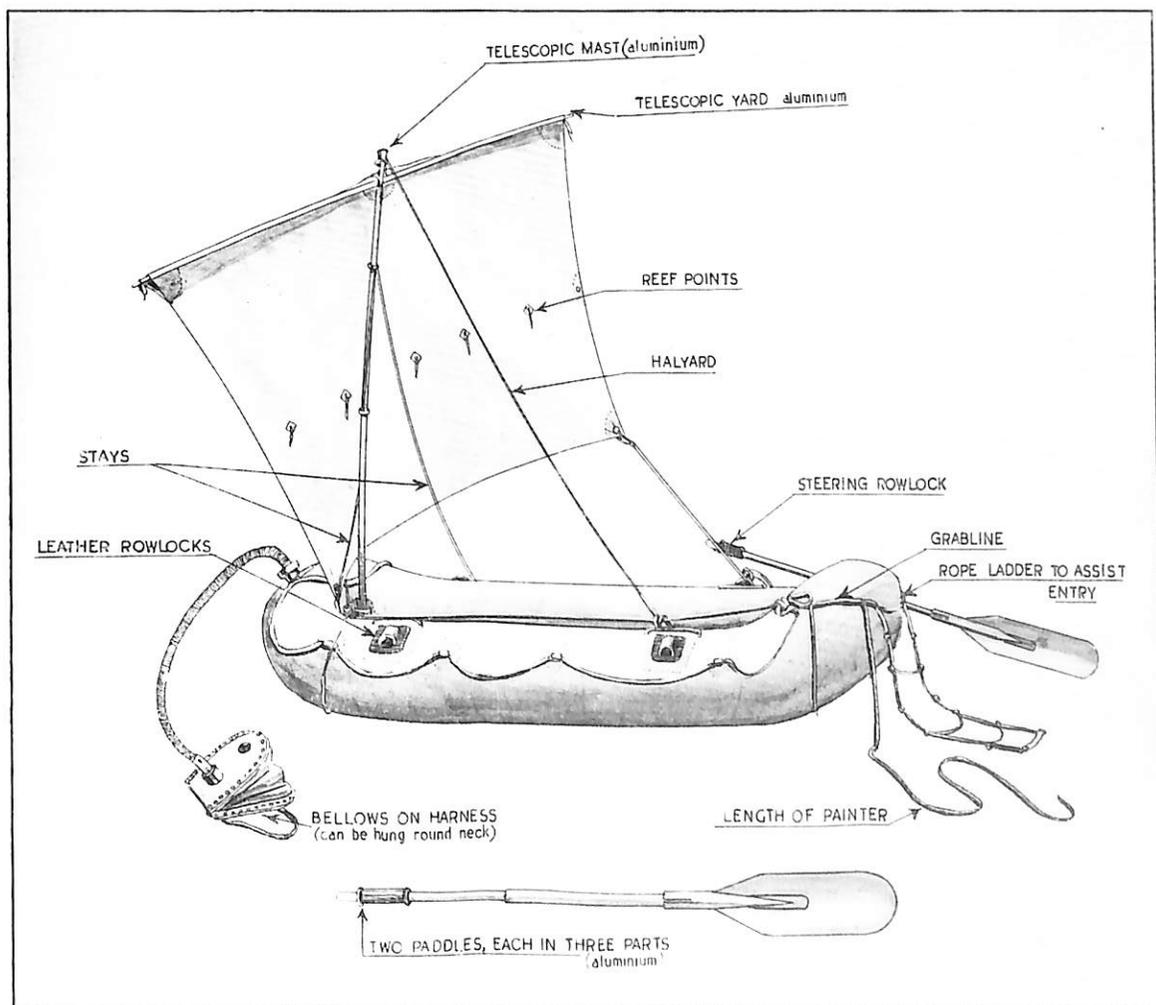
*The Bellman, perplexed and distressed
Said he had hoped, at least,
When the wind blew due East,
That the ship would not travel due West.*

Dinghies : Ours and Theirs



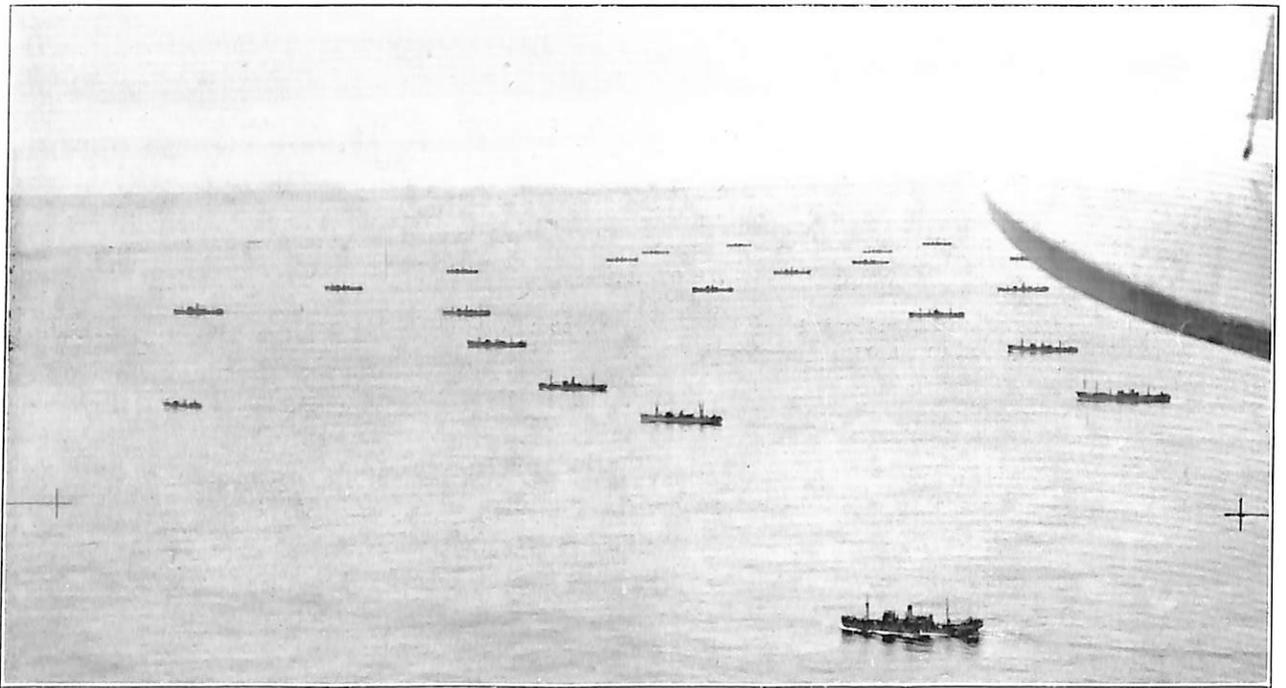
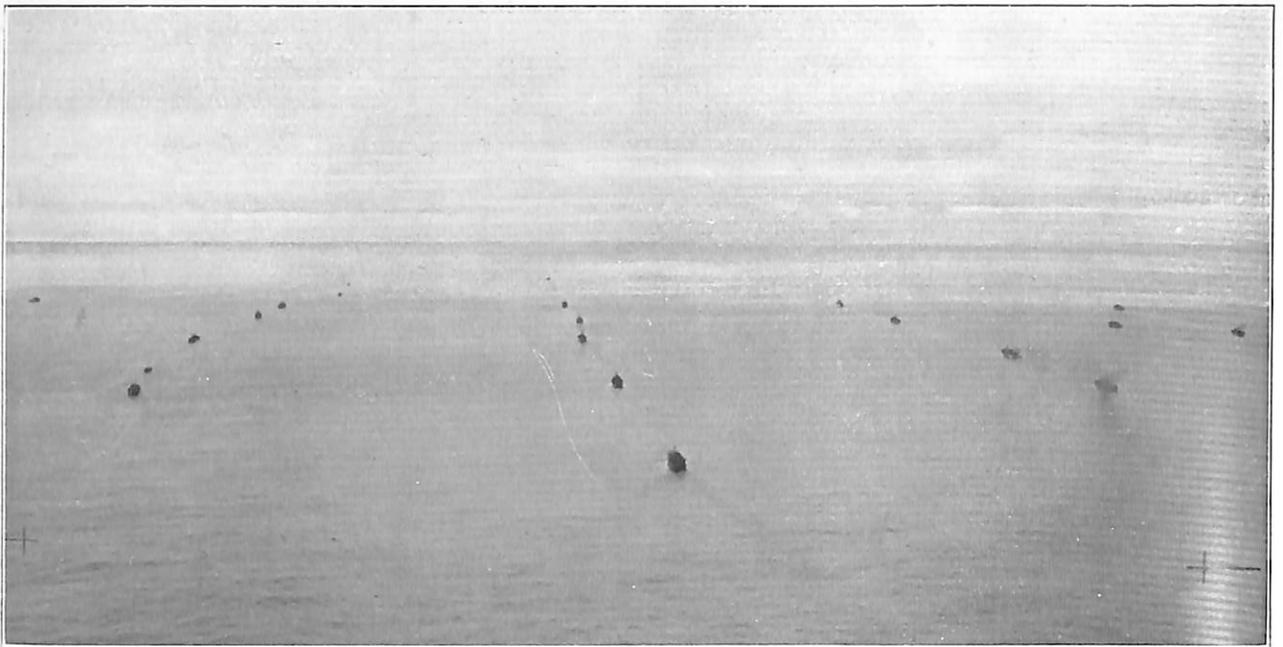
"Q" type Dinghy

For the benefit of those not accustomed to nautical terms, some of the component parts of the dinghy in the above drawing are described in colloquial language.

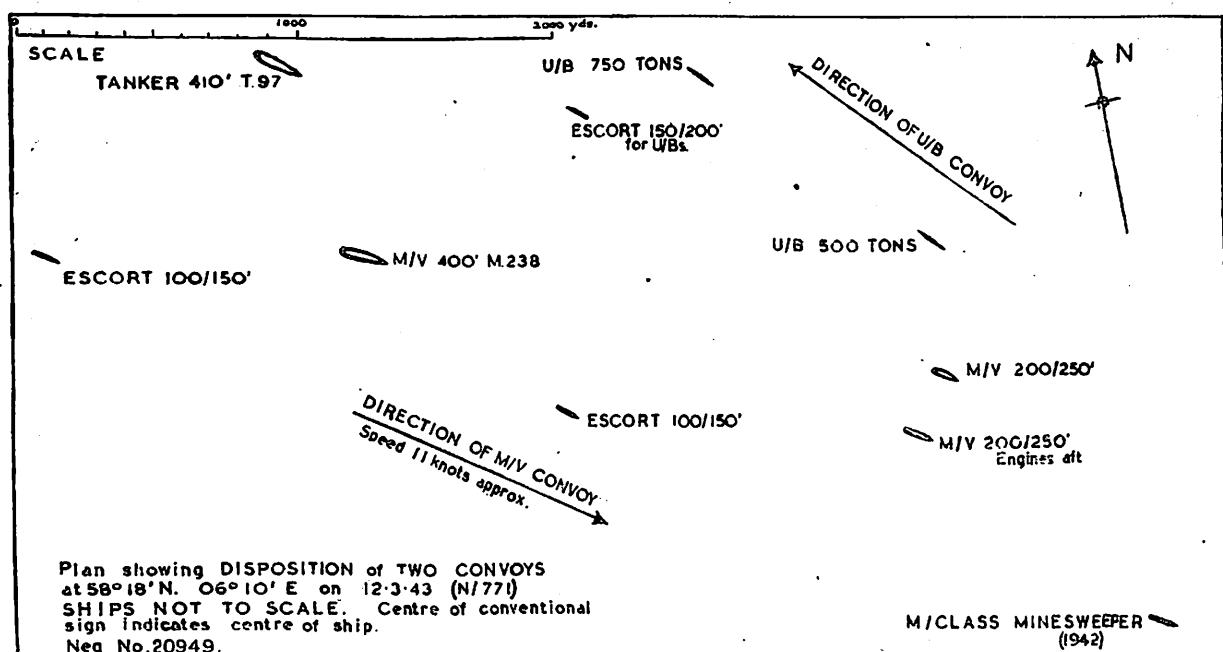
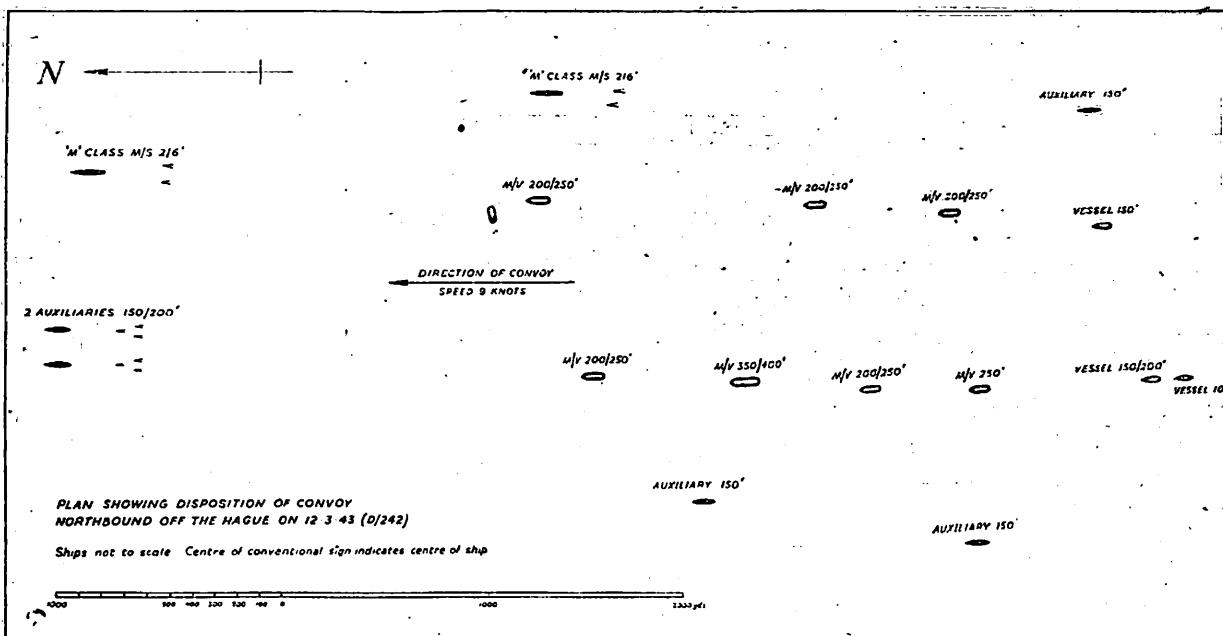


A captured German Dinghy

PLATE 5



Three photographs of a KMS convoy on its way to North Africa. The top two were taken by 246 Squadron and the bottom one by 202 Squadron. While the last named was being taken a F.W.200 was attacking the Convoy, but was driven off.



The dispositions of enemy convoys are governed by the conditions they have to contend with. While those that operate along the Norwegian coast have to be prepared for attack by aircraft, submarine and, to a limited extent, by mine, those that sail along the North German and Dutch coasts have less to fear from submarines but much reason to dislike aerial attack and mines.

The *sperrbrecher* was evolved to combat mines, and this specialised vessel may often be seen preceding convoys in the southern North Sea, its function being to clear a path ahead of the convoy, with its special mine-detonating apparatus. It has also a powerful anti-aircraft armament. Heavy losses among *sperrbrechers* have necessitated the use of additional minesweepers in recent months, and as many as four of the latter will be substituted for one of these ships.

On the whole, North Sea convoys tend to follow a stereotyped formation, though poor station-keeping may cause variations in the spacing between ships. It is notable that "M" class minesweepers are frequently employed solely as escort vessels, and the smaller auxiliaries that accompany convoys, may also have the alternative roles of escort vessel or minesweeper.

These convoys usually average from four to eight ships, and the escort often equals or exceeds the number of ships in the convoy. The merchant ships usually fly balloons.

Convoys along the Norwegian coast are usually smaller than those found in the southern North Sea, and more than four ships in a convoy is rare. *Sperrbrechers* are not seen in those waters, and almost all the escort work is done by small armed trawlers and coasting vessels, which may be equipped for A/S duties. "M" class minesweepers only accompany the more important convoys.

III.—SPECIALIST AND GENERAL ARTICLES

Photography in Coastal Command

Air photography in Coastal Command has achieved many highlights since the war began: chief among them the finding of the *Bismarck* in Dobric Fjord and the discovery of the *Altmark* in Josing Fjord, in February, 1940. In the official story of Coastal Command, published by the Stationery Office, the *Bismarck* photograph is described as the "picture that sank a battleship."

The story of military photographs goes back to the Crimea. Queen Victoria remarked in her diary on the innovation of two officers, "dispatched to Sebastopol" as "military photographers, tutored and equipped for duty." Then followed a "well-known photographer" who took "a wet plate outfit and darkroom tent" to the Crimea. Historians tell us that he photographed "strategic positions" and "contemporary weapons."

It is interesting to note that the need for P.R.U. was realized long before the Wright brothers made their first flight . . . in the days when balloons were a novelty. The next experiment in the succession was to equip pigeons and kites with small cameras, working automatically. During the siege of Paris (1870) thousands of communications were photographed in miniature size on to a negative of hardly more than a square inch, the film pulled off the glass plate when dry, and dispatched by carrier pigeons to their destination. This was indeed the forerunner of the airgraph service of to-day.

During the last war, air photography began to assume the dignity of a science. In the peace that followed, it was the enemy that exploited this new science to the full. While British air visitors to Germany were allowed to use only certain routes and their cameras confiscated, we permitted Germans to fly freely over Britain and build up the library of photographic information which has been so valuable to them during this war. But if we dallied during the years of peace, we have made up for this since the war began and air photography, by day and night, has become a vital part of Intelligence . . . as was proved in the romantic story of the *Bismarck*. It is told in the pages of "Coastal Command":—

" . . . an aircraft of Coastal Command, in the course of a reconnaissance of the Norwegian Coast, had flown as far north as Bergen. Reconnoitring the approaches to that port, the pilot discovered two warships, one of large size, at anchor in a small fjord.

On his return he made a cautious report on what he had seen to one of the Station Intelligence Officers. While they were talking the wet prints of the photographs which the pilot had taken were brought in. The Intelligence Officer examined them and saw that what the pilot had surmised was true.

He spoke immediately with Headquarters, Coastal Command. 'Bring me those prints at once,' ordered the Commander-in-Chief."

The prints were delivered at Coastal Command Headquarters in the early hours of the morning. A few hours after, the *Bismarck* was attacked by aircraft of the Command. The weather was thick and only two of them reached the fjord. But the prints, spread on a table at Command Headquarters, led ultimately to the morning of 27th May, when the torpedoes of the *Dorsetshire* sent the blazing hull of the *Bismarck* to the bottom.

Behind the archives of photographs now in the possession of the Command, there lies a story of successful experiment and improvement of technique.

For the purpose of this article, photography may be divided into four categories. They are, (a) fixed vertical, (b) oblique, (c) cine-camera gun, and (d) night photography.

Vertical Photography

Vertical photography is most commonly used for interpretation because of the stereoscopic effect obtained when we view two over-lapping photographs through a stereoscope. This form of photography is not used extensively in Coastal Command, except by the P.R. Squadrons. It is better suited for reconnaissance over land, and for recording medium or high altitude bombing attacks and for assessing the damage they cause.

When an aircraft is detailed to take vertical photographs it is fitted with a vertical camera, with a lens of suitable focal length to cover the area, at the required scale. The camera control is switched on at the interval required to produce 60 per cent. overlapping pictures, a few seconds before the aircraft is vertically over the object. The camera will automatically make exposures at that interval until the control is turned off, when the aircraft has completed its run. In high altitude bombing attacks, the bomb aimer turns on the camera control at the start of the run so that he is free to carry out his main role. The control is turned off after the bombs have exploded.

Oblique Photography

Oblique photography has been found more suitable for the maritime subjects of Coastal Command as it yields a compromise between plan and elevation. Stereoscopic study is not particularly required.

In taking these photographs, the relative position of the sun must be borne in mind. Poor photographs, lacking in detail, are usually produced when a photograph is taken up-sun. An outstanding example of this fault is shown in the top photograph on plate 6. Photographs should not be taken dead down-sun, but rather from approximately 45° on either side of this direction, to include the shadows which are very important in later interpretation. But the chance of taking a photograph should not be missed in attempting to obtain a better position. Even a poor photograph is better than no photograph at all.



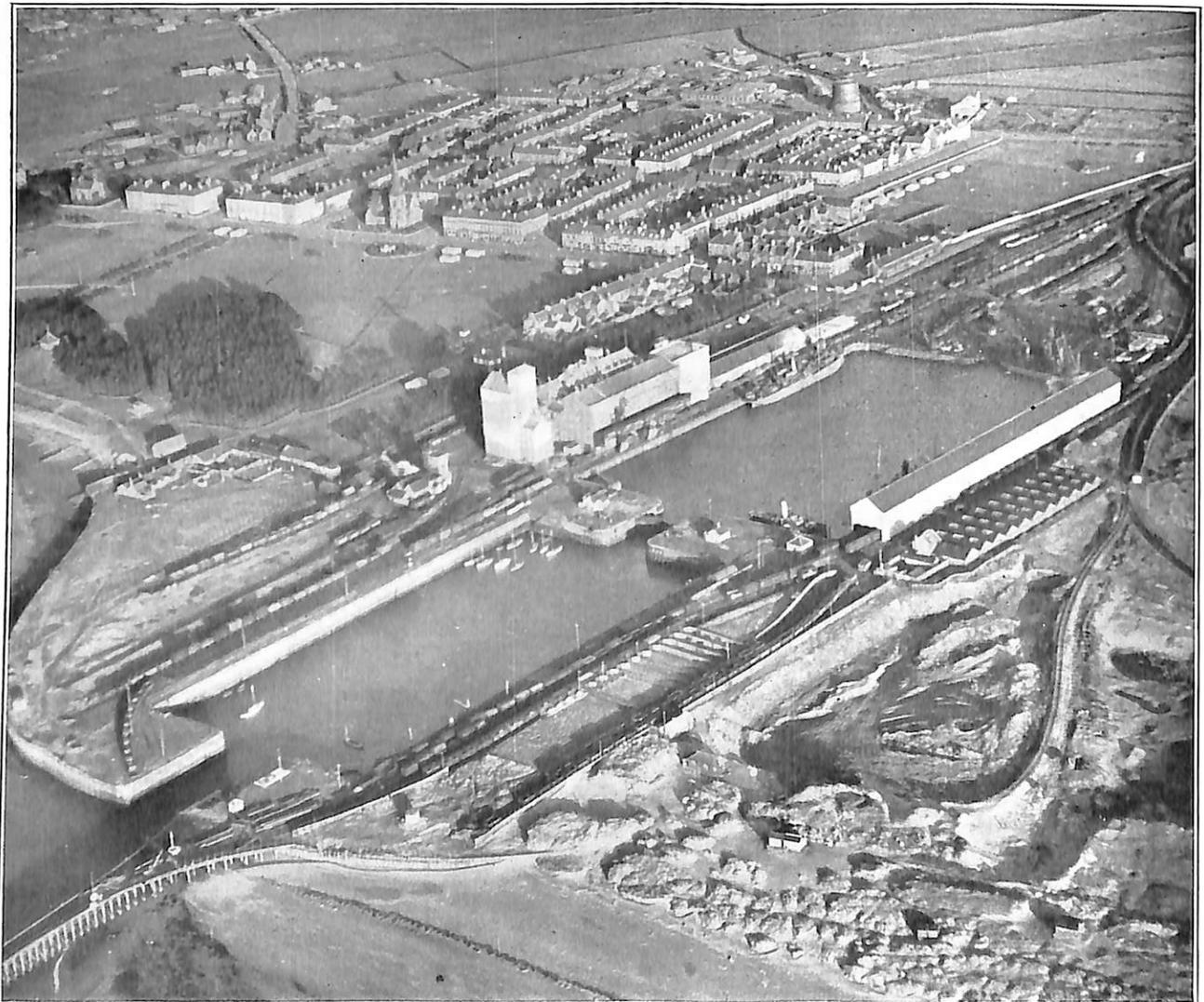
The above photograph taken with the camera pointing into the sun reveals the faults referred to in the accompanying article, page 12.



A further night photograph of the Coast near St. Vallery, taken by 514 Squadron, revealing the progress made in night photography, referred to in the letterpress, on page 13.



An example of the lack of sharpness in a photograph caused by vibration. See letterpress page 13.



The same subject—an excellent example of a hand-held oblique photograph accentuating the faults in the print reproduced above. The position of the sun and the value of the shadows should be noted.

The amateur often imagines that hand-held oblique photography is simple and foolproof. But there are many pitfalls into which the careless operator may fall. Lack of sharpness, due to movement, or photographing through perspex, often produce disappointing negatives. Unsharp results in hand-held photography are avoided by holding the camera firmly and not resting one's arms or the camera itself on any part of the aircraft. Windows should always be clean before flight and the camera should be sighted at right angles and as close to the surface as possible.

The camera operator should always see that the lens aperture agrees with the recommendation of the exposure guide on the camera.

The cliché of our childhood, practice makes perfect, must be applied to hand-held oblique photography. Every opportunity should be used to take practice photographs of subjects in this country, such as the home aerodrome, lighthouses and lightships. But it is to be remembered that such exposures should be made only on the homeward journey. It would be foolish in the event of capture to present the enemy with valuable photographs of these shores.

Aircraft have been fitted with fixed oblique camera installations since the war began. But, in the work of Coastal Command it is more usual to use hand-held cameras, as it is more simple to obtain photographs through any suitable aperture than to manoeuvre the aircraft so that the subject is in the view of a fixed camera. But there are occasions when the tactical advantage of remaining as far as possible from such objects as heavily defended convoys or coastlines, may be obtained by using lenses of long focal length. Air cameras fitted with such lenses are heavy and unwieldy and are, therefore, generally mounted in a fixed oblique position. Fixed oblique cameras are usually operated by the pilot and if he is to obtain good photographs he should use sighting marks on the wings and windows of the aircraft, thus making sure that the object is in the centre of the line of sight.

A second type of fixed oblique photography has been developed since the outbreak of the war, for recording the results of low level attacks against shipping and submarines. This is done by fixing a mirror at 45° in front of a standard vertical camera. The use of this camera is simplicity itself. All that is required is to switch on the control and the camera records the explosions, hits, misses and damage caused. The camera should be switched off after the explosions.

Improvements on this method have been made so that all that will be necessary with the equipment now coming into service will be to turn off the camera after the explosion of the bombs or depth-charges, the camera having been started automatically by the release of the bombs.

There is a further improvement not far ahead. Experiments are now being made to perfect equipment which will turn the camera off after a pre-set number of exposures. An entirely automatic camera which will take its photographs without any effort from members of the crews is, therefore, in sight.

Night Photography

For several years before the war, there were developments in the art of taking night photographs, but it was not until war produced the operational need for obtaining photographs during darkness that progress was really made. Coastal Command squadrons are seldom called upon to take night photographs, but in the past, squadrons in the Command have produced some of the best night photographs of the war. There are occasions when they may be required to take reconnaissance photographs at night, of ports, movements of convoys, or the results of night bombing attacks.

In this work also, the inventor is trying to make the equipment entirely automatic, thus relieving the crews of as many responsibilities as possible. For instance, during night bombing the photograph is automatically taken by the release of the bombs, and for reconnaissance it is merely necessary to release the flash bomb to set the mechanism in motion. Some idea of the progress made in night photography may be obtained from the photograph of St. Valery reproduced as a frontispiece to Coastal Command Review, No. 9. Anyone who did not know that this photograph was obtained at night would probably be unable to distinguish it from one taken in daylight.

An example of a good night photographic line-overlap of the French Coast is reproduced on Plate 6.

Cine-camera Photography

Cine-camera guns were originally developed for training, but it was soon realised that they would be invaluable for recording the details of combats. Pilots have been able to review their combats by seeing the films and thus assess results, and correct errors in future actions.

Cine-cameras so far have been used only in fixed-gun fighter-type aircraft. But it is anticipated that there will be a great increase in their use in the near future. As they are synchronised with the main armament, they operate automatically when the guns fire. No special knowledge is therefore needed in using them. All that the pilot needs to do is to be sure that the main switch is turned on and that the exposure weather is set to correspond to the relevant weather conditions. The cine-camera gun is a small and delicate piece of mechanism and it can be expected to perform automatically in combat only if it is maintained with care while on the ground.

We may close with the reminder that the camera can never be used too often, if it is also used well, and that the results of attacks may be confirmed by photographs. There is one more final word. The progress of automatic camera photography must not be taken as a sign that the hand-held camera is no longer of use. Captains of aircraft should always detail at least one member of the crew, whoever can be spared, to use a hand-held camera with which to supplement the exposures of the automatic camera and also in case its mechanism should fail. Like any other piece of man-made equipment, cameras have their own private gremlins.

Dinghy Drift

The success of finding the dinghy of an aircraft that has ditched involves, apart from rapid thought and action, knowledge of several factors; the most important of which are—(a) the original position of the dinghy, (b) the effect of wind, and (c) the effect of tidal stream and ocean current. Added to these, the state of the sea must also be considered, as well as the area of probability, and the vexed question of whether the drogue is likely to have been streamed—a subject on which more instruction should be given.

Unfortunately, the position of ditching is often uncertain, especially in the South-Western Approaches where any error in the W/T bearing produces a big arc of probability.

The accuracy of W/T fixes, apart from the skill of the D/F operators, depends upon two main factors, aided and abetted by a third: the angle of cut of the bearings, the distance of the aircraft from the Stations, and the angle of the aircraft to the centre point of the base line between the Stations. In the St. Eval area, the first is always small; the second, as often as not, alarmingly large! The quadrilateral of probability, for want of a better term, therefore, becomes either long and lean, or broad and full, the exact shape depending upon the aiding and abetting factor.

Thus the point to be faced by Operations Room Navigators, many of whom cannot be expected to have any practical knowledge of navigation, or of the sea, is: "Do I depend upon the W/T fix obtained, or upon the aircraft's D.R.?"

No answer can be formulated. It is one of those tantalising problems that depend upon the skill of the aircraft's Navigator, the time the aircraft has been airborne, the wind changes that have occurred during the flight, the way the D.R. position, if given, lines up with the W/T fix or with one of the W/T bearings, and the accuracy of the bearings 1st, 2nd or 3rd class. Only knowledge born of experience can supply the answer, which is usually a combination of all. But if the bearings are 1st or 2nd class, and the quadrilateral of probability is not impossibly large, with the aircraft's D.R. falling within it, then the area in the vicinity of the D.R., enlarged with an ample factor of safety, should be taken as the most likely search area, the rest of the quadrilateral of probability being taken as the least likely one.

Once the probable position of the aircraft dinghy has been established, the problems of wind drift, tidal stream and ocean current are vital considerations. The first is usually of greatest importance. Aircraft dinghies, with the exception of the new sailing ones, which will often present quite different problems, are, willy nilly, at the mercy of wind and tide. Even if fitted with W/T sets capable of transmitting over moderate ranges, or eventually with S.E., they must still be the subject of the utmost exactitude and precision.

Wind drift will always be down wind, its rate depending upon the velocity of the wind, upon whether or not the drogue is streamed, and upon the state of the sea. For a long time information upon this subject was vague and contradictory. For that matter it still is, because no two sets of conditions are likely to be the same previously, at the time or after ditching. This means that only the general data of wind drift can be laid down. The rest depends upon the experience, imagination and insight of those handling the problem.

I remember, one evening, when first at St. Eval, a ditching near the middle of the English Channel, well south. Someone approached me for my opinion, and I naturally said: "Let me have your Tidal Atlas: over there the Spring Stream runs at a maximum rate of nearly 5 knots."

"Tidal Atlas?" I was asked, "What do you mean? We're airmen not seamen."

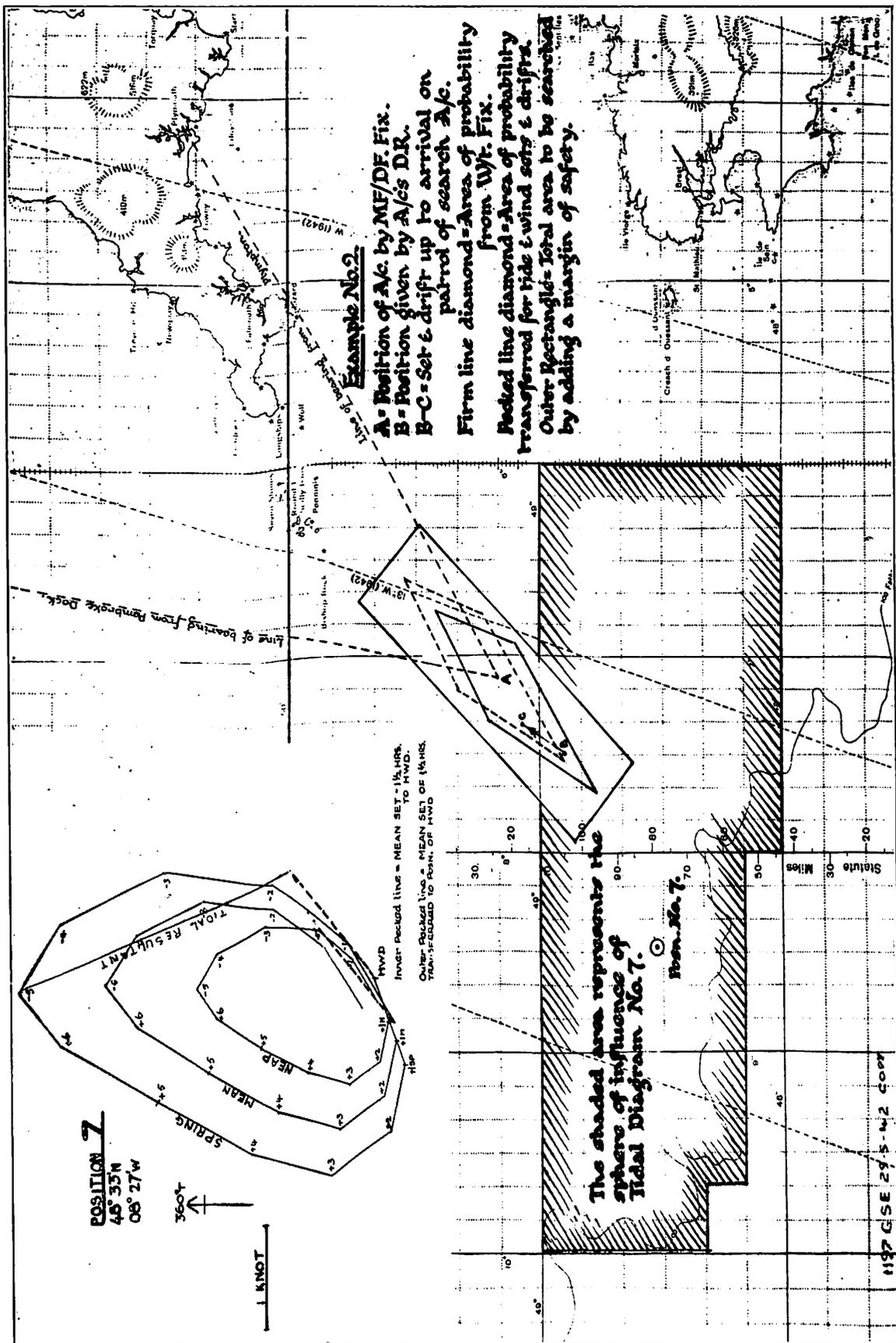
I followed the remarks with: "Well, it's probably been mislaid; I'll get mine. But you've a wind drift table, I suppose?"

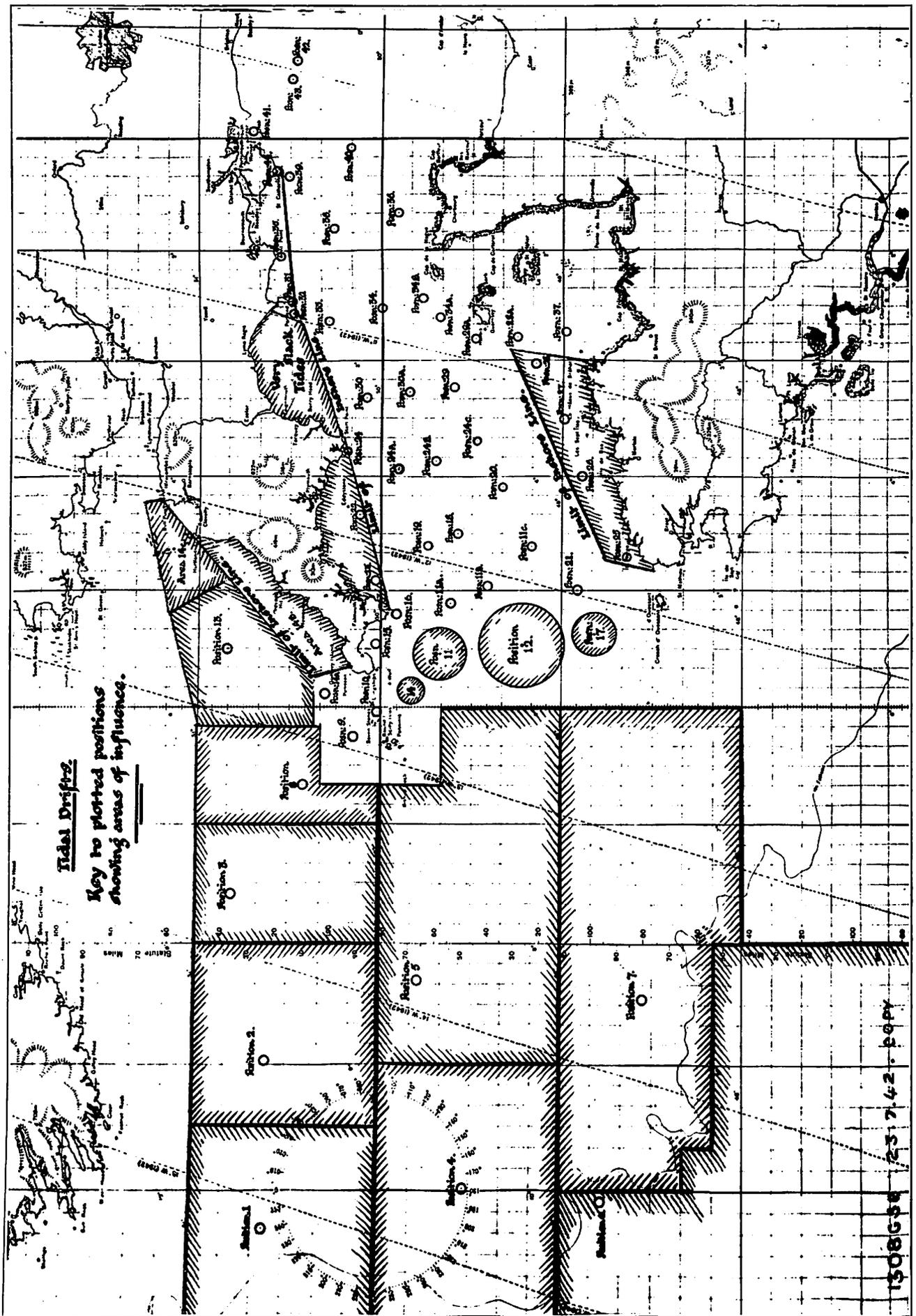
The answer was an emphatic "No!" followed by some vague suggestion of the rate of drift being 10 per cent. of the wind velocity.

That aircraft dinghy was not found—hardly surprising though it seemed likely that the crew never got clear. But it set me inquiring into dinghy drift problems, without obtaining any assurance that this matter had received systematic examination, or that any basic search method had been evolved. People seemed to say: "Yes, that is about the right distance, but I wonder what latitude or longitude we have got to?"

This led to the compilation, with the generous help of an Operations Room Navigator, of a series of tidal stream diagrams covering the west part of the English Channel and the inner South-Western Approaches, as well as a key index map. They were designed to be as simple as possible (for the working of a Tidal Atlas is no easy matter) foolproof, capable of being handled by those who had no experience of tidal streams. At St. Eval they proved their worth. They are based, like all British Island tidal streams, on High Water Dover, and they give the set and drift for every hour for Spring, Mean and Neap tides, the resultant for any period being easily measured.

The problem of wind drift was far more difficult. For a long time the general consensus of opinion seemed to be around 10 per cent. of the wind velocity. But no one knew the effect of a drogue. Then came murmurs of 5 per cent., and still later some new figures, whose authenticity seemed doubtful; for a rate of drift of 1/15th of the wind velocity in winds up to 10 m.p.h.; of 1/10th in winds between 10 and 40 m.p.h., and of 1/7th in winds above 40 m.p.h., opposed the elementary laws of water resistance. Furthermore, a decrease of 50 per cent. of the rate of drift with the drogue streamed seemed excessive.





The accompanying table—the result of a few free hours—should prove of help. It covers only the lower wind velocities. But I am pretty certain it is accurate to within one per cent., in comparatively calm waters because a great deal of trouble was taken, with the help of a friend of the R.N.V.R., to obtain reliable results. The relative rate of drift decreases progressively

drift fell from 7 per cent. to 4.3 per cent.; but that in an "H," the decrease was, in every case, less.

To support the drift figures, the recent case of a Whitley ditching close to the coast in an average wind velocity of 50 m.p.h., the wind being offshore, its dinghy fetching up a day later on the Welsh

DINGHY DRIFT TABLE

Date and Place.	Type of Dinghy.	Crew.	Sea Anchor Streamed	State of Sea.	Mean Measured Tide. Knots.	Average Wind Speed. Knots.	True Rate of Drift in Knots allowing for Measured Tide Vector.	Percentage Wind Velocity.	Remarks.
2.1.43. Falmouth	H	2	Yes	Choppy	Nil	16.8	.86	5.4	Reliable; but wind rather gusty.
Falmouth	H	5	No	Choppy	Nil	16	.94	5.9	
Falmouth	H	2	No	Choppy	.12	14.4	.92	6.4	
Falmouth	H	5	No	Choppy	.12	14.4	.92	6.4	
11.1.43. Falmouth	H	2	No	Slight chop	Nil	12.6	.888	7.05	First class.
Falmouth	K	1	No	Slight chop	Nil	12.6	.888	7.05	
12.1.43. Falmouth	H	2	Yes	Slight chop	.296	12.4	.705	5.68	Reliable.
Falmouth	K	1	Yes	Slight chop	.296	12.4	.537	4.33	
Falmouth	H	2	No	Slight chop	.24	12.2	.874	7.16	
Falmouth	K	1	No	Slight chop	.24	12.2	.899	7.37	
24.12.42. Falmouth	H	5	No	Slight chop	.59	9.9	.78	7.9	Moderately reliable only, owing to tidal stream; but figures conform.
Falmouth	H	2	Yes	Slight chop	.59	9.9	.66	6.6	
11.1.43. Falmouth	H	2	No	Calm	Nil	5.7	.54	9.47	Wind rather fickle but drift considered reliable.
28.12.42. Falmouth	H	2	No	Calm	.15	4.8	.49	10.2	Rather a short drift as the dinghies drifted ashore, but fairly reliable.
Falmouth	H	5	No	Calm	.15	4.8	.49	10.2	

as the wind velocity increases, which is in line with normal expectation. Only two types of dinghy were used—the "H" and the "K." But as both, without their drogues streamed, drifted at almost identical rates, the number of crew carried in the "H" also causing no difference, it is a reasonable hypothesis to assume that the rate of all aircraft dinghies drifting "free" will not vary appreciably.

The standard drogue at present in use is the same size for all dinghies, except the "Q," and is too small in the large dinghies. With this drogue the rate of drift will vary with different dinghies—that is, it will become less as the dinghy size increases. The table shows that in a "K," in approximately the same wind velocity—just over 12 knots, with the drogue streamed—the rate of

coast, gave an approximate rate of drift of only 2.6 per cent., again going to prove that the relative rate of drift drops progressively with the increase of wind velocity. This is only natural, for, apart from water resistance and drag, the dinghy is alternating between the troughs and the crests of a high, undulating sea in deep water, or is smothered by short, breaking seas in shallow water, and therefore, half-submerged, both conditions retarding the rate of drift.

Wind drift and tidal stream drift then have to be vectored, and the resultant found, the skill in judging the former depending upon the ability to gauge the type of sea that is running, the assessment of the average wind velocity and direction over the period, and the probability or otherwise of a drogue being streamed. To this

[Continued foot page 16

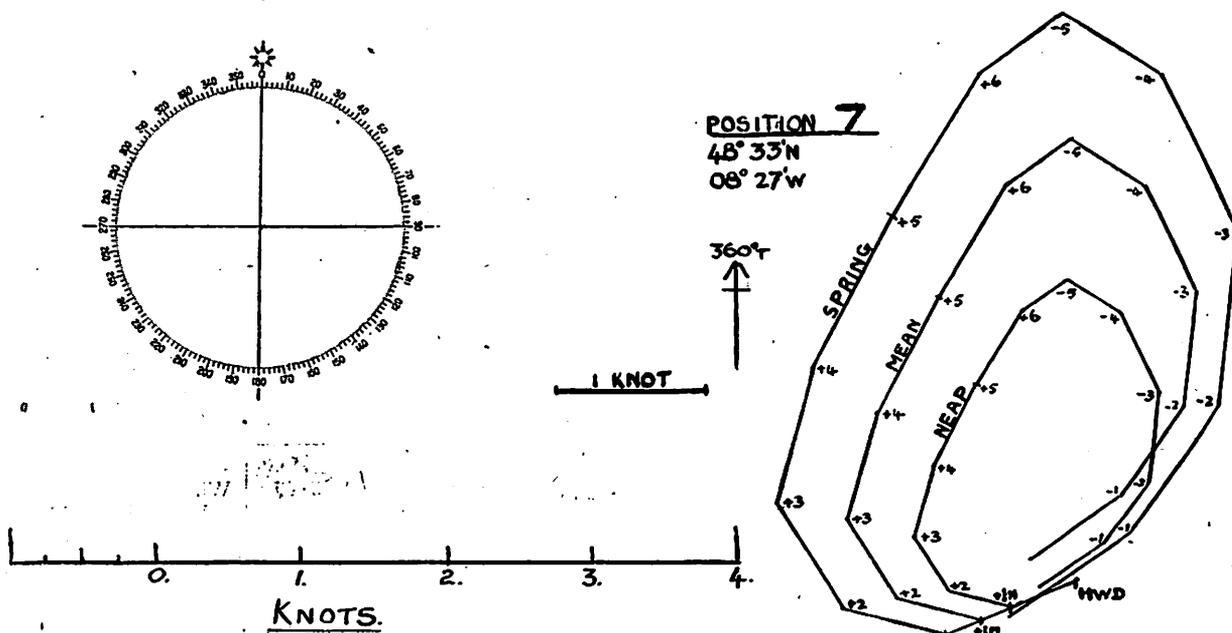
EXAMPLE NUMBER TWO

On Monday, September 14th, 1942, at 0030 hours B.S.T., an A/C was reported in the sea in position: $48^{\circ} 55' N.$, $07^{\circ} 30' W.$ by the A/C's D.R. Searching A/C are to take off in 7 hours; but the position of the A/C obtained by an M.F. fix from Plympton and Pembroke, places the A/C in $49^{\circ} 10' N.$, $07^{\circ} 07' W.$, the fix being a second class one (5° either side of the bearings). The average wind direction and velocity given by Met. forecast is 230° , 20 knots.

1. H.W. Dover on September 14th, 1942 0204 B.S.T.
Height Dover on September 14th, 1942 18.6 ft. (springs)
2. Duration between time of distress signal and E.T.A. of A/C over search area $8\frac{1}{2}$ hours
3. Set and drift of tidal stream in position No. 7 during this period of $8\frac{1}{2}$ hours 339° , 3.2 miles
4. Set and drift due to wind (assume 1 knot) 050° , 8.5 miles
5. Resultant set and drift of these two velocities 032° , 10 miles
6. Area of probability as established by W/T fix.*
7. Theoretical area of probability which must be searched.
8. Margin of safety giving total area of probability of search (*see sketch*).

* *Note.*—The area of probability given by the W/T fix is established as follows:—

- (a) Draw the given bearings from each station and let them cut.
- (b) Draw bearings 5° each side of the given bearings, the respective cuts of all the lines giving a quadrilateral figure representing W/T area of probability.



must be added the effect, if any, of ocean current—Gulf and Rennel. The example illustrated, which is self-explanatory, shows a method of working for a ditching in the South-Western Approaches, the tidal streams at this particular position being weak, rotatory, and of secondary importance compared with wind drift, though this is not always the case.

The problem of tackling sailing dinghies requires another article. It is more complicated, but not beyond average ability, if air crews are given

adequate instruction, and if those in charge of the search possess the same knowledge, an essential ideal at which to aim.

Solomon once said that certain things were beyond his understanding: the way of a man with a maid; the way of a serpent on a rock; the way of a ship upon the sea. Even if the first, sacred or profane, is impossible to predict, and the second beyond the ken of Coastal Command, the third should at least be brought within its confines. It requires only a small measure of that great man's wisdom.

A Letter from North Russia

January 28th, 1943.

It's nice to see the sun after so many months of semi-darkness. The world seems to take on life again. Not that our life has not been going forward in its normal way. We have had our share of bombing, if that can be called life. But it has been no more than a gesture of impotent fury. The Russian *ack ack* (and they have always been renowned for their artillery) has kept raiders at a respectful height and they have either dropped their bombs from that great height, or they have dived in wildly, with fighter bombers.

It has been striking to see how the normal routine of the British personnel has been carried on. Boxing Day was our worst day. We had sixteen raids. Nothing on a large scale. Just aircraft overhead, with occasional crumps.

There are now less than twenty of us Britons here, quartered in a partially ruined hotel. It functions fairly normally. We have electric light and water and the telephone usually works. Four people were killed in the kitchen, so the staff naturally don't feel like cooking when the raids are on. On Boxing Day, therefore, we cooked our own little meals in our bedrooms.

The Russians are very friendly. I only wish we were as good at security as they are. It is noticeable that their armed forces do not go around boasting about their unit, where it is, and what it consists of. They have no public houses to act as nurseries for careless talk. Perhaps this is a good thing, from the Security Officer's point of view.

Even their home brew, Vodka, is rationed and you never see a drunk Russian.

Their organisation is immense and their stores department has a multiplicity of forms which would dazzle the Government Printer in England. Demand and Issue vouchers, tally cards, etc., fall about you like confetti, but with one important difference. When stocks get into a hopeless mess, as they do on the best run operational station, the Russians have a delightful system by which a small committee is convened to prepare a sort of affidavit which they call an Akt. They solemnly list everything missing, write them off and, to the best of my information, nothing more is ever heard about it.

Their suspicion of foreigners is partly based on their wish to keep their political ideals intact. All films shown to the people in this place are carefully censored in case they reveal conditions of living more luxurious than the people here are allowed. It is thought that scenes of high life and luxury would make the people discontented. When you entertain Russians, you must have food as well as drink. They never drink alcohol alone.

I have been here for five months and the time has proved one great fact to me. Wherever the British service man is planted, in the desert or in a place like this, he can make his own pleasures. He is a master of improvisation. We have a

genius for making ourselves at home, in our own British way. I said that there were only twenty of us. Before the wing left in October, the high spot was a concert. I had a clarinet. Out of that we made a band by borrowing a piano and a trumpet from the Russians. The engineering officer made a kit of drums out of sections of a water barrel. The C.O. was the drummer and on his base drum was painted, *Sandy and his Swingers*. Saucepan lids from the bombed kitchen provided the effects. The high light was the Wing Commander's description, with a blue print, of a mysterious piece of apparatus called an oxonometer. Descriptions of its functions were drowned in ribald laughter.

We have been disappointed by the lack of snow. Even here we enjoy the warmth of the Gulf Stream: not to the extent of having palm trees growing along the inlet, as some people may imagine, but enough to save us from extremes of cold, as you find in the interior.

One's ears and hands get cold. You need warm boots, of the flying variety, warm gloves and a helmet, which protects your ears. We were issued with all these, which was benevolent and far-seeing of the High-ups. It isn't cold enough for frostbite, thank goodness.

Strangely enough, Russians are very interested in the trappings of the Service. They may be the children of a new regime, but they like our badges, our outspread gold wings and crown. We all put our badges on to our fur caps. I think they would like gold braid instead of our modest blue. They like ceremony and are very punctilious about returning salutes. The new order had shorn the Russians of ornaments and colour, but it is of interest to see that they are re-introducing epaulettes as badges of rank.

The Russians have a deep-rooted respect for the British Navy. They have visible evidence of the strength of the Navy each time a convoy arrives. There is another reason why the Russians regard the navy so well. When they come ashore our officers and sailors are always so spick and span. Collars are white, shoes shining, and behaviour so exemplary that the Russians simply think they are the cat's whiskers. It is a lesson our own men can well take to heart when they come to places like this. But I must say our own boys were very good when the wing was here. Fifty per cent. of them were Australians. It was strange, perhaps, to find these boys from down under, learning to say the few Russian words that made life easy for them and brought them friends.

I leave here to-morrow. I can honestly say that I regret it. England sounds very good to me, but this place has something. I think the Russians are so friendly, and so un-vicious in mind, that one feels at home with them. One has gone through some strange mental changes in these months and I can really say that I'd like to come back.

Jimmie and the Nazis

Jimmie and his crew had had it. The unexpected in the shape of an escort vessel picked them off as they dived to attack a U-Boat. Luckily they were able to get into the dinghy, but not before Jimmie got a nasty crack on the head.

He came to properly a week or so later to find himself alone in a German hospital with the rest of his crew already well on their way to Germany.

Languages of the foreign variety not being his forte, a further week of endeavouring rather unsuccessfully to make his wants known made him in a receptive mood to anyone who would talk to him in plain English.

So when a young and cheerful-looking Nazi arrived at his bedside and said: "You are James Crowdon aren't you?" Jimmie heaved a sigh of relief and admitted that he was none other.

"I am so sorry," said the Nazi. "They only told me to-day that there was an Englishman in the hospital or I would have been in to see you before. I know how lonely one can feel lying all day in bed with nothing to do."

Jimmie registered favourably. From all he had heard, not every Jerry would be as decent as that. But of course, one flying bloke to another, war or no war, made all the difference.

"I have made enquiries," the Nazi went on, "and I find they have notified your parents through the Red Cross that you are a prisoner, so they should know by now that you are all right. I gather they added that you were 2001 Squadron so that you shouldn't be mixed up with anyone else."

Now Jimmie, being a keen type, knew he had emptied his pockets, as had the rest of his crew, before taking off. And he knew furthermore that nobody was likely to tell the Jerry to what squadron they belonged. It was not surprising therefore that his face betrayed his astonishment.

"It is quite all right," said the Nazi. "You have not given anything away. We know at once to what squadron any prisoner belongs. What is more, your late Squadron Commander was Bill Burkett. But he was recently relieved by Andrew Carleton, so you can set your mind at rest if you think I've come here to try and pump you."

The Nazi then turned the conversation to England, which he apparently knew very well—the beauties of Wiltshire, Jimmie's county, and the relative merits of Younger versus Strong and Chelsea versus the Arsenal.

"By the by," said the Nazi, "Talking of Wiltshire, we often used to motor down on Saturdays to Bournemouth and dance at the 'Regal.' A cracking good time we used to have, is it still going?"

"Lord, no," said Jimmie, "I've been there a lot lately; you can get a drink still, or you could a fortnight ago, but the rest of the place has been taken over. It's a hell of a job to get any fun except in London."

"We are in the same boat," sympathised the Nazi. "No fun anywhere these days and damned little leave. These U-Boat fellows are the lucky ones. Lots of leave, heroes wherever they go, and bags of food when they are on board. You know the Captain of that boat you had a crack at is staying in the neighbourhood. Would you like me to bring him along?"

Jimmie reacted like hell. He thought he had made a decent attack before they went in the drink, and perhaps by a little judicious questioning, he might be able to get the answer.

"Bet your life I would." Jimmie replied. "Can you make it?"

"I'll try" said the Nazi. "I gather he wants to say a few unkind words to you for giving him a headache."

Jimmie was disappointed. "Nothing more than that?"

"I'm afraid not," said the Nazi. "The trouble with your depth-charges is that they never hurt a U-Boat unless they are practically touching it. Otherwise it is just the case of a few electric bulbs breaking, and a bit of a headache all round."

"Oh, oh!" thought Jimmie, now I am getting somewhere. A lot of chaps in the Mess were always saying that, and it looks as if it is true. I'll see if I can draw him out a bit.

"Well one of our fellows the other day sank a U-Boat and the photographs showed quite clearly that none of them went off very close."

"I'm sorry to doubt your word, but of course you know we have captured some of your depth-charges and made our own experiments with them, like you do with our stuff. And we are quite satisfied that five feet is the maximum lethal range."

"It is supposed to be a bit more than that," said Jimmie. "But I've always been a bit doubtful myself."

"All right, I'll bring Otto—he's the U-Boat Commander—along to-morrow and he can settle the argument as he did the trials."

The conversation then turned to other things and the Nazi left after a time, promising to bring some English magazines with him next day, when he returned with his friend Otto.

Postscript

Jimmie congratulated himself. He had told the Jerry nothing and had got hold of quite a useful bit of information which might be of real value later on if he could get it back to the chaps.

In fact, he had confirmed his squadron number and Squadron Commander's name. He had told the Jerry that his squadron was at "Ringwood," as the Jerry knew that there were only two Coastal Command aerodromes from which he was likely to have regularly visited Bournemouth, "Ringwood" and "Wimborne." Other information ruled out "Wimborne," so "Ringwood" was a certainty. As a gratuitous bit of information, he had informed the Jerry that the "Regal" Hotel was a first-class target for the 190's to have a crack at. Worst of all, in an endeavour to do his stuff and help the old war effort along, he had verified, in spite of reports from other sources, that Coastal Command were still using the same depth-charge.

The end of the tale is of course that Jimmie never saw the Nazi again. Otto didn't appear and shortly afterwards Jimmie was passed on to Germany with a note that from the preliminary interrogation he had reacted well to talks of England and home and that a bit of solitary confinement would probably help to loosen his tongue. In fact, a promising source of Intelligence.

And if you think all this is just poppycock, you try being a prisoner of war yourself and see.

The moral of the tale is obvious. Nothing except your name and number. And don't try and be clever because, if you do, you've had it—every time.

D.O.N.C.

Its work in the Air Ministry

The expansion of the Royal Air Force during these war years has been so rapid that many younger officers may not be aware of Air Ministry organisation, particularly, perhaps, on the operational side. They know, of course, that there is a branch which takes a close, if pessimistic, interest in their pay and allowances, and another with similar views upon equipment, but how many know the name of that department of the Air Staff which is concerned with the actual operations of Coastal Command.

The short title at the head of this article stands for "Director of Operations (Naval Co-operation)" and the Directorate is housed in the Air Ministry in Whitehall. There are four operations directorates: Fighter Operations, Bomber Operations, Overseas Operations, and D.O.N.C., each with its own Director, Deputy Director and staff, and all under the direction of the Assistant Chief of the Air Staff (Operations).

D.O.N.C., as its name implies, is concerned with the operation of G.R. aircraft throughout the world and particularly with those of Coastal Command. Future G.R. operations and G.R. operations overseas are planned within the Directorate. Liaison as between the Air Ministry and the Admiralty is vested in D.O.N.C.—a Naval Officer is on the staff of the Directorate to advise on naval matters and two R.A.F. Staff Officers are maintained within the Admiralty. In addition, the Director attends the frequent meetings of the special Anti-U-Boat Committee of the War Cabinet, preparing much of the material for presentation and discussion at those meetings.

And how does all this work? Well, obviously not without a full and up-to-the-moment knowledge of Coastal Command's operations. For this purpose an Air Ministry Liaison Officer is

maintained in the Operations Room at Coastal Command, who, sitting beside the Controller, telephones through the latest happenings to the Air Ministry War Room, who in turn inform D.O.N.C. In the War Room, as in an Operations Room, the position of patrols, enemy forces, etc., are plotted on great charts, a smaller version of which is kept up-to-date in the Directorate. At any moment therefore, the Director is able to examine a complete picture of current operations. During the night the War Room prepares a summary detailing the operations for each 24 hours up to 0600 hours and at 0900 hours this is presented to the Director together with the current operations chart. Half-an-hour later he attends the daily Air Staff Meeting and presents the Coastal Command report on operations, which, together with the reports of the other Operations Directors, gives a complete picture of the activities of the Royal Air Force during the previous 24-hours. So whether you attack an enemy raider off Cape Finisterre or a U-Boat in mid-Atlantic your attack is described at the Air Staff Meeting at Whitehall the following morning. Later, the Director presents the entire R.A.F. picture to the Admiralty at their daily Staff Meeting.

It will be seen, therefore, that the Director of Operations (Naval Co-operation) is your particular representative on the Air Staff, with a full knowledge of your capabilities, your achievements and your requirements. Decisions are taken, and future operations planned, in the light of this knowledge. The staff of the Directorate is mainly chosen from among yourselves, fellows with recent operational experience, so that your point of view is well represented. Their tour in the Air Ministry averages eight or nine months, when others take their place, so that in this most important particular, too, knowledge is kept up to date.

PYROTECHNICS

At least once a day a squad of men in blue overalls and wearing large boots scramble all over your aircraft in a state of considerable excitement, like gulls about a fishing boat. They do all manner of things to ensure that the aircraft will carry out its normal functions to the satisfaction of all concerned.

These men in overalls record their daily flap by adding their autographs to a document called Form 700 which in turn you autograph when taking over.

Among the excited many are armourers (G), armourers (B) or, to their friends, "the plumbers." The "plumbers" have seen to it that your guns, turrets, bomb gear, and bomb load are on top line, and you should be duly thankful. They have also checked the stock of fireworks on board and made good the deficiencies, if any. The armourer who did this job would probably tell you that a Pyrotechnic was a firework and he would be correct, for the word is derived from the Greek and literally means, *The Art of Making Fire*. More than this, your armourer could tell you exactly how this "art" is practised. If you asked him how he knew how many of each kind should be on the aircraft, he would probably reply that the number is "laid down in orders" or that the sergeant told him.

The above is, more or less, an account of how these devices come to be in your aircraft each day without fail and in the correct numbers and stowages. Their whereabouts up to this point was your Station Armament Officer's worry.

The responsibility has now been passed to your shoulders, via the Station Armament Officer and

his busy minions. As the Captain of an aircraft you may never have looked at the gadgets in this light. On the other hand, you probably know all the answers.

Let us take the liberty of supposing that you have not bothered about Pyrotechnics before. What then, are your responsibilities in the matter? In the first place, people do not store things in aircraft unless they have a useful purpose. The Pyrotechnics have a purpose. The types of Pyrotechnics to be carried are decided by the role which the aircraft has to carry out, and the quantities are decided by the requirements of that role. The appropriate Appendix "A," Vol. III, Part II, of the Airframe Publication, stipulates the quantities by types which should be carried. But these figures may be only basic values, and they are sometimes varied appropriately by higher authority and stipulated in Squadron Orders, to suit the job of the Squadron.

Each Pyrotechnic has a definite function and its *modus operandi* and purpose may be found in a neat little book, *A.P. 1661E, Vol. I*, or if you are really in doubt, by arranging to have the Station Armament Officer give a little lecture on the subject. He will be happy to do so when approached. He has at his disposal the Air Diagrams, Air Publications, and appropriate drill (dummy) fire-works for lecture purposes. He is there to enlighten you if you have the mistaken belief that a Marine Marker is for wind-finding, an aluminium Sea Marker for practice bombing, and Marine Distress Signal for paddling the dinghy.

Leaves from a Navigator's Log Book—IV

Man is a noble individual, only brutish in a crowd. What a chance, therefore, the Navigator has to shine above his fellows! His is a superb individualism; his the opportunity for intelligent activity; his the habit of accurate, objective observation, the authorship of realism; his the painstaking weaving of rare designs, following no pattern. It is indeed a high calling to be a Navigator.

We were rash enough to suggest in the last Review that you might like to know how you can judge your worth as a Navigator. It now occurs to us that probably you never have considered the matter was in any doubt anyway! Of course, you are a "sound practical Navigator"—weren't those the very words they used on your report from the A.N.S.? Didn't you get 80 per cent. at your O.T.U.? Now that you are an experienced *operational* Navigator you are surely above criticism. O.K.! O.K.! Then how do you explain the fact that failure to meet a convoy is directly proportional to the distance the aircraft has to fly from base? Why are three out of four sorties to convoys at 1,000-miles' range almost a pure waste of time? Why do you make landfalls up to about 100 miles wrong?

"But," you will say (supposing of course that you read our last number), "Didn't you tell us you couldn't blame the Navigator for a bad final landfall, a high calculation error, a failure to meet a convoy or bring off a strike?" Let us at once deny this. We merely pointed out that there were many reasons why such apparent navigational failures were not 100 per cent. indicative of bad navigation. A flight may be judged only when all its attendant variable circumstances have been noted. This, as we observed last month, is very difficult to do, as the Navigator alone knows exactly what took place. If, however, a bad landfall, a high calculation error, a "not met" convoy or a failure to pull off a strike are only primary indications of bad navigation, it is even truer to say that good navigation is not necessarily the reason for a good landfall, a small calculation error, a "met" convoy or a successful strike.

It is said the way to Hell is paved with good intentions. In this World however we must be content with valiant attempts to toe the line. So long, therefore, as the Navigator tries to do his best, we can ask for nothing more. Here is the crux of the whole question. We are not as interested in results as in efforts to achieve good results. Good luck and undeserved success attend the few. The vast mob of Navigators get only their deserts. Let us, therefore, strive to reach our aim with all the energy we can summon up. There is much room for improvement.

For example, how could we expect good results from badly calibrated aircraft instruments and unserviceable navigation equipment? Make sure your Compass is in tip-top form, that it has been swung in the air within the past month, and that the D.R. Compass, if you have one, has passed its many serviceability tests (see A.P. 1767). Have you a card showing what corrections to apply to your Airspeed Indicator and your Altimeter?

Do you keep your Sextant with the care such a precision instrument deserves? Do you keep a stock of really sharp pencils handy, for use in the air as you successively blunt them? (Try the sides of a matchbox if you want a nice sharp point.) Do you keep a stock of all the useful plotting maps in your satchel, or do you have to flap around after maps whenever you are briefed? Is your chart table clean and tidy? Don't you think it deserves some attention since it is the scene of such hard work? How often do you line-up your Drift Recorder and Drift Sight? Perhaps you are a lucky one, with a B3 Drift meter. Do you ever check it for truth? How about your bomb sight? How about the tail turret calibrations. Is your watch properly rated? Is your Astro Compass in first-class order, and do you know how to check its alignment in the air? What about the *Air Almanac*—is the current issue in your bag? Do you keep your sight log book up to date? (You may wish you had, someday.) All this is only a beginning, but how much of it is ever done to your own satisfaction? Do you see to it? If you don't always fly in the same aircraft, does your squadron insist that at least *somebody* looks after such things?

The Navigator must be master of his own destiny. Apart from active preparation between flights, akin to the care a gunner will lavish on his weapon; apart from a carefully worked-out flight plan, akin to a General's appreciation of an impending battle; apart from keeping his wits about him like nobody's business, the Navigator must set himself a high standard of personal perfection, in which nothing but the best is acceptable. This is asking a lot—but you have been badly misled if you thought we were going to be easily pleased.

Nothing succeeds like success; but to the Navigator success is very "heady" wine and just as dangerous. No sooner does he think he has got it "in the bag," than behold: 'a ruined giant! Nothing succeeds better in navigation than never letting up. Should the Navigator but believe he has found a short cut to work, and he is lost. Infrequent wind measurement, and probably only sloppy estimations at that, mark the downfall of many a promising lad. Then again, lack of practice in using a Sextant and an Astro Compass may well prove disastrous and always represents a failure of the Navigator to be his best. Blind reluctance to admit errors, a facile reliance on alterations of course to allow for drift changes—these are but two of the great evils of our day. Heaven rid us of this make-belief of track crawling!

Your worth as a Navigator depends largely on what you are prepared to do. If you have a conscience you will know that much of what we say applies to you. You will contribute to the winning of the war by just that much effort that you put into your job. If you have your drill buttoned-up according to the best advice, you are half-way to success. The other and more painful half depends upon your determination and power of endurance.

“ THIS MOST EFFICIENT MEANS OF DEFENCE ”

A tribute from the enemy

The following extract from a German newspaper adopts a characteristic line of propaganda, in which, while admitting the efficacy of the means we use to counter U-Boat warfare, it seeks to show that the latter must triumph. Some such consolation is becoming increasingly necessary in Germany.

The truth, of course, is that the success achieved just prior to the appearance of this article was remarkably small, and taken in conjunction with German reverses in Russia, the situation demanded propaganda which, although purporting to be written fairly and dispassionately, was really intended as a fillip to a temporarily sagging morale.

At the same time, the criticism of the work of this Command is not without its grain of truth. We have not won outright the long battle, and such comments on our work should stimulate all concerned to correct any shortcomings which a close analysis of individual effort may reveal.

Activity in those parts of the Atlantic in which Germany is carrying out operations, and in certain parts of the Indian Ocean, consists mostly of offensive action by German U-Boats and of defensive efforts by the Allies, and in these theatres the German Air Force is working exclusively in connection with U-Boat warfare.

To begin with, during 1940 and the beginning of 1941, German flying-boats and long-range bombers carried out frequent reconnaissance flights. Many a time the Condors and flying-boats sighted a convoy and guided the U-Boats to the attack. On the other hand, there were other cases which showed the unreliability of reconnaissance flights and sometimes also the difficulty of giving the exact position. However, these limitations do not in any way outweigh the advantages.

In 1940-41, aircraft became a well-known factor in U-Boat warfare. Later on, owing to the necessity of massing the Luftwaffe on the Eastern Front, and to the employment of long-range bomber formations, especially over the North Sea, co-operation with the U-Boats, as well as direct attacks on Atlantic convoys by long-range bombers—attacks which had proved so successful in 1940-41—had to be abandoned. For the present, therefore, co-operation with the U-Boats and attacks on the shipping routes have been to a certain extent abandoned. As soon, however, as the fighting on the Eastern Front has to some extent died down, the said activity will be resumed, probably on a very much larger scale and on the lines tried out in 1940-41.

In this connection therefore we may regard the Luftwaffe as a reserve which has, for the moment, more or less retired from this particular sphere of action and is devoting its attention mainly to protecting the U-Boats as they enter and leave the Bay of Biscay. On the part of the enemy, for whom the main thing is to keep open their sea communications, we find an extraordinarily extensive employment of their Air Forces over the oceans. The superiority of

land-based aircraft over ships in the approaches to the coast and in narrow waters has become one of the main principles of the conduct of present-day naval warfare. It is further recognised that the aircraft, within the limits of its range, is a serious danger to submarines. This danger is based mainly on the speed of the aircraft, the possibility of sudden appearance and the speed of attack, factors all ranged against the diving speed of the vulnerable submarine. Co-operation with destroyers, corvettes, etc., alternate with direct attacks with aircraft guns, bombs and depth-charges.

The above are the reasons for the present wide use of aircraft for defence against submarines and for the enemy's attempt greatly to develop *this most efficient means of defence.*

Then came the development of "air patrols" which grew continually, due to the systematic occupation of Iceland, Greenland, the West African coast, Madagascar, and the entry into the war of the United States and a large number of the South American States. The results, however, did not come up to expectations, and the "unreliability" of reconnaissance carried out by high-speed aircraft became apparent. A glance at the map will show how impossible it is to carry out reconnaissance over every part of the ocean. Huge areas remain unpatrolled and unpatrollable.

The next step tried was to have an auxiliary aircraft-carrier in every convoy so as to have a "travelling" patrol unit. This did not help very much either, due to weather conditions and the difficulty of take-off and landing on the high seas. Taking the situation as a whole, one sees that the aircraft versus U-Boat operations involve colossal expenditure of forces, with very slight possibilities of success. As the British often put it, U-Boats in the ocean are "needles in a haystack."

Heinz Bongars in the
Berliner Lokal Anzeiger, 28.2.43.