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A.C.B. 0233/44 (9)

SOUTH-WEST PACIFIC

ANTI-SUBMARINE REPORT

SEPTEMBER, 1944

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SOUTH-WEST PACIFIC
ANTI-SUBMARINE REPORT

SEPTEMBER, 1944

TRAINING AND STAFF
REQUIREMENTS DIVISION,
NAVY OFFICE,
MELBOURNE.

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SECTION I

COUNTER MEASURES

1. REVIEW FOR AUGUST.

Submarine activity in the South West Pacific area was again on a very limited scale during August. Only one possible attack on a merchant ship was reported and there were no reports at all of attacks by our ships or aircraft on confirmed U-boat targets.

S.S. "SELMA VICTORY" reported being attacked by a submarine in the Solomons Sea area on 24th August. Two torpedo tracks were seen. Subsequent reports confirm that there was a Japanese U-boat near Choisel island later in the month.

Sightings during the month were as follows: five in the Hollandia-Wewak area, four in the Banda Sea and three off Biak Island. These sightings were probably on a small number of submarines all engaged in supply missions or the evacuation of garrisons. The activity in the Banda Sea is the first reported for several months and may mean that the recent Allied successes on the North Western tip of New Guinea are forcing the Japanese to commence the evacuation of the garrisons on some of the small islands between Timor and New Guinea.

A coast watcher has reported that a submarine arrives at Rabaul about every five weeks with a supply of rice for the besieged garrison.

2. ANTI-SUBMARINE ATTACK TESTS (A.S.A.T.S.)

A series of A/S Attack Tests (Short title A.S.A.T.S.) has been introduced for use in training teams of R.A.N. ships. Details of these tests are being promulgated as Amendment No. 8 to Anti-Submarine Confidential Instructions Section IV.

There are fourteen tests in all, each test being progressively harder than the previous one. The submarine will employ different tactics every time but all its movements will be based on the likely tactics of a submarine being attacked by hostile forces. The A/S ship will be required to attack with

depth-charges where fitted and will be required to take the correct countermeasures against Gnats. Marks will be given for procedure as well as results.

After passing one test the ship will move on to the next, and will be graded according to the number of tests passed. A Grade XIV ship will have mastered nearly all of the tricks played by U-boats and should have complete confidence in the outcome of her next encounter with an underwater foe. It is essential that the whole Action A/S Team attends each test as no new grading will be allowed if any member of the team is absent.

A standard form, A/S 1210Z, on which the results of A.S.A.T.S. tests are to be recorded, will shortly be made available to each A/S ship. These forms will be supplied to all authorities where facilities for training on A/S Attack Tables exist and the initial issue of the form will be made to the ships when their A/S teams first attend for training. These forms are to be retained on board and are to be produced at each subsequent attempt at A.S.A.T.S.

It is intended to publish the grading of ships from time to time in the Anti-Submarine Section of a new monthly publication which is shortly to replace the South West Pacific Anti-Submarine Report.

3. TRAINING AND STAFF REQUIREMENTS DIVISION.

A Training and Staff Requirements Division has been formed at Navy Office under the Director of Training and Staff Requirements (Short Title D.T.S.R.).

The Anti-Submarine Division has been absorbed into this new Division which will also carry out functions similar to those of the Gunnery, the Naval Training and the Tactical, Torpedo and Staff Duties Divisions of the Naval Staff, Admiralty.

The Director of Training and Staff Requirements, under the Deputy Chief of the Naval Staff, will be responsible for all training in the R.A.N. ashore and afloat. This will include gunnery and torpedo, anti-submarine warfare, radar, minesweeping, seamanship and navigation, fighter direction, damage control, naval air, lookouts, aircraft and warship identification, training in discipline and leadership, planning of all courses for officers and ratings other than the Engineering Branch, visual training aids and

and training devices generally, and eventually combined operations.

4. THE SOUTH-WEST PACIFIC ANTI-SUBMARINE REPORT.

Now that the Anti-Submarine Division at Navy Office has been absorbed into the Training and Staff Requirements Division, it is intended to cease publication of the South-West Pacific Anti-Submarine Report and to replace it by a monthly publication which has been tentatively named the Royal Australian Navy "Monthly Naval Warfare Review". This new publication will include information of general Naval interest including gunnery, torpedo and radar subjects as well as the anti-submarine subjects dealt with in the present Anti-Submarine Report. The scope of the book may be increased later.

Commanding Officers are invited to submit items of special interest, not already included in their Monthly Reports of Proceedings, for publication in the Monthly Naval Warfare Review.

SECTION II

SHIPPING STATISTICS1. ANALYSIS OF CONVOYS - JULY, AUGUST, 1944.

AREA	No. of Ships		Tonnage	
	July	August	July	August
Thursday Island - Darwin	15	22	74,545	107,522
New Guinea Area	228	133	1,276,583	860,606
Total	243	155	1,351,128	968,128

2. SINGLE ESCORTED SHIPS.

AREA	No. of Ships		Tonnage	
	July	August	July	August
New Guinea Area	55	10	397,498	54,048
Arafura Sea	4	6	11,207	23,656
Total	59	16	408,705	77,704

3. INDEPENDENT VESSELS, AUSTRALIA AND NEW GUINEA.

AREA	No. of Ships		Tonnage	
	July	August	July	August
Eastern States - Western States	40	48	279,098	307,977
Melbourne - South Australia	96	91	420,707	412,946
Newcastle - Melbourne	181	194	751,438	917,599
Brisbane - Sydney	118	159	581,037	833,859
Barrier Reef - Brisbane	69	102	273,495	413,625
Coral Sea and New Guinea	535	832	3,379,434	5,352,440
Arafura Sea	2	7	4,362	14,326
Total	1,041	1,433	5,689,571	8,252,772

4. MONTHLY OUTWARD GROSS TONNAGE.

PORT	No. of Ships		Tonnage	
	July	August	July	August
Langemak	311	362	1,924,485	2,399,684
Milne Bay	239	193	1,572,302	1,188,862
Sydney	306	332	899,493	1,029,934
Humboldt Bay	141	127	799,429	789,222
Melbourne	135	141	579,771	610,476
Fremantle	69	82	516,443	559,229
Newcastle	226	219	512,980	485,547
Brisbane	83	97	403,438	466,291
Oro Bay	97	78	643,676	434,602
Lae	38	60	221,488	390,452
Townsville	72	60	301,438	248,158
Biak	20	42	119,675	235,776
Adelaide	43	46	229,777	225,382
Seeadler	45	37	196,885	181,944
Port Moresby	25	29	114,923	142,189
Thursday Island	38	40	119,393	140,473
Port Kembla	37	41	113,366	130,124
Cairns	56	56	132,275	127,506
Morobe	71	20	505,469	125,449
Whyalla	26	22	114,381	100,114
Hobart	13	18	46,731	76,098
Darwin	11	14	51,731	74,469

SECTION IIINARRATIVES1. CAPTAIN FREDERICK JOHN WALKER, C.B., D.S.O.***, ROYAL NAVY.
(Died 9th July, 1944)

Captain Walker was one of the first officers to become an A/S specialist and from 1926 to 1931 he was Fleet A/S Officer in the Atlantic and Mediterranean Fleets. In 1937 he became experimental commander in the A/S School and thus responsible for research and development of A/S materials and methods. He was holding this appointment at the beginning of the war. At the time of Dunkirk he was S.O.O. at Dover, and for his services was mentioned in despatches.

In the autumn of 1941 he left the staff of Vice-Admiral, Dover to become the Senior Officer of the 36th Escort Group in H.M.S. "STORK"; by December of that year he had become the foremost U-boat killer in the Royal Navy and outstanding among its Group Leaders. In addition to being a highly experienced A/S officer, possessing complete technical mastery of his subject, he had the personality, determination and understanding of human nature necessary to weld individual ships into a fighting team. Having created his team, he led it brilliantly, inspiring it with the joy of battle which appeared so vividly in his Reports of Proceedings. Thanks to his pungent, if somewhat colloquial, style, laced with a grim humour and a taste for unvarnished expressions, his exploits passed easily from the sea, through staff papers, into history, and his fame and personality will always stand out clearly in the annals of the Royal Navy.

Walker's first success was Convoy H.G. 76 which sailed from Gibraltar on the 14th December, 1941. He had spent the preceding days in organizing an endless chain patrol of the Straits, which, respecting territorial waters, could not be expected to achieve much success. With the convoy Walker fought a battle which lasted nine days and resulted in the destruction of four U-boats. Marking the end of a round in the Battle of the Atlantic which we won - only to suffer disasters in the next - the passage of this convoy was one of the most dramatic of the war. The battle was extraordinarily fierce; H.M.S. "AUDACITY" - the first of the escort carriers - ended her short and gallant career, H.M.S. "STANLEY" was torpedoed and blown up with almost all her company and Walker then destroyed the U-boat which had fired the torpedoes. He brought

her to the surface and, lightening with snowflake the intense darkness of the night, chased her three times round at full speed, his men and the Germans sometimes within a few feet of each other, roaring curses and shaking their fists. Finally, he outmanoeuvred the U-boat, ramming her, rode over her and sent her to the bottom. Walker's achievements were recognized by the award of the D.S.O.

Four months later, while escorting another Gibraltar convoy, Walker made his next kill. A signal from the Admiralty warned him of the approach of the enemy; his team on its toes and, when the U-boat arrived, its life was swiftly ended. H.M.S. "VETCH" made contact by radar and she and "STORK" chased it, forced it to dive by gunfire, and battered it to death. Two months later Walker, escorting a Gibraltar convoy of 23 ships with "STORK" and three corvettes, fought it through a concentration of seven or eight U-boats, losing only five ships. Earlier in the year he had taken part in the even more fiercely contested North Russian convoys and for his work with them was awarded a bar to his D.S.O. On 30th June, 1942, he was promoted Captain.

In the autumn of 1942, Walker went to Liverpool as Captain (D). He held this important post until the spring of 1943 when he returned to sea as Captain (D), Second Support Group, in H.M.S. "STARLING". His command consisted of "Modified Black Swan" class sloops, and he made them famous. Operating in the unfamiliar waters of the North Atlantic - it is strange that Walker never took part in a convoy battle in this area - the Group made history by hunting "U-202" to exhaustion, holding contact almost without a break from 10 in the morning until after midnight and carrying out the first "creeping" attack. A fortnight later on the 17th June, the Group sailed from Liverpool to open the combined air-sea offensive in the Bay of Biscay, destroying, on the 24th two U-boats in one morning. For this Walker received the honour of being made a Companion of the Order of the Bath. Five weeks later, when the offensive had reached its climax, Walker and his Group took part, with aircraft of 461 and 502 Squadrons, in the action which destroyed a complete force of three U-boats, an action always to be remembered, if for not other reason than that Walker ordered "General Chase", a signal rarely used since the days of Nelson.

The havoc wrought among the U-boats throughout the Atlantic and in the Bay of Biscay between May and August made them somewhat elusive, but Walker, operating in the North Atlantic in November, found and killed two in the space of less than 12 hours, winning thereby a second bar to his D.S.O. Bad weather deprived him of greater success but it was not long delayed. During a patrol which lasted from 29th January to 24th February, 1944, Walker achieved the supreme triumph of his career. Showing how a first

class seaman, master of all the technicalities of his craft and a born leader, could handle men, ships and weapons, Walker and his Group sank six U-boats; only one crew survived to know that they had played an involuntary part in one of the most brilliant operations ever recorded in the long history of the Royal Navy. The presence of the First Lord of the Admiralty, accompanied by the Commander-in-Chief, Western Approaches, at Liverpool when the Group returned to a tremendous welcome showed the Navy's appreciation of Walker's outstanding achievement. He received a third bar to his D.S.O. and the reward of two years seniority.

Walker's run of success continued to the end. In March he sank a U-boat in the North Atlantic and another to the north-eastward of the Shetlands when escorting a North Russian convoy. In May he sank his last U-boat - the twentieth to fall to him or his Group - and in June he was playing a leading part in Operation "Neptune". On return from his last operational patrol, he was suddenly taken ill and died within two days at a Liverpool hospital.

He was 48, having forespent his years in some of the hardest and most dangerous operations of the war. Had he lived out his normal span, his immense experience would have been invaluable to the Royal Navy and particularly to the Anti-Submarine Branch. The loss to the Service of such a seaman as Walker is, therefore, a very heavy one but he trained his men as hard and as thoroughly as he fought the enemy and his inspiration will live long amongst them; for with them he always shared his triumphs.

The funeral service was held in Liverpool Cathedral on 12th July, the Commander-in-Chief Western Approaches reading a Solemn Acknowledgment. From the Cathedral the coffin was taken to Princes Landing Stage and there embarked in H.M.S. "HESPERUS" for burial in the Western Approaches.

It so happened that a convoy was arriving in Liverpool Bay from the United States and a number of outward bound ships were sailing down the Mersey, by a happy chance to take the Gibraltar route on which Walker had won his earliest triumph. As the destroyer proceeded at high speed to seaward, she passed merchantmen which had cleared lower decks and mustered their crews on the fore-castle and poop to pay their tribute to one who had done so much to keep fresh and ancient saying "It is upon the Navy, under the good providence of God, that the wealth, safety and strength of the Kingdom do chiefly depend."

(Admiralty Anti-Submarine Report June, 1944)

2. OPERATIONS IN THE ENGLISH CHANNEL AND ITS WESTERN APPROACHES.

"Operation Neptune" - the naval side of the Normandy landings must have made it clear to the enemy that the Allies had won the Battle of the Atlantic, and after four years, the centre of the U-boat war shifted from that ocean to the English Channel and its Western Approaches. To those planning the liberation of Europe the potential threat of the U-boats must have appeared a grave one. The "Schnorkel" gear would enable them to proceed submerged for the whole of the passage from the Biscay ports to the Channel traffic lanes. Other boats would be stationed in the less confined waters off the coast of Cornwall to lie in wait for the "build-up" convoys, which could be expected to come, sooner or later from Bristol Channel and West Coast ports.

While the main weight of our counter-measures was in the English Channel and its Western Approaches, subsidiary operations of great importance were carried out to the north-eastward of the Shetlands. In both we had considerable success.

The honours must undoubtedly go to Coastal Command. Between "D-Day" - the 6th June - and the 10th June, aircraft made 18 attacks in the Western Channel - Ushant-Bay of Biscay area, sinking two U-boats for certain and probably destroying four more. Nearly half of the other attacks are regarded as promising. On the 8th, Liberator G/224 achieved a "probably sunk" and a "known sunk" within 20 minutes, and other aircraft scoring kills were Sunderlands S/201 and R/228 on the 7th and Liberators F/120 and K/206 on the 9th and 10th respectively.

These heavy losses forced the enemy to adopt yet more cautious tactics. Between the 10th and 20th the number of sightings and attacks in this area fell off considerably and no kills by aircraft were recorded. Reconnaissance showed that a U-boat had entered St. Peter Port, Guernsey, presumably to carry out the charging which, even with the "Schnorkel", it could not do at sea. The approaches to the harbour were mined and an air attack made on it, though with what result is not known.

THE 14TH ESCORT GROUP DESTROY A U-BOAT UNDER FIRE FROM SHORE BATTERIES.

Between the 20th and 30th June, a change came over the operations in the Channel area. More kills were made by surface craft, with or without air co-operation, than in the earlier part of the month. Between the 10th and the 20th there was only one kill by surface craft. This was achieved on the 18th by the 14th Escort Group (H.M.S. "FAME", Senior Officer, and H.M. Ships "HOTSPUR", "INCONSTANT", "ICARUS" and "HAVELOCK"). At 1005/18 a

U-boat was D/F'd by the Group and, though the signal was weak and the base narrow and estimates of distances in the Channel had already been found unreliable, the position of the enemy was about noon fixed within 10 miles of 49° 10' N., 03° 10' W. This position - to the westward of Le Plateau des Roches Douvres - was consistent with a U-boat making passage along the coast and the Group proceeded to the area at full speed. At 1620 "FAME" obtained contact by asdic at 2,300 yards and attacked first with Hedgehog and then with depth-charges. "INCONSTANT" was running in for a Hedgehog attack when one of the U-boat's crew surfaced in an air bubble. He was picked up by "FAME" and it was learnt from him that the U-boat had been hit forward by the first Hedgehog attack; he had escaped from the compartment. Shortly afterwards, a shore battery, probably located near Paimpol, opened accurate fire and, to counter this novel intrusion into the Group's anti-U-boat operations, "FAME" ordered "HOTSPUR", who was carrying out "OBSERVANT" with "ICARUS", to make smoke. Under cover of this, the ships withdrew to the north-westward, having first satisfied themselves that the U-boat, which was giving off much oil and air, was lying stone-dead on the bottom in 40 fathoms.

THE DESTRUCTION OF "U-971" AND "U-269"

On the 24th "U-971" was destroyed by H.M.C.S. "HAIDA" and H.M.S. "ESKIMO" about 15 miles to the north-westward of Ushant. Prisoners taken from the boat stated that they were newly out from Germany on their first operational patrol.

Early next day, the 25th, H.M.S. "BICKERTON" (Senior Officer, 5th Escort Group), made contact with a U-boat - "U-269" - to the south-eastward of Start Point, and, after a number of depth-charge attacks, brought her to the surface. The boat was abandoned and a number of survivors picked up. During the afternoon H.M.S. "GOODSON", one of the ships in the Group was hit by a Gnat. The 1st Escort Group (H.M.S. "AFFLECK", Senior Officer, and H.M. Ships "BALFOUR", "BENTLEY", "GARLIES", "GORE" and "CAPEL") was ordered to search. After closing two of the ships of the 5th Escort Group which were searching round the position of the attack, "AFFLECK" began operations somewhat further to the westward. At 2129 "BALFOUR" obtained contact by Asdic and "AFFLECK" made a Hedgehog attack, the target being at 175 ft. and the bombs detonating after nine seconds sinking time. When "AFFLECK" ran in 20 minutes later, "to disintegrate a smitten enemy" with depth-charges, a rapidly widening patch of very thick oil was seen. After satisfying herself that she was not in contact with the wreck of "BICKERTON'S" U-boat - this was later found to be three miles away - she and "BALFOUR" attacked until there could be little doubt that the U-boat had been destroyed. A thick fog made it impossible to look for wreckage.

Finally, on the 29th June, Liberator aircraft L/224

sighted a "Schnorkel" south of Start Point. Its attack caused a large oil slick and the Third Escort Group were ordered to close the position. Early on the following morning the ships of the group attacked and reported finding some evidence of destruction on the surface.

One promising attack was made during this period by a Polish-manned Wellington of 304 Squadron and another by a U.S.N. Liberator of 103 Squadron, Fortress D/206 and ships of the Ninth Escort Group.

3. U.S. SUBMARINE "POGY" TORPEDOES U-BOAT OFF JAPAN.

On 28th April, 1944, during her sixth war patrol, U.S.S. "POGY" attacked and probably sank an enemy submarine off Okino Shima, Japan.

"POGY" made contact by radar at 2121I at a range of 13,000 yards and increased to full speed. The plot showed the target making good 17 knots and zigzagging on courses of 105° and 150° with legs of about three to nine minutes. The size of the echo indicated that the target was a submarine or torpedo boat and the Commanding Officer decided to shadow until after moonset at 0002.

"POGY" began closing for the attack at 0018 and at 0034 a salvo of four torpedoes was fired from a range of 1,300 yds. The target was identified just before firing as a large submarine of about 1,800 tons. The second torpedo apparently found its mark and, after much flame and smoke had been seen, the echo disappeared off the radar screen. Three minutes later, four or five loud explosions were heard. The report states that three of the explosions may have been caused by torpedoes exploding at the end of their run or from internal explosions from the target. The latter seems the more likely as similar explosions have been heard in nearly every successful attack on a Japanese submarine. The last explosion was particularly violent and occurred about two minutes after the others.

At 0042, "POGY" ran back down the torpedo tracks and sighted a very large oil slick, described as having a "strong aromatic odor, much like the new 100 octane aromatic aviation gasoline". "POGY'S" captain suggested two possible explanations: that the Japanese are using an aromatic diesel fuel, or this particular submarine was carrying aviation gasoline to an outlying base.

4. GERMAN U-BOAT'S OPERATIONS IN THE NORTH CHANNEL.

The following story, obtained from survivors of "U-386", indicates the use to which German submarines are putting some of the equipment which has been installed during the last two years. "U-386" was sunk by H.M.S. "SPEY" on the 19th February, 1944.

About the 15th January, 1944, "U-386" was ordered to leave the group with which she had been operating in the North Atlantic and enter the North Channel (between Ireland and Scotland). She was to observe the movements of ships and to make detailed reports on beacons, light buoys and other aids to navigation. Whether she was to attack convoys assembling is not certain but it seems quite clear that she was intended to create a diversion and cause us to relax our pressure in the North Atlantic. Probably this was to have been achieved by releasing large numbers of Radar Decoy Balloons rather than by attacking merchantmen.

"U-386" approached Ireland on an easterly course, made a land-fall off Donegal and then crept round the coast towards the entrance to Lough Foyle. By 2030 on the 23rd January she was off Benmore Head in about 30 fathoms. G.S.R. watch was kept on the Wanze II and Naxos sets and, after about half an hour, the boat received a strong contact on 170 cm. which remained focussed on her, convincing her Captain that he had been detected. He ordered the "Y" service set to be manned, in order to pick up R/T traffic, and watch to be kept on 2410 k/cs and then proceeded seawards. Owing to the shallowness of the water there, it was considered useless to dive. Very soon another radar contact was registered, this time on 135 cm. and it was assumed that this was a ship. Almost at the same time, an aircraft, which dropped a flare, was sighted. The U-boat turned away and released some Radar Decoy Balloons, which seemed to have served their purpose, for all the G.S.R. contacts ceased abruptly. It was three-quarters of an hour before they were again reported.

At the same time R/T traffic began to be picked up again. A shore station was heard announcing that it was going to transmit in clear, and was then heard asking a surface unit with the code-name "Horseflesh" whether the U-boat was proceeding out to sea. This was followed by the sound of depth-charges exploding but these were well inshore. A few minutes later two ships, described as destroyers, were seen coming up astern and a Gnat was fired. An explosion was heard after an interval of 2½ minutes and it was assumed that one of the ships had been sunk; the fact that G.S.R. contacts on 135 cm. and "Horseflesh's" replies to the shore station both ceased lent colour to this assumption.

Next an aircraft flew overhead. The U-boat did not open fire and hoped that the Radar Decoy Balloons which were still being released would mislead the aircraft but they did not, for it was heard reporting the position to the shore station. G.S.R. contacts began to be received again and one of the surface craft astern could be heard asking for more aircraft.

For the next two or three hours "U-386" headed out to sea, proceeding on both diesels on the surface but about an hour after midnight one of the hunting craft was heard reporting that she had sighted the U-boat. The Captain dived at once, thinking that there were 80 fathoms beneath his keel, whereas he had only 50. After hitting the bottom, the U-boat recovered trim and continued seawards at slow speed. Depth-charge explosions were heard from time to time but they were still inshore of the U-boat. The crew thought they owed their immunity to the fact that they had stood out close to a minefield, instead of hugging the shore, as they had apparently been expected to do.

The U-boat Captain seems to have thought that he had better not trade too much on his good fortune for he spent the next thirty hours submerged, only surfacing when the air was almost exhausted. He then made a signal, reporting that he had been detected and compelled to retire but claiming the sinking of one destroyer. In reply he was ordered to rejoin his group.

5. JAPANESE SUBMARINE RO-44 SUNK NEAR ENIWETOK.

The United States Fleet Anti-Submarine Bulletin for August, 1944 publishes details of the sinking of RO-44 by U.S.S. "BURDEN R. HASTINGS" (destroyer escort) about 120 miles east of Eniwetok (Marshall Islands) on 16th June.

At 0250 (Zone Minus 12), "HASTINGS" made radar contact at a range of 20,000 yards. The initial range and size of the pip suggested that the target was a submarine or small craft. The Commanding Officer decided to close the range to about 5,000 yards, challenge and open fire if the challenge was not correctly answered. The target was plotted on a course of 350°, speed 18 knots.

At 0337 the range had closed to 5,000 yards and the target was challenged three times with an Aldis lamp but did not reply. A starshell spread was fired and, after the second starshell burst, radar contact was lost. Two men reported sighting a submarine submerging. Speed was reduced to 15 knots and an asdic search begun.

At 0354, asdic contact was made at 1700 yards, bearing 040°. A hedgehog attack followed without results.

Contact was regained at 600 yards; at 1500 yards "HASTINGS" turned towards the target and reduced speed to ten knots. Echoes were strong with no doppler and the target was drifting to the left. A second hedgehog run was made, firing by the recorder (set at 200 feet) on the leading cut-on.

Nine seconds after the pattern struck the water a heavy explosion was felt and a phosphorescent flash was seen. The ship then proceeded over the area of the explosion and dropped two depth-charges set at 200 feet and two at 300 feet as well as marker flares. About five seconds after the depth charges were thought to have detonated, an additional explosion of considerable intensity was heard.

At sunrise a moderate oil slick was observed with oil still rising. Throughout the day, oil continued to rise and in the forenoon it spread over an area one mile wide and four miles long.

Considerable debris and wreckage was floating on the surface and the following were recovered:

Sixty-one pieces of teak deck planking from two feet to eight feet in length painted black on top; one piece of stainless steel plate with Japanese writing; two varnished oak box tops with aluminum name plate and No. 44 painted between Japanese markings; 50 pieces of unfinished redwood and pine with Japanese writing; 11 pieces of plywood apparently from desks, cabinets and interior woodwork; numerous small articles such as a bamboo writing brush, small ribbons and papers of a religious nature, wooden tags marked in Japanese, insulating material, cork, canvas bag, rubber sponge, etc.; several pieces of flesh were adhering to the splintered wood.

On arrival in Pearl Harbour, an officer from JIGPAW translated the Japanese inscriptions and writing. The report states that the writing on the box tops identified the submarine as the RO-44.

Details of RO-44

An Eastern Fleet Intelligence Summary recently published details of the RO-35 class which consists of ten submarines (RO-35 - RO-44) built during 1942 and 1943.

Length	250 feet
Displacement	950 tons (surfaced)
Armament	One 20 mm, twin A/A mounting.

Torpedoes	Four bow tubes. 10 torpedoes (21-inch) carried.
Speed	8 knots submerged, 20 knots surfaced
Endurance	5,000 miles at 16 knots.
Diving Depth	A maximum of 262 feet.

SECTION IVINTELLIGENCE1. NEW JAPANESE ANTI-SUBMARINE WEAPON.

When a new type of Japanese destroyer or destroyer escort was photographed by attacking American planes North West of the Bonins on 4th August, equipment was noticed on her quarterdeck which is presumed to be a new anti-submarine weapon.

The installation appeared to be two rows of seven depth-charge throwers. The rows were fore and aft and each thrower was inclined at an angle of about 60 degrees to the deck.

It is not considered that contact charges would be fired from this mounting as only one bank could be fired at a time against an accurately located submarine. The gear is probably intended to increase the spread and depth of the Japanese depth-charge patterns. With two depth charge traps on the stern (the photograph is rather doubtful there) and fourteen throwers, the Japanese could fire a pattern of about 24 charges which, dropping at various speeds (some with parachutes and some without), would cover quite a large error in course, speed and depth prediction but would probably meet with the same countermining difficulties that were experienced with our 14 charge patterns.

2. TACTICAL USE OF "WINDOW" BY JAPANESE AT SAIPAN.

Headquarters Allied Air Forces S.W.P.A. Intelligence Summary No. 238 publishes the following information regarding the use of "Window" by Japanese planes operating at Saipan.

"Enemy planes dropped it while orbiting, then left the infected area and attacked from another direction. This tactic left doubt as to whether there were still planes in the infected area waiting to make co-ordinated attack with the planes that had left it. At other times they dropped window, orbited, and then attacked from the infected area. Under these conditions the enemy

is difficult to detect until he is about five miles closer than the nearer edge of the window.

"On 23rd June, four to six high altitude aircraft dropped window at about forty miles while approaching Saipan. They then made a radical change of course and circled the island prior to making the final approach. A similar procedure was followed on retirement. On 24th June enemy planes dropped window immediately before splitting into two groups - possibly in an attempt to conceal the fact that the raid was splitting. On 27th June window was dropped immediately before making a change of course, perhaps to conceal such change. On 28th June the above described manoeuvres were combined in one raid. On 30th June and 1st July it was dropped on retirement.

"Considerable window may be dropped by only one plane, suggesting that the Japanese think it is very effective. Actually it may be distinguished very quickly from a genuine target, but when it merges with land targets it makes the tracking of single bogeys very difficult. It appears to take about 30 to 45 minutes to fall from 20,000 feet.

"On 26th June two enemy aircraft approached Saipan from the south and a night fighter was vectored out to meet them. The fighter approached from the stern and the enemy dropped window when he was about a mile away. Contact was lost and was not regained. It is not known whether the enemy knew of the presence of the night fighter, for window has frequently been dropped at about the same stage of the approach."

3. MORE "SUCCESS" FOR JAPANESE SUBMARINE.

Continuing their policy of boosting up moral in the Imperial Navy, the Japanese published on 20th August a highly fanciful account of the disregard of Japanese submarines for Allied asdics and radar.

"On the evening of 19th June, Japanese submarine units, after receiving instructions from their commander, increased their activities as warfare on the islands grew in intensity. That evening, one of our submarines discovered an enemy task force at a point 100 kms. to the west of Rona Island. It was composed of a group of battleships and another group of aircraft carriers. Due to recent improvements of radio location sound detectors, it was extremely

difficult to approach the enemy ships undetected. It meant sure death to penetrate into an enemy formation. Nevertheless, the commander of our submarine ordered an attack on the enemy carrier in the centre of the enemy formation.

"It was several hours before sunset. Thus the bright and transparent southern sea proved a tremendous handicap, as it didn't afford the Japanese submarine ample shelter. The audiphone of the Japanese undersea craft clearly registered the protecting aircraft carriers in case any Japanese submarine should appear and launch an attack. Intense minutes ticked away. Suddenly our sound detector caught the sound of a huge..... which was propelling a gigantic enemy carrier at high speed. The commander knew for sure then that our craft had succeeded in pitching through the circle of the enemy ring formation. The torpedo officer reported that the deadly missiles were set in the torpedo tubes awaiting the firing order. The commander wanted to score sure hits, so our undersea craft shortened its range then gradually rose to periscope depth. Through the periscope was sighted a large carrier of the U.S. WASP class. It resembled a floating island. It is recalled that a ship of this type was sunk in the Coral Sea Battle on 15th August, 1942. The commander ordered the torpedoes to be catapulted out of the forward tubes. Everyone remained at their posts sweating with tense expectation. As the commander listened, his face suddenly gleamed with satisfaction as a sharp metallic sound came through the audiphone, telling us our torpedo had hit the carrier's armour belt. An instant later came a tremendous detonation through our sound detector. Due to enemy destroyers' frantic depth bombs attack, our submarine was unable to witness the actual sinking of the enemy carrier.

"On another occasion, one of our submarines which was operating in the Marianas sea area on the evening of 30th August detected through the darkness a looming shape of an enemy warship - probably a carrier - to the east of Saipan. Fearlessly closing in on the enemy ship, our undersea craft carried out a torpedo attack and set the enemy craft ablaze. Our garrisons on Saipan sighting the burning enemy carrier, knew it was the work of a Japanese submarine. They happily watched the enemy ship list heavily and finally sink to the bottom. Unfortunately, the Japanese submarine was subjected to an intense enemy depth bomb assault and failed to return to its base. Contrary to popular belief that the development of radio location detectors has made a submarine campaign almost impossible, no enemy vessels can escape the relentless attack of our submarines. The larger the enemy ships and the stricter their lookout, it only serves to augment the fighting spirit of the personnel of our submarines."

4. RADAR-EQUIPPED JAPANESE PLANES.

An Allied Air Force Headquarters S.W.P.A. Intelligence Report states that the Japanese intended to equip seventeen JILLS Model 12 with radar. This information was obtained from an order captured at Saipan.

Originally seventeen JILLS Model 11 were scheduled for this installation, but an order of February, 1944 changed them to Model 12. An action priority of "Very Urgent" was allotted to the project.

The radar set was installed in the rear cockpit, and the antenna was installed in the right side of the fuselage and in the right wing.

The radar installed was the Type 3 Air Mark VI Radar Model 4. Its primary object was anti-submarine work. A chart of the capabilities of this set is given below. According to the order these are test results. The total weight of the set is 110 Kg. (243 lbs.)

Target	Maximum Effective Range	Certain Range	Minimum Effective Range (Varies with Altitude)
Ships 10,000 tons and above	80 Km. (44 miles)	45 Km. (25 miles)	12-17 Km. (6½-9 miles) at 2,600 ft.
First Class Destroyer	50 Km. (27 miles)	35 Km. (19 miles)	15-20 Km. (8-11 miles) at 3,300 ft.
Land Target	150 Km. (82 miles)	130 Km. (71 miles)	7-12 Km. (4-6½ miles) at 1,650 ft.

5. MORE "SECRET WEAPONS".

Recent Admiralty "A" Messages have published information concerning three new German anti-shipping weapons.

One-Man Torpedo

This weapon consists of a "mother" and "child" each modified 21 inch electric torpedoes secured one above the other by connections which can be disengaged by the operator. The upper torpedo or "mother" has its warhead replaced by an empty practice head in which the operator sits under a perspex dome, while the lower torpedo or "child" is a normal electric torpedo. The pistol is magnetic and also detonates by head-on impact. The whiskers are removed and a net cutter is fitted. Large horizontal rudders are also fitted.

When the unit is under way, the top of the "mother" is awash with about two inches of the cockpit and all of the perspex dome above water. The unit is pointed at the target when the attack is about to be carried out and the "child" is then disengaged and gathers way under its own motors. The effective endurance of the coupled torpedoes is believed to be 12 to 15 hours and the speed about 2½ to 5 knots. The speed of the "mother" alone is about 3 to 6 knots and that of the "child" about 20 knots with an endurance of about 10,000 yards. The best attacking range is believed to be about 400 yards. The unit cannot submerge.

After the attack the operator usually scuttles the "mother" and swims ashore.

A modified form of this one-man torpedo has been reported. The main improvements are larger hydroplanes and possibly a small diving tank to enable the unit to submerge to a depth which probably does not exceed 10 feet.

One-Man Midget U-boat

- Characteristics:-
- Cigar-shaped hull about 25 feet long and 4-5 feet in diameter. (Graded B.3)
 - Conning tower about 3 feet high, elliptical in shape with perspex observation ports and hatch on top. (B.3)
 - Single periscope. (B.3)
 - Single rudder and propellor. (B.2)
 - Torpedoes 1-2 probably underslung. (B.3)
 - Electric motor
 - Diving depth probably does not exceed 50 feet. (C.3)

Radio-Controlled Explosive Motor Boat

These craft normally operate in groups of three boats composed of one control or "Kommando" boat and two explosive boats. Both types are built of plywood and look alike. They are 15-18 feet long with a beam of about 6 feet. The freeboard is very low and the craft can only operate in calm weather.

The control boat has a crew of one coxswain and two radio controllers while the explosive boat has a crew of one and an explosive charge of 660 pounds.

On impact with the target, the trigger rail around the fore part of the boat fires a small charge which sinks the boat and also starts a time fuse which detonates the main charge in either 2 or 4 seconds causing underwater damage to the target. The delay settings are preset ashore, the two seconds delay being intended for fast targets and the four seconds for slow or stationary targets.

The maximum speed of the control boat is 27-30 knots and that of the explosive boat is 25-27 knots. The normal cruising speed of both is 6-10 knots to avoid betraying their presence by wake. The maximum range of both boats is believed to be about 60 miles.

When ready to attack, the crews of the explosive boats set the charges to ready and jump overboard. The control boat directs each explosive boat separately on to the target by H/F W/T and then picks up their crews out of the water. The control is assisted by two guiding lights set fore and aft in the explosive boats.

If the target is missed, the boats are blown up by a chemical self-destructor.

The Japanese recently broadcast details of this new weapon on the authority of "the spokesman of the German Admiralty".

"This new weapon, the secret of which this far has been carefully safeguarded, has accounted up to now for the sinking of 35 transports totalling 225,000 tons. The weapon consists of two boats, an "explosive boat" which develops high speed and is shaped like wellknown peacetime speed-boats and which is loaded to full capacity with highly explosive matter and, secondly, a solidly built "control boat" whose task is to reconnoitre enemy targets and bring the explosive boat within accurate firing range.

"Both boats are steered each by a single man who is unarmed and who wears a lifebelt over his rubber suit. When the explosive boat reaches the maximum distance of 200 meters from the

enemy target, the commander of the boat sets a fuse and by pressing a button lets himself be blown out of the boat. The driver of the command boat then assumes long-distance control over the explosive boat against the enemy ship. Under favourable circumstances the driver of the explosive boat is picked up by the command boat".

The figure of 225,000 tons is, as usual, a gross exaggeration and exceeds the total losses of merchant ships from all causes for the whole world between June and August.

6. HANDBOOK FOR GERMAN U-BOAT CAPTAINS.

Further extracts are shown below from an Admiralty translation of "The German U-boat Command Handbook for U-boat Captains" 1942 Edition. A section entitled "German Methods of Evasion when Hunted" was published in the August edition of this report.

The Attack

The object of submerged attack is to fire with accuracy and unobserved at short range. The shorter the range, the more accurate will be the estimate of the enemy's course and of other relevant data. The operation of the hydrophones and echo-ranging sets depends on the state of the sea, water conditions, the vigilance of the personnel and other factors. The danger of discovery by the hydrophones and echo-ranging sets of the enemy is no reason for giving up a decisive short range attack. For short range attack against ships of medium or slow speed it is advisable, according to firing theory, to fire with an inclination of 90°, because in that case errors have the least influence on estimates and also because it is the most advantageous inclination for estimating speed. For greater ranges (above 1,000 meters) and against an enemy proceeding at a high speed, a finer inclination is preferable (about 60°).

The speed of the enemy is best estimated from abeam, and it is better to observe the wake rather than the bow wave, as the latter is easily camouflaged by the ship.

Favourable Conditions for Attack

Out of the sun, the vision is not dazzled while the target can be seen clearly.

From windward, the periscope when following the motion of the waves causes less spray and feather; moreover, observation upwind is difficult for the enemy, particularly when there is a strong wind and rain.

Unfavourable Conditions.

When the sea is very rough, high or with swell, the submarine has difficulty in depth-keeping, especially when attacking against the wind. The best method when there is a high sea is to attack with the sea on the beam; this gives the best conditions for depth-keeping and for a regular course for a torpedo fired with little or no angling. It is also unfavourable to attack with a background of black storm clouds when even the most carefully painted periscope looks white against this background. When attacking against the sun it is more difficult to estimate the speed, inclination and range of the enemy; there is also the danger that the periscope lens may flash like a mirror in the sun.

In general, in war, especially at night, the distance is always further than thought. Therefore be firm and self-controlled. The short-firing range is also safest for your own ship. The enemy escort does not drop depth-charges near its own ships. Good attacking probabilities may be spoiled by hesitation. - It is a mistake to remain at a distance from the enemy and wait for him to approach. The general rules for the attack are caution and prudence during passage as long as there is no target, but during attack, the highest degree of aggressiveness.

Shadowing.

The greater the range from the enemy, the finer should be the inclination for submerged attack; thus with normal visibility and in normal attacking conditions do not submerge until an inclination of zero is obtained with respect to the enemy's M.L.A. In trying to reach a fine inclination the submarine must not compromise her most obvious asset - invisibility. Therefore, by day and with good visibility no more than the tops of the masts should be seen. Keeping in the enemy's area while remaining by day at the limit of visibility is an extremely lengthy and tiring manoeuvre. It consists of tireless zigzagging on the horizon, approaching every time the tops of the masts grow smaller and moving off immediately when they appear larger.

Attacking submerged

Attacking submerged is also possible at dusk and on clear moonlight nights. Under these conditions the submarine may easily be nearer the enemy than she thinks. The rare opportunity of attacking an enemy must be exploited by the submarine at all risks to herself and with the use of all her torpedoes, however great the enemy's patrol activity.

The classical attack from the stern tubes is only carried out when the submarine is ahead of the enemy, or else when, owing to

an unexpected alteration of course on the part of the enemy, it turns out to be advantageous to fire from the stern tubes than the bow tubes. If the submarine is ahead of the enemy she must steer towards him for a stern shot; steering towards him is more advantageous than allowing herself to be overtaken by the enemy, because when she has to turn on to the attacking course she makes a turn smaller by two director angles than in the opposite case. Do not turn too soon, or the range will be too great. Keep a good hold on your nerves.

Browning Shots

With firing ranges above 1,000 meters and uncertainty regarding firing data, multiple fan shots must be fired. There is thus a strong chance of one torpedo hitting for certain.

Finishing Shots

If a finishing shot is required to finish a ship that has already been hit, remember that there are proportionately more misses with finishing shots than with attacking ones.

- (a) For the finishing shot, put the enemy on the bow with an inclination of 90° and a range of 2 to 3,000 meters.
- (b) Close to less than 1,000 meters on moonlight nights, and by day submerge and fire at 400 to 500 meters.
- (c) If enemy forces are sighted (on the sea or in the sky) fire the finishing shot at once.

Basic Principle - Better a few ships destroyed than many damaged.

After the attack

If after attacking submerged a severe anti-submarine attack on the part of the enemy makes it necessary to go deep, do so rapidly, moving away from the firing position and from the track of the torpedo. On the surface, in the confusion following the explosion of a torpedo, and while depth-charges are being dropped, the enemy hunt cannot use echo ranging sets or hydrophones. Do not proceed at hydrophone speed until you have reached a certain distance from the firing or sighting position. After the submarine has reached the necessary depth, stop everything and listen in silence to find out how the enemy is behaving and act accordingly. Do not go to greater depths than necessary because this, too, has marked disadvantages, such as causing severe leakage at the shafts and other hull apertures, and strain on the hull. Always choose the lesser risk, weighing the risk of depth-charges against severe leakage in

the hull. Come up to periscope depth again only after an exhaustive sweep of the horizon with the hydrophones and the echo-ranger.

7. JAPANESE PHILOSOPHY OF DEATH.

Tokyo Radio recently commented on the inability of the Allies to understand the Japanese attitude towards death.

"It is becoming increasingly clear to us that it is totally impossible for the British or Americans to comprehend the fearless attitude of the Japanese towards the phenomenon called death. It seems that the deaths of entire Japanese garrisons and civilian workers at Attu, and since then on various island outposts, either in the face of enemy fire or by their own hands, has been a shocking revelation to many people in Britain and America. Our enemies have often tried to explain this as an act of fanaticism. But that is because they are ignorant of the true trait of the Japanese people. According to their standards of what constitutes bravery in arms it is hopeless to analyse what prompts the fighting men and women of Japan to serve so diligently and to face certain death so stolidly.

"Yes, the subject of the Japanese attitude towards life and death is outside the realm of understanding by our enemies who are masters in the art of bragging until the going gets a little tough - whose entire scheme of life is ruled by selfish and material desires. This is the reason why they continually delude themselves by calling the Japanese maniacs or fanatics. According to their theory everything that is beyond their juvenile mind to solve is bad. However, from the standpoint of Asiatic philosophy, the dying of whole garrisons by shunning surrender as the lowliest form of human act has a deep significant meaning - significant because although the flesh of those who died so honorably have perished from the earth, their spirits are given eternal life.

"It is for this supreme achievement that every Japanese man, woman or child strives at home or on the battlefield. When a Japanese soldier dies he does with the satisfaction that his spirit will live in his descendants, and his fellow men still living. This implicit trust of all Japanese for each other is one of the many results of this philosophy of life and death and the source of the indivisible unity of this nation under all circumstances. We are confident we will certainly win this war. But no one believes that he will live to see that day of victory with his own eyes or sense the thrill of that occasion with his own body. Desire for victory has not been clouded by such selfishness. The actual attitude is that one is fortunate if he can offer his life in attainment of that

goal and have his dependants live to enjoy the fruits of such a triumph.

"This spirit is prevalent in songs being sung and plays being written today. It is evident on the battlefields as we hear of air forces crashing their planes into enemy objectives and staunch garrisons holding their positions against superhuman odds till life in the last soldier has flickered and died from this earth. These instances have been increasing and they will continue to increase as the critical stage of the war approaches. But these sacrifices will ultimately be the real basis for our victory and Asia's victory in this war."

8. INFERIORITY OF JAPANESE ELECTRICAL EQUIPMENT.

An admission of Japanese inferiority in electric equipment was published in the newspaper "Manichi Shimbun" in January, 1944.

"The point where our electric weapons are surpassed is not in design but in manufacturing technique. In our wireless sets it is in valves and the insulation materials which are inferior, while our short wave detectors and locators though superior in design to British and American are inferior as regards material. When I say that our valves are inferior I mean that the glass porcelain, filling materials, filament etc., are of lower quality and the life of the valve is short; and our wireless sets are inferior because our insulation materials are of lower efficiency and easily deteriorate."

SECTION V

MISCELLANEOUS1. GERMAN AND JAPANESE SUBMARINE LOSSES.

As stated in the last report, 12 U-boats were sunk or probably sunk by warships and aircraft during the month of July. This was the smallest figure of losses for some months. The U-boats can also claim their greatest success against shipping since March 1944 - five ships in the Indian Ocean, four in the Atlantic and two in British Coastal waters, a total of 61,000 tons in all. It is doubtful whether they will get much consolation from this success as the ratio is still more than one U-boat lost for each merchant ship sunk. During July all Atlantic convoys proceeding to the United Kingdom arrived without loss.

During August 87 attacks developed on U-boats - 45 by warships, 35 by shore based aircraft and 7 by carrier based aircraft. Fifteen U-boats were sunk or probably sunk - 8 by warships 3 by combined warship and Coastal Command aircraft, 2 by Coastal Command aircraft and 2 by carrier borne aircraft. All Atlantic convoys arrived in the United Kingdom unharmed but four ships totalling 28,000 tons were sunk in the Indian Ocean.

2. GLOSSARY OF SELECTED TERMS RECENTLY INTRODUCED INTO A/S WARFARE.

The glossary of terms below does not profess to be anything like complete but it may be of some assistance in sorting out a few of the ever-increasing number of code names and abbreviations now in use for Allied and Axis anti-submarine measures and counter-measures. Figures in brackets are references to the edition of the South-West Pacific Anti-Submarine Report in which fuller information may be found.

- A.N.D. Admiralty Net Defence - Anti-torpedo net streamed by merchant ships in dangerous waters. (44/2).
- A.S.A.T.S. Anti-Submarine Attack Tests - A series of 14 standardized tests now being introduced into the R.A.N. (44/9).

- Barrage Attack A/S attack carried out by a number of ships simultaneously. (44/6)
- Bathothermograph Instrument for producing water temperature depth curves and so predicting effective range of the asdic beam at various depths. (44/7 and 44/9)
- Child Lower torpedo of German human torpedo and assembly. (44/9)
- Creeping Attack A/S attack where one ship keeps station astern of the submerged submarine and cons another ship in to attack. (44/3 & 4).
- Curly Torpedo German torpedo which proceeds with a to-and-fro motion after an initial straight run of variable length. (44/8).
- Elliptical Target Towed A/S training target (43/3)
- Floating Meteorological Buoy Buoy dropped by German U-boats which automatically transmits weather information over an extended period.
- Foxer Allied counter to the Gnat. Americans use one set of parallel bar noise-makers towed astern and the British use two sets, one on each quarter. (43/6).
- Fu-Bo Contact-keeping smoke floats used by German U-boats.
- Gnat Acoustic Homing Torpedo used by German U-boats (44/2 and 44/9)
- G.S.R. German Search Receiver for Allied radar transmissions.
- Hagenuk German Search Receiver on the 1½ meter band
- H.A. Type Submarine New Japanese submarine 98 feet in length (44/8)
- Helicopter Kite Helicopter towed by German submarines to increase radius of vision. One kite has been captured in the Indian Ocean. (44/3 & 4).

Kalbokan Japanese frigate-type of A/S escort vessel (44/7)

Leigh Light 24 inch searchlight carried by A/S aircraft, principally Wellingtons and Liberators.

Loran Beam Long range Naval radio navigational aid.

Lut Improved Curly torpedo (44/8)

M.A.C. Ships Merchant Aircraft Carriers. Tankers and grain ships equipped with a flight deck. (43/4)

M.A.D. Magnetic Airborne Detector (44/7)

Mark X Depth Charge 1-ton depth charge which can be fired from a destroyer's torpedo tubes.

M.A.S.T.U. Mobile Anti-Submarine Training Unit usually accommodated in a double-decker bus. (44/7)

Metox German Search Receiver on the 1½ meter band.

Milch Cows Nickname for German supply U-boats

M.O.B. German asdic equipment

Mother Upper (controlling) torpedo in German human torpedo assembly. (44/9)

Mousetrap American equivalent of British Hedgehog (43/1)

Naxos German Search Receiver on the 10 cm. band.

Pillenwerfer See S.B.T.

'Q' Attachment Tilting oscillator used for depth determination (43/6).

Radio Sonic Buoys Buoys dropped from aircraft which amplify and transmit underwater noises (44/7)

R.D.B. Radar Decoy Balloons (43/6 and 44/5)

R.D.S. Radar Decoy Spar-buoys (44/6)

Retro-Bombs Rocket-propelled bombs projected backwards to neutralize the forward speed of the aircraft (44/7)

R.Ps. Rocket Projectiles carried by aircraft and used as A/S weapons (43/6)

Roman Candles White rockets used by merchant ships to indicate attack by U-boat or E-boat. (44/2)

S.B.T. Submarine Bubble Target developed by the Germans to produce false echoes or hydrophone effect during an A/S attack (43/2 and 44/7)

Schnorkel Extensible trunking containing air intake and diesel exhaust pipes - used by German U-boats in Channel operations (44/6)

Schwann Buoy Buoy dropped by German U-boats containing transmitting beacon for homing aircraft

Shark A/S projectile fired from the main armament and intended to strike the U-boat underwater (44/5)

S.M.S.D. Shipborne Magnetic Submarine Detector developed by the U.S. Navy (43/3)

Squid Ahead throwing weapon which throws bombs the exploding depths of which can be set electrically from the depth prediction asdic gear. (43/5)

Step Aside Procedure Procedure to be adopted by A/S ships not fitted with Foxer when approaching a U-boat which may possibly have fired a Gnat (See A.S.C.Is.)

Triplane Target A/S target used for training in the use of depth predicting gear. (44/8)

Two-inch Rocket Flare Flare fired from Rocket Projector attached to the gunshield of forward mountings of A/S vessels to eliminate the need for starshell. (43/6).

Wanze German Search Receiver on the 1½ meter band

W-Boat Small German U-boat with high submerged speed (44/5)

3. THE EFFECT OF TEMPERATURE GRADIENTS ON MAXIMUM ASDIC RANGES.

During the past 12 months the U.S. Naval Authorities have made considerable progress in the study of the effect of temperature gradients on the effective range of an asdic beam, and the following notes published in the Admiralty Anti-Submarine Report are based on their experience.

The range at which a submarine can be detected depends on the loudness and character of the echo in relation to the reverberation and background noise. It is governed to a large extent by the spreading and weakening of the sound as it travels to the target and back.

TEMPERATURE GRADIENTS ABSENT

If the temperature does not change by more than half a degree in the first 50 ft., the asdic beam is not appreciably deflected, either up or down, and its rate of spreading and the consequent weakening of the echo with range is normal. If the search is made at normal operating speed in calm to moderate weather, and the gear is in good condition, a submarine will usually be detected to at least 2,500 yards. There may be some reduction owing to the echo being obscured by strong reverberations if the water is shallow and the sea bottom is rough - with rock, coral, stones or shingle.

TEMPERATURE DECREASES WITH DEPTH (NEGATIVE GRADIENT)

(See Fig.1)

If the temperature decreases with depth the beam is bent downwards, leaving a Shadow Zone into which little sound can penetrate. A submarine which is a few hundred yards inside the shadow zone is not likely to be detected. An example showing the effect of a negative gradient is shown in Figure 1; the temperature scale is on the right of the diagram and the depth scale on the right of the diagram and the depth scale on the left. To make the diagram a reasonable size, the depth scale is eight times the range scale and an exaggerated impression of the bending of the beam is obtained if this is not taken into account.

TEMPERATURE INCREASES WITH DEPTH (POSITIVE GRADIENT)

(See Fig.2)

If the temperature increases with depth, the asdic beam is bent upwards to the surface, where repeated reflections will extend the effective range against a shallow target to 2,000 - 4,000 yards. An example of the effect of a positive gradient is shown in Figure 2.

Conditions are not likely to be so good against a deep target.

LAYER EFFECT (See Figs. 3 & 4).

If there is no temperature gradient, or a positive gradient, at shallow depths, followed by an underlying layer with a negative gradient, a shallow target should be detected at long range, while contact with a deep target can only be established at a considerably reduced range. This reduction of range against a target below the layer is known as Layer Effect, and it is due to the greatly increased spreading of the beam in the underlying negative gradient, as shown in Figures 3 and 4. It does not make the deep target undetectable, but it shortens the working range of the of the asdic against it; within the reduced working range, echoes from the deep target are more or less normal, because the steep rays which come into use at close ranges are not seriously affected by temperature gradients.

MAXIMUM RANGES IN SHALLOW WATER (See Fig. 5).

In soundings less than 100 fathoms the roughness and texture of the bottom may be important. If the bottom is smooth sand, or sand and mud, the maximum range is likely to be extended by multiple reflections as shown in Figure 5. Trials made under such conditions show that, however severe the temperature gradient, contact may be possible at a range of 2,000 yards or more; sometimes the contact can be held continuously during the run-in but, under slightly different conditions, regions of strong echoes may alternate with regions of weak or no echoes - Skip Distances.

If the bottom is rock, coral or stones, the maximum range is likely to be reduced below normal by strong reverberations.

RANGING ON SURFACE VESSELS

In the presence of layer effect, ranging on another surface vessel does not give a reliable indication of the effective range of the asdic against a deep submarine, unless it is diminished by a factor which depends on the temperature gradient. The Bathythermograph was made by the U.S. Naval Authorities to measure the gradient and to predict the range, either from a surface range, or from tables when tactical requirements do not permit opening and closing the range from adjacent screening vessels.

USE OF BATHYTHERMOGRAPH

The bathythermograph is streamed like a Kelvin sounding lead and it brings to the surface a record of the variation of temperature with depth on a smoked glass slide. United States vessels are fitted with a small electric winch, not more than 30 ft. forward of the propellers. In British vessels the Kelvin sounding machine

Figure 1. Negative gradient.

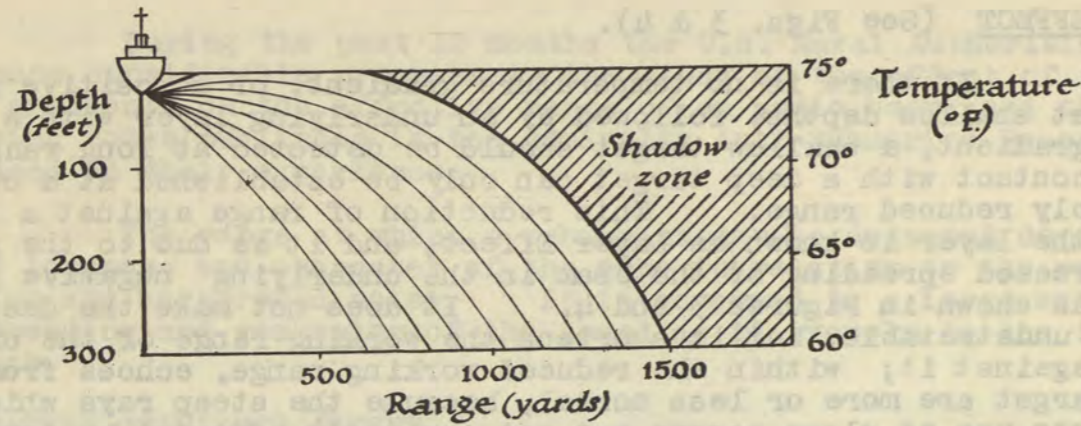


Figure 2. Positive gradient.

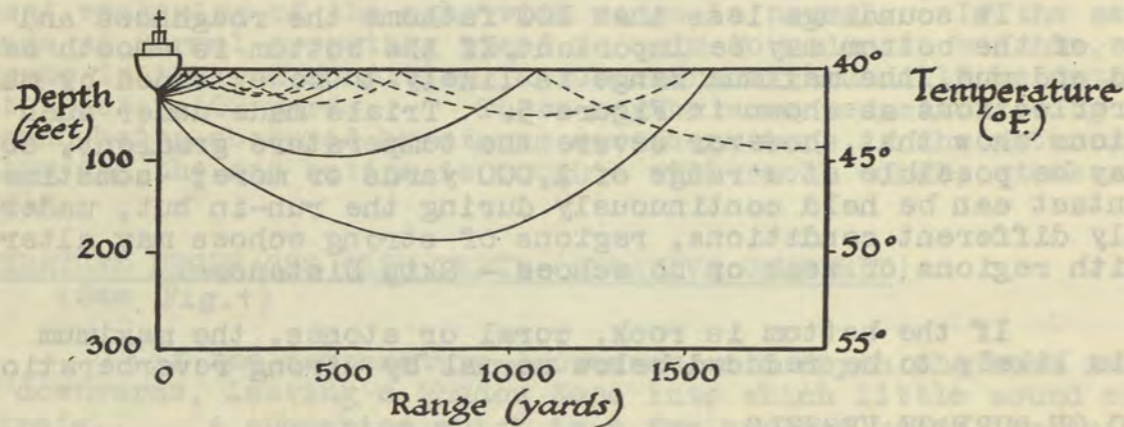


Figure 3. Layer Effect below water, with no gradient.

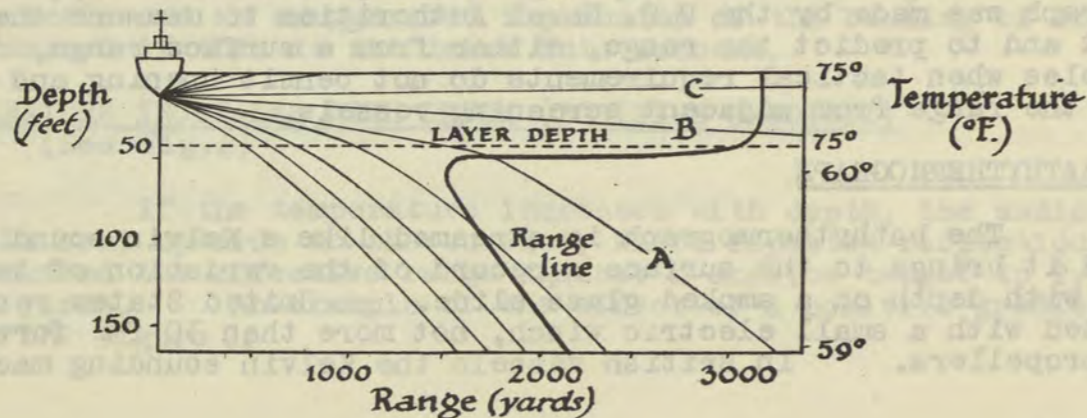
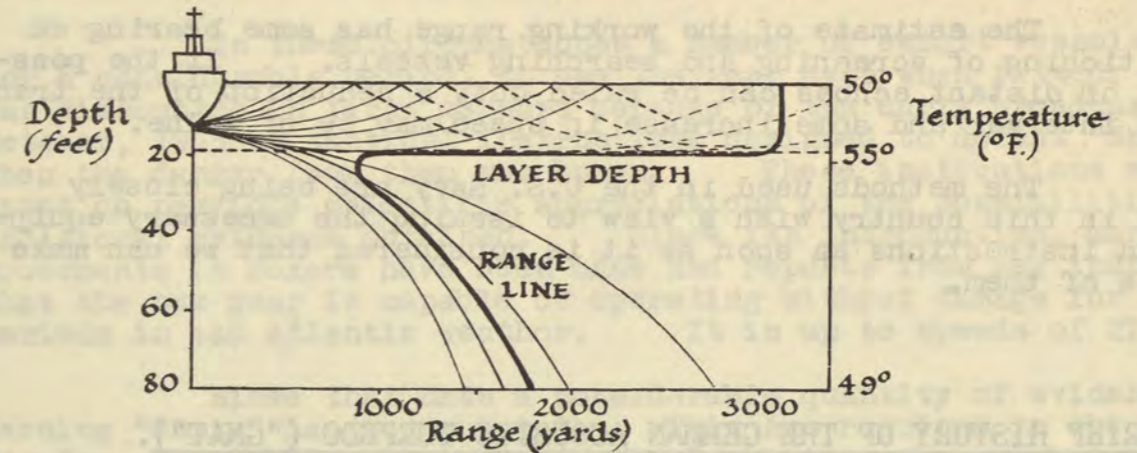
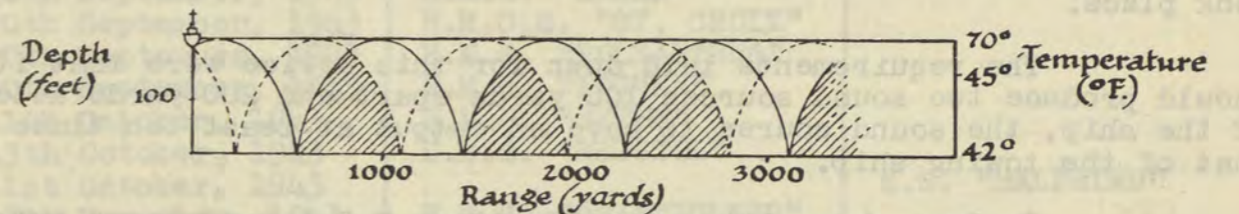


Figure 4. Layer Effect below a Positive Gradient.



The heavy line shows the probable limit of echo detection.

Figure 5. Sound Beam Pattern for a Negative Gradient in shallow water with four bottom Reflections.



The shaded regions are possible Ship Distances.

can be used if it is no further forward than the bridge. For use at speeds greater than 10 knots the usual sounding wire has to be replaced by stronger (3/32-in) wire.

VALUE OF MAXIMUM RANGE PREDICTIONS

The estimate of the working range has some bearing on the stationing of screening and searching vessels. If the possibility of distant echoes can be ruled out, a reduction of the transmission interval and some increase in speed may be of value.

The methods used in the U.S. Navy are being closely studied in this country with a view to issuing the necessary equipment and instructions as soon as it is considered that we can make good use of them.

4. A BRIEF HISTORY OF THE GERMAN ACOUSTIC TORPEDO ("GNAT").

As far back as 1942 the Admiralty was experimenting with an acoustic torpedo and, with accumulating evidence, a scientific appreciation of the possibilities was made in April, 1943.

As a result, counter-measures were designed for the protection of slow ships from a long range acoustic torpedo. At that time it was thought unlikely that such a torpedo would exceed 20 knots, and, as there were indications that the principle was being applied to air-driven torpedoes, long range was assumed.

Since little or nothing was known of the characteristics of the torpedo, the counter-measure was designed to defeat a majority of the possible combinations of listening pattern and rudder control. Thus the British twin Foxer was born three months before any attacks took place.

The requirements laid down for this device were that it should produce two sound sources 100 yards apart and 200 yards astern of the ship, the sound course to have an output at least ten times that of the towing ship.

In September, 1943, the "Gnat" or T.5 torpedo came into operational use by U-boats and the first casualties were recorded. It is probable that a few casualties from T.5 or earlier acoustic torpedoes had occurred before this, but without being recognised. Owing to steps already taken in the preparation of counter-measures it was possible to fit a complete Escort Group with Twin Foxers 17 days after the first casualty had been reported.

The natural dislike of towing anything likely to hamper manoeuvre, the bad weather prevalent in the Atlantic in the Autumn of 1943, some faults in design of the Foxer running gear, and the undoubted difficulty of gaining and maintaining asdic contact with Foxers running all combined to render the use of Foxer unpopular at sea.

In these circumstances a number of escort vessels failed, for a considerable period, to use the gear even when fitted. This was discounted in large measure because of the early broadcast in October, 1943 of tactical instructions designed to defeat "Gnats" when the danger from them was known. These instructions were based on previous scientific appreciations of the possibilities and additional evidence obtained. Since its introduction, many improvements in Foxers have been made and reports from sea indicate that the new gear is capable of operating without damage for long periods in bad Atlantic weather. It is up to speeds of 22 knots.

Since that date a considerable quantity of evidence concerning "Gnats" has accumulated. This has resulted in the necessity for slight changes in our tactical counter-measures but has, in general confirmed the soundness of our physical counter.

The value of these measures may be judged by the fact that so far, with the two possible exceptions shown in the accompanying list, there is no case of a casualty when either the recommended tactical procedure has been adopted, or British Twin Foxers have been streamed and working.

ESTIMATED "GNAT" CASUALTIES *

Date	Escorts or Destroyers	Others
20th September, 1943	H.M.S. "LAGAN"	
20th September, 1943	H.M.C.S. "ST. CROIX"	
20th September, 1943	H.M.S. "POLYANTHUS"	
20th September, 1943	H.M.S. "ITCHEN"	
11th October, 1943	H.M.S. "HYTHE"	
13th October, 1943	U.S.S. "BRISTOL"	
31st October, 1943		S.S. "HALFRIED"
18th November, 1943	H.M.S. "CHANTICLEER"	
11th December, 1943	H.M.S. "CUCKMERE"	
12th December, 1943	H.M.S. "TYNEDALE"	
12th December, 1943	H.M.S. "HOLCOMBE"	
16th December, 1943		S.S. "McDOWELL"
24th December, 1943	H.M.S. "HURRICANE"	
31st December, 1943		S.S. "EMPIRE HOUSMAN"

Date	Escorts or Destroyers	Others
9th January, 1944	H.M.S. "ABELIA"	S.S. "ANDREW G. CURTIN"
26th January, 1944	H.M.S. "OBDURATE"	
26th January, 1944	H.M.S. "HARDY"	
30th January, 1944	H.M.S. "WOODPECKER"	
20th February, 1944	H.M.S. "MAHRATTA"	
25th February, 1944	H.M.S. "GOULD" ø	
29th February, 1944	H.M.S. "ASPHODEL"	
9th March, 1944	U.S.S. "LEOPOLD"	
9th March, 1944	H.M.S. "LAFOREY" ø	
30th March, 1944	U.S.S. "DONNELL"	
3rd May, 1944	U.S.S. "MENGENS"	
3rd May, 1944	F.S. "SENEGALAIS"	
4th May, 1944	U.S.S. "FETCHTELER"	
4th May, 1944		

* Not all of these vessels were sunk. It is considered that T.5 and not T.4 caused the casualties.

ø Both these ships were sunk at the end of a hunt, the U-boat firing at comparatively short range as she surfaced before being destroyed.

5. TYPE 149X ASDIC SET.

Details of the Type 149X Cruiser Asdic Set have been published in a recent Admiralty Anti-Submarine Report.

The purpose of Type 149X is to enable approaching torpedoes to be detected in time to take effective avoiding action while providing also a means to carry out an echo-detection sweep. This equipment is already fitted in H.M. Ships "RAVAGER", "GLASGOW", "SHEFFIELD", "BELFAST" and "MAURITIUS" and is being fitted in H.M.S. "SWIFTSURE".

Type 149 embodies a directional hydrophone rotating at high speed and a conventional echo-detection set and is a development of the Type 132 double-oscillator Asdic set fitted in capital ships, aircraft carriers and cruisers.

The listening oscillator of the Type 132 is removed and a 15 K/c spherical hydrophone installed in its place. Modification to the directing gear and electronic system is involved. The

echo-detection set remains unchanged except that its frequency is raised to 20 K/cs. to avoid interference with the hydrophone.

The hydrophone is rotated at 30 r.p.m., which gives a good chance of detecting a torpedo at an early stage in its travel, especially since the hydrophone effect present during its initial acceleration is louder than that emitted when it settles down to running speed. If discharged from a submarine, the actual moment of firing may be indicated.

In addition to aural reception, continuous visual presentation of the sound received by the hydrophone is given on a plan position indicator (P.P.I.), enabling the relative bearings of all sources of sound to be obtained at any moment. This should be particularly valuable during a torpedo attack, when there may be a number of sources of sound - ships in company and torpedoes - and these will be shown separately on the P.P.I. providing they are on appreciably different bearings.

Both paravanes and their chains cause severe interference at speeds above 18 knots.

Normal watch-keeping is carried out in the Asdic control between decks, but a remote P.P.I. unit is being fitted on the bridge in some cases. The provision of a bridge P.P.I. entails a certain amount of risk, since immediate action must be taken on any report of hydrophone effect and attempt to classify or analyse the hydrophone effect on the bridge may cause dangerous delays. It is considered preferable to accept the occasional "False alarm" and to alter course immediately a report of unidentified hydrophone effect is received rather than risk any delay while the report is being confirmed.

No operational reports of this new equipment have been received but good results have been obtained from trials in "RAVAGER" and "GLASGOW".

The following is an extract from the Commanding Officer, H.M.S. "GLASGOW'S" report of the trials:-

"Trials of Type 149 Asdic indicate that the set is a valuable detector of torpedoes, giving indication to the Officer of the Watch in good time to take successful avoiding action.

"Paravane chains cause severe interference at speeds over 18 knots. Trials without chains indicate that detection will be greatly improved at high speeds and probably enable detection of torpedoes at 24 knots."

6. HYDROPHONE EFFECT OF "DUKWS".

The Commanding Officer, H.M.A.S. "MILDURA" has reported that a group of Army amphibious landing craft (DUKW) recently approached his ship without hydrophone effect being heard.

"During recent exercises when this ship co-operated with the Australian Army in Laguna Bay, near Caloundra, Queensland, it was noticed that no hydrophone effect was detected from the "DUCKS".

"The "DUCKS" were driven from the beach, into the surf, and then out to this ship, at anchor in the bay, approximately 1½ miles from the beach.

"These landing craft have fast reciprocating engines, but it was only when they increased revolutions preparatory to leaving the ship's side that slight hydrophone effect was noticed.

"The propellor of the "DUCK" is enclosed in a tunnel which is open at the bottom.

"The A/S set was in good working condition; bottom echoes and water noises being received clearly. This set has fitted a Type "A" oscillator".

The Commanding Officer, H.M.A.S. "RUSHCUTTER" made the following comment:-

"It is presumed that the propeller tip speed of this particular "DUCK" was insufficient to create cavitation, with its consequent super-sonic H.E., at normal running speeds.

"That hydrophone effect was heard only on an increase in revolutions is common to some ships (i.e. when extra pressure is applied to the blades) and may indicate in this case a low noise level of the "DUCK" at normal speed which is a necessary requirement for this type of craft.

"The tunnel may be responsible for the lack of H.E. It may reflect what H.E. there is downwards or cause a disturbance sufficient to screen the sound source."

7. INFLATED GERMAN CLAIMS OF SHIPPING LOSSES.

The table below shows the percentage exaggeration of

monthly German claims of Allied tonnage sunk and damaged by Navy and Luftwaffe since 1st January, 1944. Exaggeration will probably known no limits at all now that the "sacred soil" itself is under fire.

	German Claims		Actual Figures *		Percentage ex- aggeration	
	Sunk	Damaged	Sunk	Damaged	Sunk	Damaged
<u>1944</u>						
January	178	249	92	36	93	592
February	144	200	80	23	80	770
March	156	176	83	15	88	1,073
April	154	227	75	29	105	683
May	132	169	27	18	389	839
June	313	328	31 (a)	67 (a)	910	390

* Losses due, or assumed to be due, to Japanese action, and losses due to mines have not been included, as these are not included in the German claims.

(a) 11,000 gross tons may have to be transferred from "Damaged" to "Sunk", in which case the percentage exaggeration would be 624 and 486 respectively.

SECTION VI

MATERIELC.A.F.Os. ON ANTI-SUBMARINE SUBJECTS.

C.A.F.O. 1944	Subject	Brief Description
1333	Types 144 (Series) and 145 (Series)	Inclusion of Control Training, Pattern 9960 - REPORTS
1335	Reduction of Warning of Impending Attacks during A/S Hunts	Possibility of using "Q" Attachment only.
1386	"Q" Attachment	Introduction of New Rack, Mounting for Receiver, etc. - As. and As.
1433	Domes, Patterns 3067, 3159, 6935/A/B, A.403 and A.404	Securing of Pintle
1435	Automatic Training System	Modification to enable "Step Across" Procedure to be used
1468	S.D.Ratings	Exposure to Aural Shocks from Gunfire.
1482	Depth Charge Primer Placer	Modification of Mark I model to Mark I*
1544	"Q" Oscillator Pattern A 2215	Method of Changing Oscillators
1547	Bearing Recorders, Patterns A.2097 and A.2247	Adjustment of Pattern A.2070 Switch, Transmitting
1549	A.V.C. Receivers	Additional Ventilation

C.A.F.O. 1944	Subject	Brief Description
1700	Depth Charges Marks VII, VII* Marks X and X* and Mark XII - T.N.T. Amatol or Minol	Minimum Speeds for Firing Depth Charge Patterns
1719	L.F. Motor Alternators, Patterns A.477 and A.478	Introduction of Spare Brushes and Brush Springs

Attention is also drawn to the following orders -
1334, 1336, 1382, 1383, 1384, 1385, 1422, 1423, 1492,
1543, 1545, 1548, 1656, 1703 and 1722

