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A.C.B. 0254/44 (2)

ROYAL AUSTRALIAN NAVY

MONTHLY NAVAL WARFARE REVIEW

DECEMBER, 1944

S E C R E T

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SECTION I

CURRENT EVENTS IN SOUTH WEST PACIFIC

1. THE NAVAL BATTLES OF 24th/25th OCTOBER

It is now possible to give a general picture of the events in the Philippines area during the period 24th/26th October. There seems no doubt that the Japanese plan was to carry out two synchronised attacks on the Allied Naval Forces in the Leyte Gulf while the main American covering force under Admiral Halsey was occupied with the Japanese carrier task force well to the north east. The story of how this plan miscarried with disastrous results for the Japanese is most conveniently divided into three parts and the narrative below deals with the activities of each of the Japanese groups separately.

The Southern Group

This group was probably at Singapore at the time of the landings at Leyte Island. It seems quite certain that the landings were a complete surprise to the Japanese who must have considered that the surveying and beach demolition operations which commenced in the Leyte Gulf area on D-3 Day were a feint on the part of the Americans. But for this mistake the Singapore force would probably have appeared much earlier.

The composition of this force is believed to have been two battleships of the "YAMASHIRO" class, three to five heavy cruisers, two light cruisers and about ten destroyers. It was first sighted coming from the direction of Borneo on 24th October. This force was considered to be a greater potential threat than the central force which was under attack by aircraft as it approached the San Bernardino Strait. Rear-Admiral Oldendorf, with six battleships, seven cruisers (including H.M.A.S. "SHROPSHIRE") and 16 destroyers (including H.M.A.S. "ARUNTA") at his disposal, accordingly formed a patrol late on the 24th at the northern end of Surigao Strait through the narrow waters of which the Japanese would have to pass after proceeding through the Mindanao Sea on their way to Leyte. The complete absence of Japanese submarines allowed this patrol to be made at the slow speed of five knots.

The general plan was to form our forces in a crescent across the northern end of the Surigao Strait with the battleships together in the centre to the north, two cruiser squadrons one on either side

of the strait about 4 miles south-east and south-west of the battleships and the destroyers in two groups close to the land on either side further to the southward.

The approaches to the southern end of the strait were patrolled by about 30 P.T. boats which eventually achieved their purpose by giving early warning.

The first sighting report came just after 0200 from a P.T. boat which reported four battleships and an unknown number of cruisers and destroyers in two groups separated by about four miles. The P.T. boats carried out several torpedo attacks but they failed to turn the enemy. It is possible that the Japanese destroyers were detached to deal with the P.T. boat menace for, when the force was first detected by radar by the main Allied force at the northernend of the strait, the battleships were in the van and the destroyers were not picked up until late in the proceedings and certainly never closed for a concentrated torpedo attack.

The Allied destroyers were ordered in to attack with torpedoes at 0304. These attacks were completed by 0340 and several hits were observed ("ARUNTA'S" part in these attacks is shown in more detail in another section). Despite the damage sustained in these attacks the Japanese force still came on, no doubt aware that their central force was successfully passing through the San Bernardino Strait and that Admiral Halsey was fully occupied with the Japanese carrier force away to the north-eastward and was not an immediate threat.

The fire from the Allied battleships and cruisers had been withheld while the destroyers were attacking in order to retain the element of surprise but at 0351 the order came for the cruisers to open fire. At this time the leading Japanese ships were at a range of 8-9 miles from the seven cruisers ("SHROPSHIRE'S" part in this action appears in another section). The fire was in full Radar control and was devastating. The American 6-inch cruisers were firing about 10 salvoes per minute in spite of the fact that they were carrying out the deliberate fire ordered and at times the shells must have been falling in the target area at the rate of nearly 1,000 per minute. The Japanese, who had been steaming northward at 19 knots, turned to the westward at 0406 and slowed down to 12 knots. They later reduced to 8 knots and retired to the southward. After the first few minutes of gunfire there was no difficulty in line keeping as the sea appeared to be a mass of ships on fire. Eight burning ships were counted from "SHROPSHIRE" alone. All targets were standing out clearly in the light of the blazing vessels. The battleships "FUSO" and "YAMASHIRO" were definitely sunk and survivors were picked up from both ships.

There was very little retaliation on the part of the Japanese and their return fire was very ragged. It is probable that the

concentrated fire was so shattering and was coming from so many directions (the American battleships opened up just after the Japanese turned) that the enemy fire control organization was completely confused and never recovered. None of our battleships or cruisers was damaged in any way.

As dawn broke the few remaining ships of the Japanese squadron were pursued down Surigao Strait. One destroyer which attempted to escape to the south and east of Dinagat Island was sunk by the combined fire of the cruisers. She disappeared in about 2 minutes after fire was turned on her.

The pursuers had to be recalled from the chase just after 0630 when news came through of the attack by the central Japanese force on the small group of escort carriers and destroyer escorts off Samar Island.

Before it could withdraw to the Mindanao Sea the southern Japanese force had lost at least two battleships, one cruiser and five destroyers.

The few Japanese ships that escaped had no respite and were attacked by carrier borne aircraft while still in the vicinity of the Surigao Strait and later during 25/26th October by land based aircraft while fleeing down the Mindanao Sea.

The Central Group

The central group probably consisted of five battleships, (believed to be "YAMATO", "MUSASHI", "NAGATO", "KONGO" and "HARUNA"), 10 cruisers and about 12 destroyers. This force headed for Leyte Gulf by way of the Sibuyan Sea and San Bernardino Strait after passing south of Mindoro.

The first sighting of this force was on the 24th to the westward of Mindoro. An air strike was sent out by Admiral Halsey and, although it did not achieve the success that it was at first thought to have done, it did slow down the Japanese force and possibly prevented the synchronisation of the two attacks on Leyte Gulf from the north and south. One damaged battleship (probably "MUSASHI") did not get through the San Bernardino Strait.

Because it was considered that the threat from the north had been shattered by the air attacks on the 24th, the American strategy was concentrated on the smashing of the southern force by Rear-Admiral Oldendorf's battleships and cruisers. Three groups of four escort carriers to the eastward of Leyte were thus left with a few destroyers and destroyer escorts as their only cover. The Japanese force coming down from San Bernardino Strait sighted the northern of these groups at about 0630 and opened fire from about 30,000 yards. It was now daylight so that there was no suggestion that

the Japanese were using full radar control. The carriers retired at their best speed of 19 knots to the south east but one ("GAMBIER BAY") was hit and slowed down. The Japanese closed to 2,000 yards before she was sunk. Avenger aircraft were flown from the carriers and carried out several attacks leaving one cruiser and a destroyer dead in the water.

The Japanese force was formed with the battleships in the centre and cruisers on either bow of the formation. Nevertheless two American destroyers and a destroyer escort went gallantly in to attack the battleships with torpedoes at 0740 and were all sunk by withering cross fire from the cruisers.

Realising that there was no hope of success for the attack against the Naval forces at Leyte owing to the failure to co-ordinate the attacks and to the presence of a now superior Allied force, the Japanese broke off the engagement before the main Allied force could come up from Surigao Strait, and retired northwards. The Japanese were also probably aware that Admiral Halsey's carrier task force was hurrying south. This central force was seen retreating through San Bernardino Strait late on the 25th and was harried next morning by land based aircraft west of Panay. The total losses suffered by this force are not known but there is reason to believe that the four battleships which attacked the escort carriers escaped to the west although a few of them were probably extensively damaged. They were certainly very fortunate that the American carrier force could not arrive at the San Bernardino Strait before early in the forenoon of the 26th.

The Northern Force

This group consisted of two battleships with flight decks aft ("ISE" and "HYUGA") one fleet carrier ("ZUIKAKU") and three light carriers ("CHIYODA", "CHITOSE" and "ZUIHO" or "TAIYO") five cruisers and about six destroyers. I now seems fairly certain that this was a purely diversionary force intended to lure away the Third Fleet carriers while the other two Japanese forces were attacking Leyte Gulf.

This northern force apparently came from Japanese home waters and was first sighted 200 miles to the east of the north-east tip of Luzon at about 1600/24th. The Third Fleet broke off their attack on the Japanese central force late on the 24th and hurried northwards. The enemy altered course to the north during the night of 24th/25th but was pursued and engaged during the forenoon of the 25th. Heavy casualties were inflicted on the Japanese by torpedo bombing and strafing attacks carried out by air strikes from the American carriers. It is claimed that the four Japanese carriers were sunk together with one cruiser and two destroyers. The action

was broken off by Admiral Halsey when the news came through of the attack by the central Japanese force on the American escort carrier force. Admiral Halsey hastened to the south-west in an endeavour to cut off the retiring Japanese force before they passed through San Bernardino Strait and the Japanese carrier force was last seen retreating towards Formosa.

2. OPERATIONS IN SURIGAO STRAIT, 25th OCTOBER

On the night of 24th October, an attack was expected from Japanese surface forces through Surigao Strait and Task Group 77.2, augmented by Task Group 77.3, took up position to cover the northern entrance of the strait. With the battleships in the centre, cruisers and destroyers of Task Group 77.2 on the left flank and cruisers and destroyers of Task Group 77.3 on the right flank, the force patrolled at slow speed on an east-west line on the western side of Surigao Strait abreast Cibugan Grande Island. H.M.A.S. "SHROPSHIRE and U.S.S. "PHOENIX" and "BOISE" were the cruisers of Task Force 77.3 stationed 240° 8,000 yards from the battle line and H.M.A.S "ARUNTA" and U.S.S. "HUTCHINS", "DALY", "BACHE", "KILLEN" and "BEALE" were the destroyers stationed 230° 8,000 yards from the cruisers.

The narrative below has been extracted from the action reports received from "SHROPSHIRE" and "ARUNTA".

H.M.A.S. "SHROPSHIRE".

At 0202/25th, P.T. 134 reported an unidentified target proceeding up the strait and opposite the south point of Panaon Island.

The first radar contact on the Japanese force was made by "KILLEN" at 0247 - two or three targets bearing 170° 17 miles. "SHROPSHIRE" contacted these ships at 0313 on her SG set at a range of 34,300 yards on a bearing of 161°. Her appreciation was that there were two large ships steering 003° at 19 knots. At 0340 a second group of two large ships was picked up bearing 157° 30,350 yards but this group turned sharply to the south when the first group came under fire.

When the order to open fire was made at 0351 the enemy's course and speed were estimated at 340° 18 knots. "SHROPSHIRE" was not able to open fire until 0356 when the range dropped to 15,800 yards, the maximum blind fire range for her 285 set. The primary gunnery target selected was believed to be a battleship.

"SHROPSHIRE'S" first broadside was spotted by radar as 400

yards short and a correction of "up 400 yards" was applied before firing broadside two. By a streak of good fortune, the target was illuminated by a flash as the first broadside fell and a correct -ion for line of "Left 4" was made when the splashes were clearly seen to the right of the target. The second broadside was spotted as 200 yards short and a further correction of "up 200 yards" was applied. The third and fourth broadsides were both spotted as straddles "over". Both the Commanding Officer and the Spotting Officer observed hits from these two broadsides.

In all 32 eight-inch broadsides were fire and 15 straddles were spotted from the 29 splash echoes observed. A very high rate of fire was attained in rapid salvoes - as many as 8 broadsides in two minutes - and an average of 3.6 salvoes per minute was maintained. This was particularly noteworthy in view of the fact that the turrets had been in service for 16 years and "SHROPSHIRE" had fired 2,396 rounds of 8-inch since December 1943.

The ship experienced no damage or casualties. There was some return fire and at least 4 salvoes of heavy calibre were heard to pass over the ship.

In the radar section of her report, "SHROPSHIRE" states that the 285 first picked up the echo at 19,000 yards. The 8-inch shells were followed out to the target by both L18 and L24 panels and range spotting corrections were observed. It was noted that other shell splashes varied from 500 short to 400 over, One ship was firing consistently 300 yards short. Occasional visual sightings showed the line to be correct. During the engagement all ships switched on transponders and Type 281 and 243 successfully identified friendly ships for the tactical plot. The only suspicious Japanese radar transmissions were noted on the L18 panel just prior to firing when some sweeping interference was noted for a few seconds. No jamming or "window" was experienced.

The cease fire came at 0410 when the range was 13,700 yards At this time a rangefinder range on a burning ship confirmed that it was one of the group being engaged by "SHROPSHIRE". Four new echoes were picked up just after 0500 all retiring southward. These four together with the four previously mentioned and a possible destroyer echo near the engaged group made a total of nine ships contacted by "SHROPSHIRE" during the action.

H.M.A.S. "ARUNTA"

"ARUNTA" had been detailed to lead "KILLEN" and "BEALE" in the event of a destroyer torpedo attack developing. She first contacted the nearer of the two groups of ships at 0252 at a range of 30,800 yards. When the range decreased to 27,000 yards, five ships could be distinguished.

C.T.G. 77.3 gave orders for the destroyers to attack with torpedoes at 0304 and Comdesron 24 led round to the southward.

The left flank destroyers made their attacks first and at least one hit was observed. At 0311 "ARUNTA" was ordered to attack and the three destroyers increased to 25 knots on a course of 145°. The attacks were not to be supported by gunfire in order to effect surprise and "ARUNTA" endeavoured to reach a position 6,000 - 7,000 yards on the port bow of the enemy. The Japanese opened fire at 0319 with starshell. Some bursts were to the right and others were short. At 0320, at a range of 7,200 yards, "ARUNTA" passed the order to fire torpedoes to port. At 0326 "ARUNTA" fired her four torpedoes at the only large ship sighted in the enemy formation. The range was then 6,900 yards and the estimated inclination 125° left - the enemy's speed had been plotted as 25 knots. No results were observed from "ARUNTA'S" attack but a large flash at 0327 was thought to be a hit by either "KILLEN" or "BEALE".

The only fire from the enemy observed was one salvo 300 yards short apparently of a calibre of about 4-inch.

Smoke was made and the destroyers retired on a course of 000° and speed 25 knots. At 0331 a few salvoes were fired in the direction of the destroyers and one fell between the two American ships.

At 0352 "ARUNTA" opened fire at visible destroyer targets bearing Red 90, range 13,300 yards. Eleven 6-gun salvoes were fired on 285 ranges and hits were observed from the first two salvoes after which salvoes from other ships made observation of the fall of shot impossible. Fire was checked on this target when "HUTCHEN" passed through the line of fire laying smoke. "ARUNTA" now opened fire on a second target at Red 60 range 11,400 yards. Fifteen 6-gun salvoes were fired but the fall of shot could not be accurately observed.

At several times during the run enemy radar interference was observed on the SG screen. This was similar in all respects to the interference experienced by "ARUNTA" on 10th June, 1944, a description of which was published in "Monthly Statement of Japanese Radar and Radio" for August, 1944.

3. AUSTRALIAN L.S.Is. AT INVASION OF PHILIPPINES

Details of the activities of H.M.A. Ships "WESTRALIA",

"MANOORA" and "KANIMBLA" during the assault on the Philippines were not received in time to be included in the November edition of the Monthly Naval Warfare Review. The narrative below is based on the Report of Proceedings received from H.M.A.S. "MANOORA".

Green Beach Attack Force which included the three Australian L.S.I's and H.M.S."ARIADNE" carried out a full dress rehearsal at Tanahmerah Bay on 10th October and then returned to Humboldt Bay. On the 13th, the force weighed and proceeded and, after rendezvousing with the Northern Attack Force on the 15th, set course for the Central Philippines. Excellent weather with smooth to slight seas and light variable winds was experienced throughout the whole voyage. Speeds of 7 to 9 knots were maintained.

Exactly on schedule time, 0200/20th October, 1944, the three Australian ships left the Northern Attack Force at Point Reb and, preceded by U.S.S. "RINGGOLD", proceeded down the swept channel towards Point Est. The Flagship, U.S.S. "HUGHES", in company with H.M.S. "ARIADNE", was waiting at Point Est and the formation proceeded at 6 knots in Cruising Disposition G.1.

Dawn broke fine and clear with light airs and a very smooth sea. At 0715, one lone Japanese fighter (TONY) appeared but, after dropping one bomb which dropped harmlessly, he disappeared to the south-west.

At 0845, transports arrived in the inner transport area, when operations were commenced. All boats were lowered and troops began disembarking. W hour was advanced from 1000 to 0930. The scheduled bombardment was cancelled when information was received that it was almost certain that no Japanese were on Panaon Island, on the extreme south end of Leyte Island. At 0926 all troops were disembarked and the transports moved in towards the beach to discharge cargo. At 1002 "MANOORA" was anchored in 40 fathoms, 800 yards from the nearest beach, and the discharge of cargo was commenced. All assault waves landed exactly on time and the beach was found to be excellent for landing craft.

Friendly aircraft from escort carriers were overhead throughout the day and no enemy interference was experienced during the whole operation of discharging troops and cargo.

Great numbers of Filipinos in canoes thronged around the ships throughout the whole day. Food, cigarettes and clothing were handed out to these people whose gratitude at deliverance from the Japanese was most sincere and moving.

The discharging of cargo was completed by late afternoon and with an escort of destroyers the L.S.I's left the assault area

just before 1800. Four attacks by single enemy aircraft developed in the next hour but on each occasion the attacker was driven off by the barrage before he could inflict any damage.

The attack forces, led by U.S.S. "HUGHES", proceeded through the Straits into Leyte Gulf. During the night, 15 A.P.A's from the Northern Attack Force joined the Panaon Group, and at dawn on the 21st the convoy of 18 transports, escorted by five U.S. destroyers, proceeded away from the Philippines and arrived at Humboldt Bay on the 25th.

4. H.M.A.S. "GASCOYNE" AT LEYTE ON D-3 DAY

The story below of the activities of H.M.A.S. "GASCOYNE" during the period 12th to 31st October has been extracted from her Letter of Proceedings.

"GASCOYNE" left Hollandia on 12th October with the "Dinagat Force", Task Group 78.4, and arrived off Leyte Gulf soon after daylight on the 17th. Very bad weather had been experienced during the 15th and 16th and this had made fuelling operations extremely arduous. When the Dinagat Attack Force and the fast minesweepers left the convoy at 0200 on the 17th the wind was Force 7-8 from the west with visibility zero. The convoy was apparently on the front quadrant of a typhoon which was proceeding in a westerly direction at a slightly greater speed than the convoy speed of 8 knots. "GASCOYNE" was in radar contact of the land at daylight and made the entrance to Leyte Gulf at about 1200. By afternoon the wind had reached Force 10-11 but it commenced to back at about 1600 and by daylight on the 18th the sea was smooth, the wind light and the sky nearly clear.

"GASCOYNE" made contact with the Homunhon Island Attack Forces and entered the Gulf at 0700/18th and proceeded up the swept channel into San Pedro Bay. The Fire Support and Bombardment Group of six battleships, five cruisers and 20 destroyers were then in company off the entrance. A commencement was made with buoying the shoals in San Pedro Bay that afternoon by "GASCOYNE" and Y.M.S. 393 and satisfactory progress was made.

"GASCOYNE" anchored in the vicinity of Mariquitdaquit Light at 1800 and was about to commence watering Y.M.S. 393 when two bombs dropped by a VAL landed about 100 yards on the port side. Fire was opened and several hits were claimed and it understood that the plane crashed some 3 miles away.

The Australian H.D.M.L. 1074 and Y.M.S. 316 made a landfall some 20 miles to the south shortly after daybreak on the 18th and arrived in San Pedro Bay at 1700. "GASCOYNE" remarks that the performance of H.D.M.L. 1074 in steaming some 3000 miles of open sea from Morotai Island to Leyte Gulf via Hollandia and Manus, with breaks of only 48 hours at Hollandia and 24 hours at Manus, during which time the ship's company were employed embarking stores, fuel, etc., and in weathering a typhoon after having been in a collision, reflects great credit on the Commanding Officer and all concerned.

The buoying was completed by noon on the 19th and the battleships moved up to continue their bombardment of the attack beaches.

From then until the end of the month "GASCOYNE" was engaged in routine survey work, interrupted by such incidents as the landing itself on the 20th, the Surigao Straits and Samar Sea battles on the 25th, another full gale on the 29th and frequent visits from Japanese aircraft. Of the latter "GASCOYNE" remarks:- "Since arrival in Leyte Gulf 39 Japanese air raids have taken place in the close vicinity of this ship. During these raids four ships have been seen to be hit, in each case by a disabled aircraft, and thirty aircraft have been shot down in sight. Of the bombs dropped four were within 200 yards of the ship. The only damage received was the whaler's falls stranded and one man injured in the leg from other ships' shells bursting overhead. During these raids hits from this ship's gunfire have been observed on five enemy planes but in each case several other ships were firing at the same plane. It is claimed that two of these were brought down by hits from this ship".

5. LANDING OF 5th AUSTRALIAN DIVISION AT JACQUINOT BAY

H.M.A. Ships "BARCOO", "VENDETTA" and "SWAN" departed from Lae on the 2nd November to provide covering and escort for elements of the 5th Australian Division proceeding to effect a landing in the Jacquinot Bay area of New Britain on 4th November.

M.L's 802 and 827 departed from Arawe on 3rd November to escort amphibious craft transporting the remainder of the landing force to the rendezvous position which was reached at the scheduled time of 1500K/3rd November. The M.L's were allocated to 5th Australian Division for employment on general and communication duties after the landing which was successfully carried out at 0600K/4th without enemy opposition.

Air support was provided by No. 6 Squadron, R.A.A.F.

H.M.A.S. "FALIE" departed from Lae on 3rd November carrying the Port Director and his staff for Jacquinot Bay. She arrived on the 5th and the Port Directorate was set up.

"BARCOO", "VENDETTA" and "SWAN" returned to New Guinea arriving at Langemak on 8th November.

6. H.M.A.S. "MANOORA" DESTROYS AN "OSCAR" AT LEYTE

H.M.A.S. "MANOORA" anchored in San Pedro Bay, Leyte Island, at 0723 on the 14th November having just arrived in convoy from the south. Several Japanese planes had been reported in the vicinity and the convoy had been attacked twice on the previous day.

During one of these attacks, gunfire from destroyers and transports on the starboard side of the convoy had brought down a "JILL" which had just released a torpedo which missed an L.S.V. by 40 feet.

At 0737 two enemy aircraft were sighted at about 1,500 feet just south of Cataisan Aerodrome and immediately one aircraft commenc-ed a shallow dive of about 20° on "MANOORA" from about 1,000 feet on a bearing of Green 50. Ship's head was 300° and the sun at this time was bearing Green 162.

All guns that would bear opened fire immediately. Oerlikon and .5 calibre machine gun shells commenced hitting from the very first shot and continued hitting throughout the dive. As the plane approached under this hail of hits, the pilot most fortunately veered off slightly to his left spoiling for him was was apparently a suicide dive. When about 300 yards away and 150 feet up the plane caught fire and, continuing the dive, crashed into the water certainly not more than 100 yards immediately astern of "MANOORA".

The plane was identified as an "OSCAR". Very shortly after this, possibly a matter of seconds, the second enemy plane was pounced upon from his rear by one of two P.38s which had appeared on the scene and was most promptly shot down. The plane crashed just out of sight behind the near hills very close inland ahead of the ship.

7. U-BOAT OPERATIONS IN SOUTH WEST PACIFIC - NOVEMBER 1944

The invasion of the Philippines has brought about a quite significant increase in Japanese U-boat activity. Unfortunately for the Japanese the meagre successes of their submarines have been achieved with considerable losses to themselves - four promising reports of attacks on U-boats in the Philippines area were received before the end of November.

It appears that at least five Japanese U-boats were operating in the area east of Leyte during the last week of October. An attack developed on a returning convoy of assault ships on the 25th in an approximate position 08° 30' N, 128° 20' E. In the operations that followed the U.S. destroyer escort "EVERSOLE" was torpedoed and sunk but U.S.S. "WHITEHURST", while rescuing survivors from "EVERSOLE", obtained a contact which produced a large underwater explosion and an oil slick one mile long after being attacked. A quantity of wooden gratings with Japanese markings also came to the surface.

Later in the week and in the same area, U.S.S. "ROWELL" sighted a periscope and carried out an attack which yielded a large quantity of oil and debris while U.S.S. "HELM" and U.S.S. "GRIDLEY" made eight attacks on another contact which resulted in explosions with oil, planking and human remains coming the surface.

There were isolated sighting reports in the New Guinea and New Britain area during November and H.M.A.S. "LITHGOW" reported on the 6th that she was attacking a probable submarine contact in a position 00° 07' S, 134° 08' E. An aircraft attack developed on a possible U-boat 60 miles north of Wakde on the 14th but no results were observed and an A.S.V. contact next day indicated that the U-boat was still in the area.

H.M.A.S. "SHEPPARTON" attacked a possible submarine about 60 miles west of Bathurst Island on 17th November. Other A.M.S. vessels came to "SHEPPARTON'S" assistance on the 18th but met with no success and the hunt was abandoned at dusk.

On 10th November an Allied submarine reported that she had sunk a German U-boat in the northern end of Lombok Strait between Lombok and Bali Islands.

The fourth probable sinking of a Japanese U-boat since the invasion of the Philippines occurred on the 27th November when a submarine which had been sighted by an aircraft was attacked and sunk by four American destroyers in a position 10° 30' N, 124° 25' E, between Leyte and Cebu Islands (i.e. west of Leyte).

In other parts of the Pacific the Japanese underwater fleet pursued a mild policy of aggression and succeeded sinking an American

merchant ship 960 miles east of Oahu in the Hawaiians on 30th October and a tanker inside the harbour at Ulithi Island (about 100 miles north-east of Yap) on the 20th November. The latter sinking was made by a midget submarine which was subsequently sunk by American forces just off the entrance to the harbour. Commander Seventh Fleet has issued a warning that similar attacks must be expected in Phillipine and Northern New Guinea waters.

SECTION II

OPERATIONAL

1. CHANGES IN OPERATIONAL COMMAND, S.W.P.A.

FORMATION OF TASK GROUP 74.1

Following the re-assignment of Task Group 74, Commodore Commanding Australian Squadron has been designated Commander Task Group 74.1 as from 15th November. Task Group 74.1 consists of "AUSTRALIA", "SHROPSHIRE", "HOBART" (on reporting) "ARUNTA" and "WARRAMUNGA" plus assigned destroyers.

PHILIPPINES SEA FRONTIER

Philippines Sea Frontier has been established under Commander 7th Fleet in the area north of the Equator within the limits of the South West Pacific Area with the following boundaries:-

Southern limit	- Equator
Northern limit	- 20° North
Eastern limit	- 130° East
Western limit	- Coasts of South China, Indo China and Malay.

Philippines Sea Frontier will operate as a Task Force of 7th Fleet assigned Task Force 75.

COMMANDER(D) ESCORT VESSELS

The Headquarters of Commander (D) Madang were transferred to H.M.A.S. "SWAN" on 18th November. Commander (D) is now in command of "SWAN" and, on arrival at Mios Woendi, he will assume the duties of Commander (D) Escort Vessels in Forward Areas. He will exercise operational control over all escort vessels under N.O.I.C. New Guinea operating westbound from Hollandia and will be responsible for their training.

2. P.P.I. RADAR

The Plan Position Indicator will soon be introduced into

R.A.N. surface warning radar sets as the standard system of presentation. Now is the time for some thought to be given to the advantages, use and limitations of this display system. Most officers are already aware of this system, and in the interests of brevity, no attempt will be made here to describe the actual presentation or how it is achieved.

Taking the advantages first, the P.P.I. presents a continuous all-round "picture" of the area surrounding a ship, the extent of which depends upon the capabilities of the set itself, but in general can be said to extend to what is horizon distance in good visibility from the height of the aerial. This eliminates all strain on bridge officers and operators when there is the need to "watch" several target at once. It also makes the separation of moving targets from land and other fixed echoes very much easier. In certain cases it presents a picture of the coast line, but this is not always accurate as may be seen later.

The picture presented on the tube has the very great advantage of presenting the tactical situation continuously. When a remote P.P.I. is fitted on the bridge this will be the normal arrange-ment, the Commanding Officer and Officers of the Watch are able to use this in operations such as Convoy work, Night action, A/S hunting etc.

P.P.I. pictures lend themselves particularly well to easy identification of prominent coastal points for navigational purposes. This, however, requires care in reconciling the coast line and other prominent points with the picture presented on the P.P.I. This has been recognised and was put to full use in several recent U.S. landing operations in the Pacific. Contour models were constructed to scale from stereoscopic air photographs of the proposed scenes of operations. By means of a small instrument which projects a beam of light approximately equivalent to the beam of a P.P.I. Radar it was possible to illuminate the points that represent those which will normally produce echoes on a P.P.I. screen. These illuminated points were then photographed with the point of origin of the light beam in the various positions corresponding to points on the run in of ships to the landing beaches. All ships to take part in the operations were then supplied with copies of the photographs. Thus it was possible for ships immediately to identify prominent navigational points without previously having seen them.

This process can only be used occasionally but by intelligent reading of the chart, together with a realization of the limitations of the equipment, it is possible to use P.P.I. as an aid to blind navigation. The points to be remembered are:

(a) Normally the higher land will appear on the tube first. Land which is beyond and below the level of the high ridges will

be in the "radar shadow" and will not produce echoes.

(b) If the actual coastline is low lying, it will not appear on the tube until the ship is comparatively close. Thus echoes which may be assumed to present the coastline may be higher land at some distance behind the actual coastline.

(c) In some sets, notably Admiralty Type 276 and 277 all echoes will appear unduly elongated at close range, and out of proportion to the actual size of the target. This is due to the presence of "side lobes" and "beam width". Bearings of ship and echoes must therefore always be taken from the centre of the arc of the echo and bearings of tangents of islands and prominent headlands etc. treated with reserve. For close navigation, this elongation will be more pronounced and will produce a picture, completely unrecognisable from the chart. This, however, can be mitigated by turning down the "gain" or "input" control on the P.P.I. or the remote P.P.I. This will reduce the side lobes and present a picture more closely resembling the actual coastline or situation. While the "gain" is reduced, however, the echoes at longer ranges will be much weaker and probably not discernible. It is essential therefore, that the "gain" be reduced only when absolutely necessary, otherwise, long range coverage cannot be maintained.

Navigation using P.P.I. is much easier when a number of small but precipitious islands are within the range of the set, than when navigating along a continuous coastline. The islands will appear as separate echoes in their correct relative positions, while the coastline, if at all undualting, will not produce a true picture for the reasons stated in Para. 5 (a) and (b) above. Thus the P.P.I. will be much more useful in Barrier Reef passages, for instance than off Great Sandy Island.

Little experience is required to interpret correctly the picture on the P.P.I., provided the above limitations are remembered. The following extracts of a report on the blind area bombardment near Cape Gloucester illustrates what can be done:- "At 0330 the coastline near Cape Gloucester was clearly visible on the screen. At about 0430 a fix was obtained on a headland north of the Cape and the target area traced on the A.R.L. table. Plotting was based on this fix. Subsequently, a navigational fix was obtained by the navigating officer which agreed within 300 yards of this Radar fix. By constant comparison on the Radar screen with an air photo, fixing and plotting were continuously carried out. Finally, at about 0530, the Radar ship obtained a mark which was assumed to be the air strip from plotted positions. The bombardment commenced using this information at 0600, and three salvos fired blind. The first salvo gave no splash on the screen and was deduced as over or onto the beach The second salvo ("down 200 yards") gave a definite splash echo. From this information it was concluded that the range of the bombardment

position was correct to within 100 yards. When subsequently the area became visible to the bridge, the navigating officer obtained a visual fix which actually confirmed the fix provided by the Radar".

In most R.N. and R.A.N. Radar Sets, ranges by "A" scan are more accurate and picking up ranges greater than the P.P.I. ranges. In addition, the bearing accuracy is probably greater in the "A" scan. Therefore, when carrying out normal P.P.I. sweep it is preferable to carry out one 360 degree sweep using "A" scan at least once every two minutes. Once a target has been detected, the subsequent use of "A" scan and P.P.I. will depend upon the Commanding Officer's discretion according to the situation.

In addition to the "gain" control previously mentioned there are usually "focus" and "brilliance" controls on the P.P.I. unit. The titles indicate for what purpose they are used, and they should not normally require adjustment once they are set up. It should be remembered, however, that the "brilliance" control should be set so that brightness of the echoes are kept to a minimum. "Focus" can be adjusted after "brilliance" control is set at a minimum consistent with easy reading.

3. PERFORMANCES OF AUSTRALIAN RADAR

The following observations received from the Commanding Officer, H.M.A. Radar School are based on the average performance figures given for the A272, A286P and A286Q in Radar Routine Reports.

(a) There is a slight improvement in the performance of the A272 during 1944 over the average results achieved during 1943. This suggests an all round improvement in mechanics and operators.

(b) The A 286P has performed better against ships as well as aircraft.

(c) The A286Q shows a marked superiority over the A286P, which it is replacing. This is particularly so against aircraft, its principal application. Against ships, it also promises improved performances but as too few reports are yet available of results on surface targets, the averages quoted should be treated with reserve.

AVERAGE PERFORMANCES OF A272 IN A.M.S. VESSELS

Target		1944		1943	
		Range (Yards)	No. of Reports	Range (Yards)	No. of Reports.
Buoys	Maximum	4,550	24	4,900	15
	Reliable	3,070	27	3,200	18
M.T.B's or M.L's.	M	7,810	24	7,500	16
	R	5,890	25	5,600	17
Submarines	M	7,990	17	7,300	12
	R	6,000	16	5,500	11
A.M.S.	M	15,200	30	15,400	20
	R	11,300	33	11.700	22
Destroyers	M	20,000	13	16,600	8
	R	13,800	17	12,900	11
Small Cruisers	M	20,400	1	20,400	1
	R	18,000	2	18,000	2
Large Cruisers	M	24,000	1	-	-
	R	21,000	1	-	-
A/C Carrier	M	25,000	1	-	-
	R	23,000	1	-	-
M/S under 5000 tons	M	17,000	28	16,400	17
	R	12,800	32	12,000	21
M/S over 5000 tons	M	23,600	31	23,100	21
	R	18,500	31	17,900	21
A/C below 1000 feet	M	8,900	6	6,700	5
	R	6,600	7	4,300	5
Liberty Ships	M	22,000	3	22,000	3
	R	16,500	3	16,500	3
Bearing Accuracy		plus or minus 2°		plus or minus 1°	
Range "		plus or minus 95 yards		plus or minus 100 yds.	

AVERAGE PERFORMANCES OF A286P/Q IN A.M.S. VESSELS

Target		1944 A286P Range (Miles)	1944 A286P No.of Reports	1944 A286Q Range (Miles)	1944 A286Q No.of Reports	1943 A286P Range (Miles)	1943 A286P No. of Reports
Buoys	M	1.25	2	-	-	1.25	2
	R	0.62	2	-	-	0.62	2
M.T.B's or M.L.	M	1.4	4	3.0	1	2.0	2
	R	1.1	4	2.1	2	1.62	2
Submarines	M	3.00	1	2.5	1	3.0	1
	R	2.50	1	-	-	2.5	1
A.M.S. Vessel	M	5.3	14	5.0	6	4.7	12
	R	3.6	17	4.1	6	3.3	15
Destroyer	M	5.7	8	6.0	1	5.14	6
	R	4.0	8	5.0	1	3.62	6
Small Cruiser	M	7.5	1	-	-	7.5	1
	R	6.0	1	-	-	6.0	1
Large Cruiser	M	9.0	2	-	-	9.0	1
	R	7.0	2	-	-	7.0	1
M/S under 5000 tons	M	6.25	16	6.6	5	5.5	14
	R	4.40	14	4.1	5	3.9	12
M/S over 5000 tons	M	7.0	16	7.6	5	6.4	13
	R	5.0	18	6.0	5	4.7	15
A/C below 1000 feet	M	16.9	14	16.6	6	17.0	7
	R	12.0	17	13.0	6	12.0	9
A/C 1000 ft. 5000 ft.	M	26.3	18	34.7	8	26.5	14
	R	19.0	18	25.5	8	20.0	14
A/C 5000 ft. 10,000 ft.	M	32.0	12	48.0	7	30.5	10
	R	25.0	12	33.0	6	20.0	10
A/C 10,000ft. an above	M	40.0	1	64.0	2	-	-
	R	25.0	1	52.5	2	-	-
Bearing Accuracy		± 7°		± 5.5°		± 5°	
Range Accuracy		± 1 mile		± 1 mile		± 1 mile	

4. FORMATION OF 21st AND 22nd MINESWEEPING FLOTILLAS

Eighteen Australian manned A.M.S. vessels - 12 at present under the operational control of Commander in Chief East Indies and six under the control of C.S.W.P.S.F. - are being formed into the Twenty-first (Orepesa) and Twenty-second (LL) Minesweeping Flotillas. The 21st M/S Flotilla will consist of H.M.A.Ships "BALLARAT", "WHYALLA", "BENDIGO", "GOULBOURN", "KALGOORLIE", "BURNIE", "LISMORE", "MARYBOROUGH" and "TOOWOOMBA" and will commence training in Australian waters. The 22nd M/S Flotilla - H.M.A.Ships "CAIRNS", "CESSNOCK", "GAWLER", "GERALDTON", "IPSWICH", "TAMWORTH", "WOLLONGONG", "LAUNCESTON" and "PIRIE" - will probably commence their training on the East Indies Station.

Commander F.B. Morris, R.A.N. in H.M.A.S. "BALLARAT" will be Senior Officer 21st M/S Flotilla with Acting Commander N.R. Read, R.A.N. in H.M.A.S. "WHYALLA" as Second Senior Officer. Commander J.K. Walton, R.A.N. in H.M.A.S. "GERALDTON will be Senior Officer 22nd M/S Flotilla with Acting Commander A.J. Travis in H.M.A.S. "PIRIE" as Second Senior Officer.

By a re-arrangement of escort vessels now operating in the South West Pacific, a reduction of only two will be made in the number available for duty in the New Guinea - Morotai Island area.

5. R.A.N. SHIPS WHICH HAVE PASSED THE 100,000 MARK

Since the publication of A.C.B. 0254/44 (1), Letters of Proceedings have been received from four more A.M.S. vessels which have steamed more than 100,000 miles. H.M.A.S. "LISMORE"(commissioned 25th January, 1941) had completed 144,205 miles by the end of September giving her the greatest mileage among Australian-built ships commissioned since the beginning of the war. By the end of October H.M.A.S. "ROCKHAMPTON" (commissioned 21st January, 1942) had steamed 121,934 miles, H.M.A.S. "LAUNCESTON" (9th April, 1942) 101,632 miles and H.M.A.S. "WOLLONGONG" (commissioned 23rd October 1941), 101,342 miles.

SECTION III

NARRATIVES

1. MERCHANT AIRCRAFT CARRIERS IN THE BATTLE OF THE ATLANTIC

In the Autumn of 1942 it was decided, in order to meet an urgent need for additional air protection against U-boats, to equip a number of selected merchant ships as aircraft carriers capable of operating a limited number of aircraft. These ships were the logical development of C.A.M. ships but, whereas the latter carried only one aircraft (a "Battle of Britain" Hurricane) which could be operated on a single occasion and was then lost, the new type of ship had to be capable of operating aircraft continuously throughout the Atlantic crossing. Two classes of vessel were chosen for conversion to aircraft carriers, grain ships and tankers. Grain ships, carrying bulk grain, were to be fitted with a 400-ft. flight deck, hangar and lift aft, and would be able to operate four Swordfish; tankers, carrying heavy fuel oil, would have a 450-ft. flight deck, but no hanger, and would operate three Swordfish.

On 25th April, 1943, the first M.A.C. ship, "Empire Macalpine" was completed, and, after embarking stores, arrived in the Clyde on the 4th May to commence working up. On 28th May she sailed in the Convoy O.N.S.9, returning to the United Kingdom in Convoy H.X.245; H.M.S. "CHASER" was in the latter convoy and it was discovered that it was practicable to operate aircraft from the M.A.C. ship at a time when the motion of the ship was too much for the escort carrier. The next M.A.C. ship to become operational was "EMPIRE MACANDREW", a grain ship. Her first operation was with Convoy O.N.S.15,which sailed on 6th August. The first M.A.C. tanker to come into operation was "RAPANA" which sailed with Convoy O.N.S. 17 on 31st August.

By the end of 1943 there were two grain ships and seven tankers in operation, and early in 1944 the majority of the remaining ten M.A.C. ships became available. There are now six grain M.A.C. ships and thirteen tanker M.A.C. ships operating with North Atlantic convoys, two of the tankers, "MACONA" and "GADILA", being manned entirely by Dutch personnel and flying the Dutch ensign.

Unfortunately opportunities to meet the enemy have been few. About the time of the arrival of M.A.C. ships in the North

Atlantic, U-Boats began to shift to other areas, the remaining ones approaching their targets with extreme caution. Latterly, the appearance of U-Boats on the O.N./H.X. convoy routes has been very rare indeed. The reluctance of the enemy to show himself is reflected in the number of sightings made by M.A.C. ship aircraft, only two confirmed sightings having been made and no decisive results were obtained in either ensuing attack. The first of these attacks was made by two aircraft from "EMPIRE MACALPINE" on 22nd September, 1943, during the last great North Atlantic convoy battle. These attacks inflicted no damage. On 25th May, 1944, a strike of two aircraft from "ANCYLUS" and one from "EMPIRE MACKENDRICK" made almost simultaneous attacks on a U-boat 35 miles astern of Convoy O.N.M.237. Owing to lack of wind, the Swordfish could only carry four R.Ps. each. The U-Boat remained on the surface, returning intense fire and damaging the aircraft from "EMPIRE MACKENDRICK", which continued to shadow the U-boat until it dived seven minutes after the last attack upon it.

In April of this year it became evident that, with the excessively timid attitude adopted by U-Boat, "REPTILE" patrols would provide only a very remote chance of sighting. With three M.A.C. ships in a convoy, there was available a formidable air hunting force of about ten aircraft which could be more usefully employed flying planned searches in depth than the "REPTILE" patrols which are essentially defensive. Instructions were accordingly issued to M.A.C. ships to fly searches and it is to be hoped that this policy will enable them to "kill" a U-boat in the near future.

Although no positive results in the shape of attacks have so far been forthcoming, the air cover provided by these ships in all weathers should not be underestimated. The difficulties with which they have had to contend are many. In the vicinity of the Newfoundland Banks there has been the ever-present menace of fog and landing on a small deck with a lot of movement, in visibility of two hundred yards or less, can be hazardous in the extreme. Some lives have been lost and on many occasions landings have been effected only by excellent airmanship on the part of the aircrew and good seamanship on the part of the Master. Two of these successful attempts are outstanding, the first by an aircraft from "EMPIRE MACALPINE" which landed safely in 50 yards visibility and the second by an aircraft from "RAPANA" which landed in 100 yards visibility; on the latter occasion an eleo collapsed when the aircraft reached the deck and the lower mainplane was damaged. Ingenious methods have been found of defeating the dangerous vagaries of North Atlantic weather. An aircraft from "EMPIRE MACRAE" was successfully landed on a 70-knot gale by the ship proceeding full

speed down-wind, in the opposite direction to a scattered convoy, and bringing the aircraft on over the bows.

Latest figures show that, since M.A.C. ships became operational, 55½ per cent. of their time has been spent at sea. This figure includes two or three ships which have had to be docked for periods of over a month because of major defects. To date M.A.C. ship aircraft have flown nearly 3,000 operational hours, each ship flying an average of about 35 hours per voyage.

In addition to operational flying a number of valuable exercises have been carried out by aircraft from M.A.C. ships while with convoys.

One exercise was carried out during the forenoon of 4th July, when a search of two aircraft was flown off "RAPANA" to locate an imaginary U-Boat. A sighting report was made, followed by the sending of a striking force of six Swordfish from the other M.A.C. ships, which were homed to the position and attacked a smoke float which represented the U-Boat. Two corvettes were detached to the spot, and were successfully homed by the shadowing aircraft. Corvettes then attacked the smoke float with gunfire, which the planes spotted for them, and finally with depth-charges.

I.F.F. was used throughout, the aircraft using different code settings, and useful practice was obtained by escorts, M.A.C. ships and aircraft in identifying the various settings and locating the originators. This exercise was very successful, and there were no failures in communication or co-operation.

M.A.C. ships, with few opportunities for any spectacular achievement, have come to be regarded as an integral part of the escort force and their absence as seriously weakening the protection afforded by the escort group. Apart from their anti-U-Boat operations, aircraft from M.A.C. ships have proved invaluable as "Sheepdogs", rounding up stragglers and marshalling scattered convoys. Commodores of convoys welcome their help in signalling, the M.A.C. ship being regarded as the standard signal link.

2. AIR ATTACK ON FORMOSA, 10th TO 16th OCTOBER

The following account of the American combined carrier-based and land-based aircraft raid on Formosa is summarised from the O.N.I. Weekly for 18th October.

Penetrating deeply into Japan's inner defence zone, carrier aircraft of Admiral Halsey's Third Fleet struck in great force during the week 10th to 16th October at the enemy's principal Naval and military installations on the island of Formosa. The attacks followed closely upon the raid of the week before on shipping and airfields in the Ryukyu Islands. On three successive days planes of Vice Admiral Mitscher's fast carrier task force swept over Formosa, one of the most strongly fortified areas in the Japanese Empire. The attacks, which were concentrated mainly on installations in the vicinity of Takao, Formosa's principal military and industrial area, on the south-west coast, were co-ordinated on the third day with a heavy and very successful raid by China-based Super-Fortresses of the 20th Bomber Command. The Super-Fortresses followed up with two more heavy attacks on Formosa before the end of the week.

Preliminary reports indicate that the combined attacks on Formosa did heavy damage to the enemy's major military and naval installations and resulted in the destruction of at least 437 Japanese aircraft - 232 shot down in combat and 205 destroyed on the ground. In addition, more than 100 ships and many small craft were sunk or damaged by carrier planes, which reported at the end of the third day no shipping of consequence left in the area. Powerful opposition by Japanese fighters was encountered in the first two days, but by the third day few enemy planes were air-borne and only a small number were seen on the ground.

The first attacks by the American carrier planes were made early in the morning of the 12th and Tokyo radio reported that more than 1,000 aircraft participated in the raids. The principal targets were Takao, Tainan and Taichu all on the west coast railway and the port of Karenko on the east coast. A typhoon which swept Formosa two days earlier probably disrupted Japanese communications and hindered the enemy's preparations for defence; nevertheless the Japanese opposition was strong and determined. The U.S. planes shot down 124 enemy aircraft and destroyed at least 97 on the ground. At least 35 Japanese merchant ships were sunk or damaged; among these were 4 large cargo vessels.

The attacks were continued on the 13th. Again the Japanese offered strong opposition, but the Americans knocked down nearly 100 enemy aircraft and destroyed approximately 75 on the ground. Many more Japanese ships were sunk or damaged, most of them small coastal craft and escort vessels. Many of the larger vessels surviving the previous day's attacks are said to have fled to harbours along the China coast. Additional damage was caused ashore, mainly in the Takao area. Planes also attacked the Pescadores Islands which lie between Formosa and the China coast and are the site of important military installations, including airfields and a major naval base at Bako.

By the end of the second day, according to incomplete figures, the enemy's aircraft losses totalled at least 396 - 221 shot down and 175 destroyed on the ground. American losses in the two-day series of attacks totalled 71 planes and 31 pilots and 21 air crewmen. At least 113 Japanese ships had been sunk or damaged, as shown in the following summary:-

Sunk	Probably Sunk	Damaged
2 large AK's	2 large AK's	1 large AK
7 medium AK's	6 medium AK's	6 medium AK's
9 small AK's	6 small AK's	22 small AK's
8 subchasers	5 coastal AK's	1 large AP
2 coastal AK's	2 AO's	11 subchasers
	5 subchasers	1 large AO
	2 AM's	11 coastal AK's
	4 small escorts	

In addition to the vessels listed in the table, at least 85 small craft were listed as sunk or damaged.

When carrier planes raided Formosan targets on the 14th, they apparently encountered relatively little opposition. Eleven Japanese planes were reported shot down and about 30 others destroyed on the ground. Further destruction among airfield installations was effected by the planes which attacked almost at will.

Just after midday on the 14th a force of considerably more than 100 Super-Fortresses struck heavily at Okayama, about 10 miles north of Takao. Anti-aircraft fire was meagre at all targets and no fighter opposition was encountered. Two planes were lost but 10 out of the 11 members of the crew of one of these were saved when the plane crash-landed at a forward base.

Super-Fortresses made their second attack just before noon on the 16th. Approximately half the force struck at Okayama and the other half at Heito, an important air base and supply depot near Okayama, and at other targets of opportunity in Formosa and in China. Enemy fighters intercepted, but all of the planes returned safely to their bases in China.

A smaller group of Super-Fortresses made the third raid on the 17th. The main targets were Takao and Einansho, 10 miles south-east of Takao. Some anti-aircraft fire and fighter resistance was met but again all of the planes returned.

Although Tokyo Radio broadcast fantastic, almost hysterical claims about the damage inflicted on the American carrier task force units, Admiral Nimitz announced that no ship

had been lost. No damage of consequence was received by any of the battleships or carriers but two "medium-sized ships" were damaged by aerial torpedoes. The attacks on the task force began on the night of the 12th, when small groups of enemy aircraft repeatedly attempted to bomb or torpedo the carriers or supporting ships. Strong counter-attacks were made on the task force during the following night and on the afternoon of the 14th when numerous single and twin engined aircraft made desperate efforts to slip through the screen of fighter planes. Nearly 200 enemy planes attacked on the 14th and 15th; at least 95 of them were shot down by fighters and the ship's anti-aircraft batteries. On the 16th the Fleet units were again subjected to almost continuous attacks by enemy aircraft but at least 65 of the attackers were shot down.

Summarizing the losses inflicted on the Japanese, Admiral Nimitz reported that during the seven-day period of October 10th to 16th, Pacific Fleet carrier planes and ships' anti-aircraft batteries destroyed 915 planes. Approximately 565 were destroyed in the air in the Ryukyu-Formosa-Luzon area and 350 were destroyed on the ground. Of those shot down, 269 were over the targets and 296 were in the vicinity of the Fleet; 40 of the latter number were downed by anti-aircraft fire.

3. NORTH RUSSIAN CONVOYS RESUMED IN AUGUST

After an interval of three months, the sailing of convoys to North Russia was resumed on 15th August, when Convoy J.W.59, composed of 34 Merchant ships and 11 Russian M.L's sailed from Loch Ewe.

The escort comprised of two Escort Carriers, "VINDEX" (Flag of C.S.10) and "STRIKER", five Fleet destroyers, with Captain (D) 3 in H.M.S. "MILNE", and 12 escort vessels from Western Approaches with the Senior Officer in H.M.S. "CYGNET".

The escort joined the convoy in the vicinity of the Faroes on 17th August. During the first three days the carriers' aircraft were conserved as far as possible, Coastal Command aircraft operating from shore bases being relied on to provide the air cover. It was particularly important at this stage to maintain radio silence, since units of the Home Fleet were moving up the Norwegian Coast closer inshore and they were very anxious to avoid being sighted by enemy reconnaissance aircraft which might have been attracted out to sea by hearing transmissions on the Convoy R/T wave.

By noon on the 20th the convoy had reached the limits of the

shore based patrols and the carrier-borne aircraft began to fly offen -sive searches to a depth of 80 miles. These searches, which normally consisted of three Swordfish spread in a sector of 120°, were maintained for the remainder of the operation.

At 1757/20 the first H/F D/F bearing was obtained, estimated to be from a U-boat at a distance of about 30-40 miles on the starboard bow. An aircraft sent to this position carried out a spiral search without result. The U-boat transmitted again at 1840, when three Hurricanes from "VINDEX" and one Swordfish from "STRIKER" were sent to investigate.

At 2215/20 U.S.S.R.S. "ARCHANGEL" (ex-H.M.S. "ROYAL SOVEREIGN") with an escort of eight Russian (ex- "TOWN" Class - originally transferred from the United States to Britain) destroyers closed and took station in the convoy.

During the night of 20th/21st, while the convoy was shaping a course to pass to the northward of Bear Island, "KEPPEL" and "KITE" obtained and attacked several contacts on the starboard quarter. At 0644/21 "KITE" who was still in the area of contacts, was torpedoed amidships and sank within a minute. Survivors were picked up by "KEPPEL".

H/F D/F bearings continued to pour in during the day and it became evident that several U-boats were closing the convoy from the south. Searches were flown continuously on the starboard side of the convoy but failed to sight any U-boats. This was probably due to the U-boats being considerably outside the 80 mile range. There is a strong tendency to underestimate the ranges of H/F D/F transmissions in these latitudes. There is no doubt, however, that the contact keeper was well inside the searched area but he continued to remain aggravatingly elusive.

At 0310/22 "STRIKER" flew off her "Blue" section of Wildcats to investigate a "bogey" that had approached from the direction of Norway. They "tally-hoed" at 0334 on a Blohm and Voss 138 which was shot down at 0420 after it had made several alterations of course in cloud which was 10/10ths at 1,000 feet.

At 0834 the pilot of Swordfish C/825 reported that he had sighted a U-boat and a minute later claimed that he had sunk it with depth-charges, leaving one survivor in the water. The U-boat had surfaced just before the aircraft had come down out of the cloud. Sighting it on his port beam, the pilot dived on it at 30° and released his three depth charges. These exploded along the starboard side from aft to forward, the last of the three going off appreciably later than the others, having apparently lodged in the upper deck fittings at the U-boat's bow and exploding when the bow reached 25 feet. The plot indicated that this U-boat was the contact keeper and in all probability the one that sank H.M.S. "KITE".

At 1100/22 one of "STRIKER'S" aircraft reported two U-boats on the surface 68 miles south-east of the convoy. "VINDEX" flew off three Hurricanes and "STRIKER" two Swordfish and three Wildcats which were homed to the sighting aircraft. One of these U-boats dived, but the other preferred to fight it out on the surface and, at 1142, was attacked with rocket projectiles and cannon by the three Hurricanes. The first aircraft to attack neutralized all A/A fire with its cannon, but the R.P. failed. The second and third aircraft attacked with cannon and R.P. but the R.P. generally missed "over". Cine-camera gun films showed that the U-boat had been smothered with cannon fire.

At 1145 another U-boat was reported about 50 miles on the starboard bow of the convoy, 30 miles from the scene of the last attack, but it dived before an attack could be carried out. Three more sightings were made during the afternoon but on each occasion the slow speed of the Swordfish prevented them from making attacks that were likely to be lethal.

Searches were concentrated on the starboard beam and bow of the convoy since H/F D/F bearings in this sector became even more frequent in the dog watches. Swordfish from "STRIKER" reported two more sightings at 1940 and 2050, but both U-boats dived before an attack could be made.

At 2200/22 "STRIKER" turned over to "VINDEX" after completing what must have been one of the most strenuous flying programmes ever carried out by an escort carrier in 24 hours.

There were four more sightings late on the 22nd and, just after midnight, the activity in "VINDEX'S" air direction room was intense. Aircraft "K" was orbiting a position in which two U-boats were known to be, with the presence of a third suspected, aircraft "L" was fighting a surfaced U-boat with two Hurricanes being vectored to its assistance and aircraft "A" was investigating a contact 15 miles from the ship. At the same time H.M.S. "WHITEHALL" was being vectored to the assistance of an aircraft which was being homed in distress with one cylinder out of action. Three Swordfish were being vectored out to relieve the previous search and two more were being homed. "STRIKER'S" Wildcats were meanwhile intercepting a bogey which turned out to be aircraft "A".

Two more sightings were made at 0305 and at 0435. The first was attacked with depth-charges ten seconds after the U-boat dived and thick oil and black substance were seen on the surface but the second escaped when R.P'S failed to explode.

The density of U-boat H/F D/F traffic on the 23rd exceeded even that of the previous day. It was satisfactory to note that

the U-boats, after having been prevented from getting ahead of the convoy's turn to the south at 0215, were falling further and further astern. Sightings were made at 1339 (one U-boat attacked with depth-charges producing a large patch of oil), 1720 (one U-boat), 1936 (two surfaced U-boats which dived and allowed the R.P. attack to be made at the swirl only) and at 2220 (two surfaced U-boats) which were attacked with depth-charges.

The Advanced Striking Group was ordered to proceed to the position of this last attack at full speed. "MERMAID" obtained a good contact shortly after 0300/24 and made 15 attacks which are thought to have destroyed the U-boat.

During the final day, the provision of air cover was left to the Russians who were now beginning to appear in considerable force with Catalinas, Bostons, Hurricanes and Yaks.

The convoy entered harbour at Kola Inlet on the 24th and the escorts were able to enjoy four days' rest before Convoy R.A. 59A sailed on the 28th.

Thick weather was encountered soon after the sailing of the eastbound convoy and the routine of flying deep searches was not begun until 2200/29. Two hours later one of "VINDEX'S" Swordfish obtained an A.S.V. Mark XI contact about 20 miles ahead of the convoy but this disappeared at 8 miles. Sightings were made at 1428/30 and 0925/1 and the latter was attacked with depth-charges 45 seconds after the U-boat dived.

A U-boat which had been particularly elusive was finally sighted fully surfaced by aircraft A/825 at 0615/2 bearing 246° 48 miles from the convoy. The Swordfish attacked with R.P.s two of which fell 300 feet short and two 30 feet over. The relief Swordfish which had been sent out to home the Advanced Striking Group to the spot sighted and photographed a long oil streak which seemed to indicate that one or more of the R.P.s might have scored a hit. The Striking Group arrived at 0923/2 and commenced a hunt. "KEPPEL" sighted a periscope after about two hours and, after massed creeping attacks had been carried out, the U-boat was destroyed at 1530/2.

After this no further threat developed and the convoy arrived at its destination unmolested. Thus, during the passage of the two convoys, at least 25 sightings of U-boats had been made by aircraft and in the attacks that developed one U-boat was definitely sunk and one probably sunk by combined air and surface and one was probably sunk by air attack. Several others were probably damaged.

(Summarized from the Admiralty Anti-Submarine Report for September, 1944)

SECTION IV.

INTELLIGENCE

1. FURTHER DETAILS OF "SCHNORKEL"

The United States Fleet Anti-Submarine Bulletin for September 1944 published information on the Schnorkel additional to that previously published in the South West Pacific Anti-Submarine Report. The information was compiled from material derived from prisoner of war sources by the British and Americans. Photographs of the Schnorkel installed in U-1229 were published in A.C.B.0254/44 (1).

U-Boats with Schnorkel in operation can maintain a submerged speed of 6.5 knots for a considerable time. Batteries can be charged air bottles charged and the boats can be vented while submerged. Evidence now indicates that all operational U-Boats have been fitted or are intended to be fitted with Schnorkel.

U-Boats proceeding on Schnorkel present a very small radar target. As further protection against radar transmission, a G.S.R. aerial is fitted to the top of many Schnorkels. Prisoners from U-1229 stated that this boat proceeded submerged in the North Atlantic for more than 14 days, surfacing occasionally for 10 or 15 minutes only to take navigational sights. During this period no radar transmissions were received on the G.S.R.

General Description.

The Schnorkel mast consists of an air induction trunk and a diesel exhaust line which are enclosed in a metal fairing. The cross section of this fairing is streamlined. At the top of the mast, forming the head of the air induction trunk, is a floater valve which closes when it reaches water level. About 32 inches below this, the diesel exhaust lead makes a 90 degree turn and ends a few inches outside the fairing. The base of the mast is hinged to enable it to be raised and lowered. When lowered it rests in a recess on the deck.

The mast is about 26 feet in length and, when raised, is a few inches lower than the top of the extended periscopes. The raising and lowering is done by means of a hydraulic motor connected with the telemotor system of the boat. The air induction trunk is eight to twelve inches in diameter while the diameter of the diesel exhaust lead is considerably less.

Air Intake.

When the Schnorkel is in an upright position, the air intake trunk is connected with a lead that extends to the main air induction shaft. The connection is made pressure proof by means of two tapered rubber gaskets pressing together. Thus the air travels past the floater valve in the head of the mast, through the air intake trunk, past a flood valve and through an intermediate quick closing valve into the main air induction shaft. Thence it is conducted to the diesel compartment and to the other compartments in the pressure hull.

Diesel Exhaust.

The diesel exhaust gas passes through the normal exhaust group valve. It then flows through a line which leads to a special Schnorkel exhaust valve. Thence it passes through a line which extends through the hinge at the base of the Schnorkel. through the exhaust line of the Schnorkel mast and is expelled. In operation, it is designed to be expelled a few inches below the surface of the water. Considering that the distance of the floater valve to the exhaust outlet is about 32 inches, it would thus appear that under operating conditions something less than 30 inches of Schnorkel is exposed.

Operating Procedure.

The Schnorkel mast is normally raised or lowered at a depth of 20 metres(65½ feet). It is not normally raised while the U-boat is on the surface because of possible breaking of the hinge fittings caused by the ship's roll. One or both diesels can be used while operating on Schnorkel.

Effect of Wind and Sea

Schnorkel operation generally is not feasible in sea force greater than 4. It functions better in long ground swells than in a choppy sea. In the latter case, the floater valve is constantly opening and closing, making conditions in the pressure hull uncomfortable. In a calm sea, a following wind is unsatisfactory as it tends to blow the exhaust fumes into the air intake.

Normally the diesels can continue to operate for about two minutes after the floater valve is actuated without producing any ill effects. The head of the Schnorkel cannot be allowed to go more than about two meters (6½ feet) beneath the surface. At greater depths, the water pressure becomes so great that the diesel exhaust cannot be expelled and the engines stop.

Trim.

The difficulties of maintaining trim are greatly increased when the Schnorkel is used. Often a continuous trickle of water comes through the intermediate valve, necessitating the use of pumps. One prisoner stated that it was intended eventually to fit all boats with an automatic depth-keeping device.

Charging Air Bottles

Air bottles can be charged when proceeding on Schnorkel by using the electric compressor. In the case of U-490, however, the Junkers compressor was sometimes employed. To reduce the exhaust gas in the boat, a special cone-shaped funnel had been designed and built by the engine room crew. This funnel reflected the exhaust gas of the Junkers compressor toward the diesel air intake. It then passed through the diesels and was expelled through the diesel exhaust lines.

Charging Batteries.

Batteries can be charged when proceeding on Schnorkel in a number of different ways. One or both diesels can be coupled to both the propeller shafts and the generators or they can be coupled one to the propeller shafts and one to the generators. The speed of the U-boat varies from two to about six knots during this operation.

Batteries are never charged with a voltage higher than 145. At 149 volts gas is generated. Ventilating lines are installed in each battery compartment to lead off the gas. These lines are connected with the main air exhaust line and are fitted with barometers which indicate the pressure in the compartments. A change of pressure of 14 millibars or more indicates a dangerous concentration of gas. The gas passes through the ventilating lines and into the main air exhaust line. It is conducted through special leads to the diesel air intake. Thence it is sucked into the diesels and expelled through the diesel exhaust. Batteries are always ventilated for at least 15 minutes before charging.

2. JAPANESE AIRCRAFT CARRIERS

The information below, extracted from the O.N.I. Weekly of 4th October, 1944, supplements the details of Japanese aircraft carriers published in A.C.B. 0254/44(1).

Fleet Carrier "TAIHO"

"TAIHO" is believed to be the flagship of Cardiv one which consists of "SHOKAKU", "ZUIKAKU" and "TAIHO". ("ZUIKAKU" has been reported as sunk by American Third Fleet Carrier planes north east of Luzon on 25th October).

The "TAIHO" is estimated to be 860 feet overall and capable of carrying in excess of 80 planes, the capacity of "SHOKAKU" class

carriers. It is believed that this ship was built from the keel as a carrier. The armament has been tentatively reported as consisting of ten 5-inch dual purpose guns in twin mounts. Radar is mounted on the island structure.

There is a superficial resemblance between the "TAIHO" and carriers of the "HAYATAKA" class in the general arrangement of the funnel-island superstructure. Unlike the "SHOKAKU" class, "TAIHO" and units of the "HAYATAKA" class have a prominent funnel protruding above the large island. The "TAIHO'S" funnel, however, is considerably broader than that of the "HAYATAKA" and the island is more simplified and rectangular in mass.

"TAIHO" is unique among Japanese carriers in that the flight deck extends the full length of the ship. All other Japanese carriers on which graphic material is available indicate open areas below the flight deck at bow and stern. "TAIHO" is also the only Japanese fleet carrier which is closed at the bow.

The resemblance of "TAIHO" to "ENTERPRISE" and units of the "ESSEX" class and to British carriers of the "ILLUSTRIOUS" class should be noted. The British carrier "UNICORN" has a similar funnel island structure but is a smaller carrier, with greater freeboard.

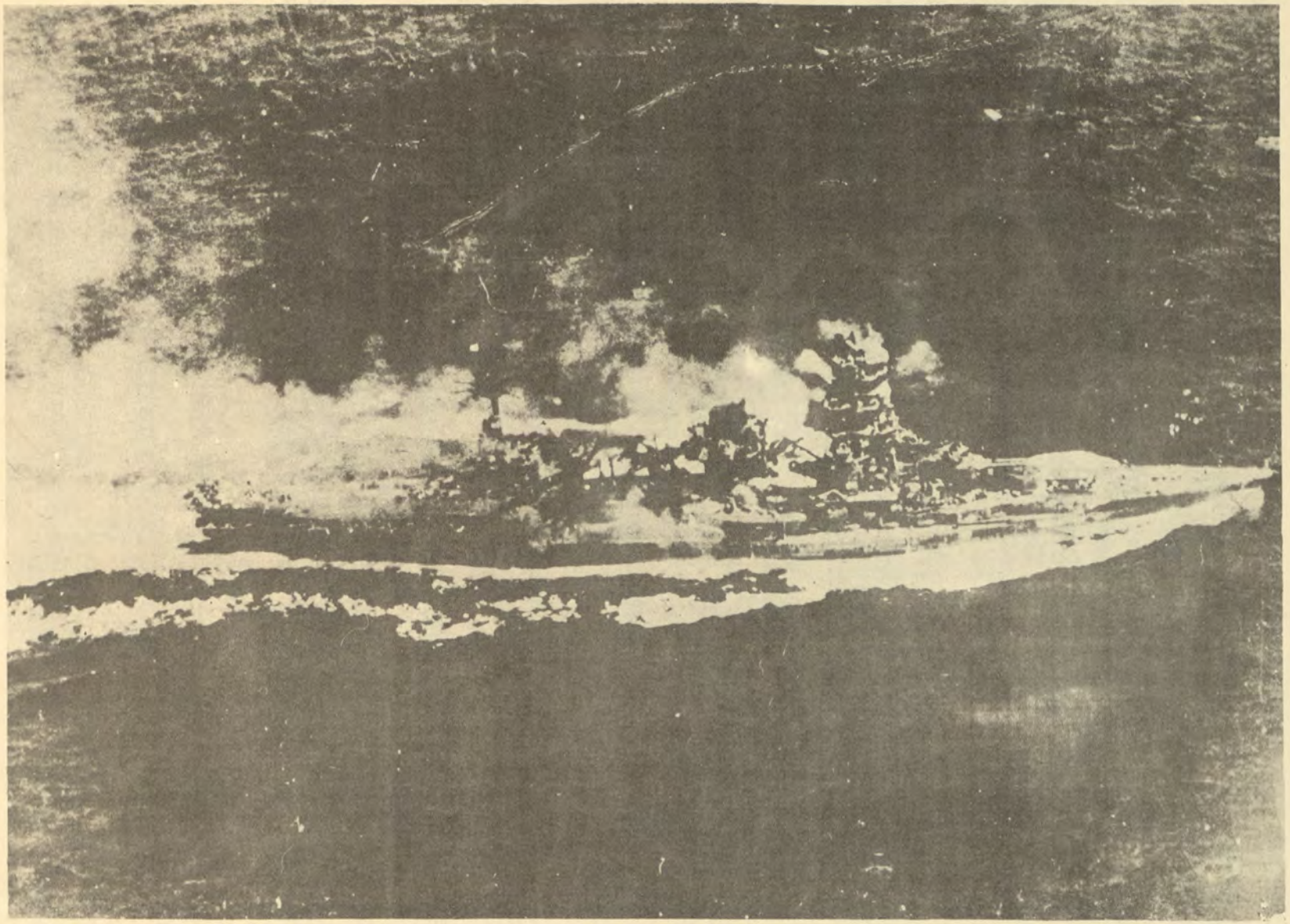
The following comparison can be made between "TAIHO" and U.S. and British carriers in the area below the level of the flight deck at bow and stern.

U.S. Fleet Carriers - Open at bow and stern (exception:"SARATOGA")
British Fleet Carriers - Closed both bow and stern
"TAIHO" - Closed at bow, open at stern.

Conversion of Battleships of the "ISE" Class

Reports indicate that the battleships "ISE" and "HYUGA" of the "ISE" class have undergone conversion enabling them to carry from 18 to 25 planes, probably float planes and dive bombers. (Both of these ships were observed in the Japanese carrier force which approached the Philippines on 24th/25th October.)

According to these reports, a flight deck has been added abaft number four turret. Planes are catapulted but, of course, are unable to land aboard these ships. Apparently "ISE" and "HYUGA" are used as "supply carriers" during an engagement to supplement the normal complement of planes on the regular carriers. At the conclusion of the action, their dive bombers would land aboard the regular carriers for repairs, fuel and bombs or for the return trip. If within range, planes from these ships could fly to land bases upon completion of duties.



"ISE" Class Battleship photographed by plane from U.S.S. "ESSEX" on 25th October, 1944. Note flight deck aft.

Statistics for the refitted "ISE" class are as follows:-

Displacement	32,000 tons (standard) (?)
Length	683 feet
Beam	94 feet
Draft	28 feet 8 inches.
Armament	8 14-inch in twin mounts. 16 5.5-inch casemates. 8 5-inch in twin mounts Anti-aircraft battery undoubtedly increased; number and size undetermined. One catapult, 18 to 25 planes reported carried.
Speed	23 knots (designed), may be lower 25.5 knots (full), may be lower

3. JAPANESE AERIAL TACTICS AGAINST SHIP TARGETS

In "Know Your Enemy", an Addendum to C. in C. Pac - CinCPOA "Weekly Intelligence" Vol. 1, No. 15, a summary is made of documentary evidence bearing on Japanese tactics for aerial operations against ship targets. Most of the material is drawn from official Japanese documents but use is also made of unofficial documentary and prisoner of war information which appears logical and consistent. The section on "The Attack"-dive bombing, glide bombing and torpedo attacks - is summarized below.

Dive Bombing

Dive bombers should approach to within 50 miles of the target in normal flight formation. Aircraft should be in normal close formation in order to maintain their defensive firepower and at the same time simplify communications and receive more effective support from the fighter escort. When about fifty miles from the target, a screening formation is taken up - usually a series of small Vees in a general Vee formation.

A high altitude approach is favoured if visibility and cloud conditions permit. Approach altitudes of from 13,000 to 33000 feet are given in various documents with 16,000 to 20,000 the most favoured.

For night approaches the following altitudes are given.

Full moon (10 to 20 days old) fine weather and good visibility:	10,000 to 13,000 feet.
With full moon, light clouds and good visibility, or with full moon, fine weather and a certain amount of mist in the air:	6,500 to 10,000 feet
With new moon (5-10 or 20-25 days) fine weather and good visibility;	8,000 to 11,500 feet
With new moon fine weather and misty air:	5,000 to 8,000 feet

It is said that while the above is standard, the succeeding planes may come in at higher altitudes by being stepped up.

At a distance of from 33,000 to 65,000 feet from the target, the attack formation is taken. It consists generally of a column, or, when the attack is to be made from more than one direction, two or more columns. An altitude of 13,000 feet is preferred at this time and is maintained until the order for attack is given, at which time the formation drops to about 6,500 feet at an air speed of more than 140 knots.

The planes dive at 60^{o} to an altitude of 1,600 to 1,800 feet at which altitude the bombs are released. It is stated that a smoothly co-ordinated attack by 36 planes can be accomplished in three minutes.

Normally the approach is made directly to the target but it is recommended that -

(a) When the sun is high, fly out of it;
(b) At dawn and dusk, fly out of the dark;
(c) Fly against the blue of the sky rather than the white of the clouds;
(d) Make use of scattered clouds.

When the wind is negligble (below 50 feet per second) it is recommended that the dive be made from the bow or stern. If the wind is greater than 50 feet per second, the dive should be made with the wind at the tail of the plane.

It is estimated that, in a multiple formation attack, 18 planes are required to make five or six direct hits and that eight planes will be shot down.

Glide Bombing

Glide bombing is prescribed when, because of visibility,

sufficient altitude cannot be gained for dive bombing. It seems to be standard for night attacks. The push-over to the glide is at 3,300 feet and the angle of the glide is 40° to 45°. The bombs are released at 1,000 feet during the day and at 1,300 feet at night.

Torpedo Attacks

There is relatively little documentary evidence on Japanese torpedo tactics. Information available indicates that the approach formations are very similar to those employed in dive bombing.

Standard approach altitude is stated to be 6,500 to 10,000 feet. Observations in recent encounters indicate that when within radar range an altitude of 160 feet or less is used. One prisoner of war stated that the approach until near the formation was at 3,300 to 5,000 feet after which the planes dropped to about 160 feet.

When the attack has started, the aircraft fly in a loose string, although in the face of heavy A.A. fire they may come in line abreast on a broad front.

One source states that the torpedo should be dropped from altitudes of 160 feet at an air speed of 160 knots; according to other sources, from 330 feet at an air speed of 140 to 160 knots. Reports indicate that torpedoes have been released at altitudes varying from 50 to 5000 feet.

The release point is uniformly stated to be 2,500 to 4,000 feet depending on the course of the target - 3,200 feet where the target is on a straight course and the target angle is 60 to 80 degrees, 130 degrees and 2,500 were the target is in an outside turn and the target angle is 30 to 60 degrees.

4. JAPANESE LIGHT CRUISER "OYODO"

The Japanese light cruiser "OYODO" (commissioned in 1943) and Flagship of C. in C. Combined Fleet, has heretofore been thought to be one of the "AGANO" Class. However, in the light of latest information, most of which was obtained from an officer Prisoner of War survivor of the light cruiser "NATORI", whose statements were deemed fairly reliable, it is now considered that this vessel, while similar to the late "AGANO" in some respects, is in fact of a new and unique design.

This design appears to be similar to that of the heavy

cruisers "CHIKUMA" and "TONE". The main battery is grouped forward of the bridge to permit of increased aircraft stowage in the after part and the fitting of a large catapult on the stern. The hangar is unusually high, giving an excellent field of fire to the anti-aircraft battery mounted above it.

Reported specifications are as follows:-

Displacement	At least 10,000 tons
Length over-all	575'
Speed	37 Knots maximum
Armament:	
Main Battery	Six 15.5 cm 45 (?) cal. (about 6.1-inch). Two triple turrets forward of bridge. Probable maximum elevation of 60°
Secondary Battery	Eight 10 cm 50 cal. (about 3.9-inch). Dual Purpose Guns. Two twin turrets aft of bridge on port and starboard. These guns are the same new type as those on "TERATSUKI" Class destroyers, and have a reported elevation of 90°.
Anti-Aircraft Battery	Thirteen 25 mm. Anti-aircraft Guns. Four triple mounts atop corners of hangar, one single mount forward of bridge.

Unlike the "AGANO" and other Japanese light cruisers, no torpedo tubes are fitted.

Aircraft	Four "NORM II" or SHUN ("Purple Cloud").
Radar	Search radar known to be fitted; estimated equipped with fire control radar and radar search receiver.

(7th Fleet Intelligence Centre).

5. JAPANESE "MATSU" CLASS DESTROYER

Details were published recently in the United States

Pacific Fleet and Pacific Ocean Area Weekly Intelligence of the new Japanese "MATSU" class destroyers of which there are believed to be now five ships in commission - "MATSU", "MOMO", "TAKE", "KUWA" and "ULE". The information was obtained from five members of the crew of "MATSU" who are now prisoners of war.

The destroyer appears to be designed for anti-submarine and anti-aircraft escort rather than for fleet work. The close range A.A. armament is particularly strong for a ship of her size. The following list of characteristics was made after a close check of all data given by the prisoners.

Length:	295-325 feet
Beam:	32-33 feet
Tonnage:	700-1000 tons
Speed:	Maximum 30 knots, cruising 18-20 knots.
Propulsion:	Turbines - twin screw
Armament:	Three 5-inch dual purpose (single mount forward and twin mount aft.) Four 25 mm. AA. triple mounts (One forward of bridge, one on each side between torpedo tubes and after funnel and one at foot of mainmast) Twelve 25 mm. A.A. single mounts (six on each side) Five 13 mm. AA. M/G (three on bow and two on quarterdeck) Two "Y" guns on the quarter-deck.
Radar:	Two cones mounted on the foremast.
Rangefinder:	Two meter - above bridge.
Searchlight:	On superstructure at foot of mainmast.

6. JAPANESE WOODEN CARGO VESSELS

To offset Japan's tremendous loss of steel shipping, a programme of wooden ship construction was inaugurated in 1943. This programme, launched with wide publicity and invested by the Navy with an "A" priority, was to reach a new peak in 1944 of over

a million gross tons a year, according to Japanese propaganda. Available estimates, however, place the actual tonnage at a far lower figure.

The choice of wood as the basic material for this programme was dictated by the country's acute shortage of steel. In the wooden ship metal is used only for nails, certain installations and the propelling machinery. Wood also is much more easily handled by untrained labor than steel. Further, Japan's dockyard facilities for steel ship construction have been strained to their utmost. A yard for wooden ships can be set up almost anywhere in a region where timber is plentiful. Cranes, slips and shops can be built of material on hand, and construction begun almost immediately. Outside of Japan proper, Indo-China, Java and Thailand are supplied with teakwood, while Manchuria, the Philippines and South China may also undertake building, using pine and fir as the medium.

To speed production, the programme was standardized into five designs of 500, 300, 250, 150 and 100 gross tons respectively, with the principal effort devoted to the three smaller types. An output of one boat per slip per month was expected by the Japanese, dependent on the delivery of Diesel engines, which appears to be the principal bottleneck in the programme.

Japan's dwindling stocks of seasoned timber seems also to have been a delaying factor. Some ships have been built of green wood, and this, combined with hurried building methods, has rendered the repair of these vessels extremely difficult. The enemy is known to have considered a proposal that one half of the existing dockyards be assigned to repair work alone.

The wooden vessels are intended to carry all the coastal cargoes of the Japanese Empire, leaving the steel shipping for overseas traffic exclusively. Rice, Japan's basic food staple, and most of the raw materials for industry, will be their burden. They have had a prominent place in military operations, too, in the supply of advanced bases, ever since the battles at Lae and Guadalcanal. As carriers, they are not well adapted to individual weighty objects, such as tanks or artillery, but rather to small packaged cargoes, not over two tons per item, such as ammunition and foodstuffs. Their expendability is a prime advantage; the loss of any single ship is of far less consequence than the sinking of a large freighter. At sea, these coasters are small objects hard to see or identify. Camouflaged with palm fronds, they may lurk close to shore and be mistaken for an island. Their slight draft enables them to cross over reefs or sail in shallow waters inaccessible to larger vessels.

Their principal tactical disadvantages result from their slow speed (about eight knots) and limited sea range (about ten days,

operating period). With slight defensive armament, the wooden vessels, once spotted, are apparently an easy target for aircraft, readily sunk or set afire by machine gun strafing or light bombs.

Wooden Sea Trucks - Sugar Division

These vessels are known to be distributed along the entire Japanese-held area from Burma to New Guinea. They have been seen in the Marshalls, Carolines, and Bonins as well, at times immediately preceding attack by our forces.

Sea trucks vary in length from about 70 to 120 feet. Draft when loaded is estimated to be 6' forward, 9' aft. Engines are Diesel or semi-diesel, estimated at 180 to 200 HP. Speed is about eight knots, probably less, twelve tons of fuel oil are carried. Crews vary from nine to fifteen in number. Radio is carried, indicating the possibility of using these vessels as outpost boats.

(O.N.I. Weekly)

7. GERMAN MIDGET U-BOAT CAPTURED IN FRANCE

The Midget gives the impression of being essentially an improved version of the "Human Torpedo" (Mother and Baby type). It is altogether more substantial and almost certainly is capable of submerging.

Hull

The hull is built in three sections and is between 25 and 30 feet long. The hull plating seems to be generally of 3/16 in. steel plate. Frames appear to be spaced 9 ins. apart. The lower half of the hull is recessed on both sides to provide close stowage for the two torpedoes.

The conning-tower is made of aluminium alloy and is riveted to the hull. Access is by means of a small circular hatch. There are four rectangular perspex windows and, almost certainly, no periscope. A brass cylinder, which projects up through the forward deckhead of the conning-tower, appears to be some form of compass.

Two substantial lifting lugs are welded on the upper side of the hull, one well up forward and one down aft. Another lug, which seems to be for towing, is welded to the stern.

The all-up weight, including two torpedoes, has been assessed at approximately ten tons. At normal surfaced trim it seems

that the hull would only just be visible and all (2 ft.) of the conning-tower would be above water.

Control and Propulsion

The Midget is controlled by a wooden rudder and there is also a single wooden hydroplane mounted below the rudder. It seems that some form of telemotor system is used to control the rudder and hydroplane. In the cockpit there are two handwheels, mounted amidships on the same axis, which appear to operate these telemotors through a system of burrs. It is assumed that there are trimming tanks for and aft but this could not be confirmed.

A six-cylinder internal combustion motor is mounted inside the hull abaft the cockpit. It drives a single propeller through what seems to be a normal friction clutch. On the propeller side of the clutch, and concentric with the shaft, is an electric motor. This motor is almost certainly a normal type torpedo motor. The main batteries are stowed below the cockpit, with possibly others in the compartment immediately forward of the cockpit.

Fuel

The motor appears to be a conventional petrol engine but no petrol tanks could be located. From a cursory examination, however, it seems unlikely that any fuel other than petrol could be used.

Endurance

It is impossible to estimate this. When the batteries, fuel tanks and electric motor have been carefully examined some estimate will probably be made. It seems, however, that the endurance would depend more on the human factor than on any other. At a guess it would seem unlikely to exceed 36-48 hours.

Diving Depth

This too can only be guessed at the moment. An expert who has been connected with the "X" craft development considers that 150 ft. would be quite possible. Unfortunately, the control gear in the cockpit had been smashed and burnt by an aircraft rocket and no information was forthcoming from any instruments.

Speed

Based on the assumption that the petrol engine is 35-40 b.h.p. it seems feasible to expect 5-7 knots on the surface. Submerged speed is difficult to assess even when the batteries and

electric motor have been examined, but, taking into account the hull form, 2-2½ knots would be a good guess.

Torpedoes

Two 21-in. electric torpedoes are strapped to either side of the hull. They are suspended on lugs which run in a channel section guide rail which runs horizontally along the hull.

The system of releasing the torpedoes is ingenious. A hydraulic ram operated from inside the cockpit knocks a pin out of the steel retaining band; the torpedo is then freely suspended by the two lugs in the guide rail. The same movement of the ram knocks the starting switch of the torpedo and it simply glides away under its own power.

Special equipment

There does not appear to be any form of listening equipment or radio in the craft and firing of torpedoes must be done visually. The only special equipment appeared to be the air purifying system.

Detection

The small size of the craft (only half the size of one of our "X" craft) will almost certainly make it difficult to detect by asidcs. When running submerged, detection by hydrophone effect will also probably be difficult. However, the odd hull form may tend to give a sizable wake and facilitate echo detection. The craft would be extremely vulnerable to depth-charge attack.

(Admiralty Anti-Submarine Report).

8. GERMAN MIDGET SUBMARINES

For over 18 months an increasing number of reports have described experiments in Germany on small submarines and semi-submersibles ranging in size from one or two-man craft up to 250 tonners At least two types have been detected in photographs, and one of these (Hela II) is known to be in production.

The Hela II is an 108-foot submarine seen at Hela in early 1944 and now being built in Hamburg and Kiel. It takes approximately two months to assemble from five prefabricated hull sections

(manufactured elsewhere) and an additional month to fit out.

Dimensions:	108 feet overall, 9 ft. beam and 11 ft. (ect.) depth from deck to keel
Displacement:	140-200 tons (est.)
Armament:	One 20-mm. on deck (unverified) Two 21-inch bow torpedo tubes (unverified)
Propulsion:	Tapering stern suggests the often-reported closed-cycle engine may be installed. The submerged speed of a submarine with this machinery has been reported all the way from 9 to 40 knots.
Complement:	12-18 (est.)

The Hela I is a smaller type. The conning tower of this type is glass-enclosed, a feature permitting extremely short crash-diving time. Hela I was photographed at Hamburg in July, 1944.

(O.N.I.Weekly September 20th, 1944).

SECTION V

MISCELLANEOUS

1. GERMAN AND JAPANESE SUBMARINE OPERATIONS

Reports received since the publication of the November edition of the Monthly Naval Warfare Review show that three more U-boats were sunk in September making a total of 12 - 10 German and two Japanese. Of the Japanese losses one was sunk by an American submarine about 240 miles east of Japan and the other was sunk by an American destroyer escort west of Yap.

During October Allied shipping losses from all causes were the lowest of the war. No ship was sunk by a German U-boat in any area but four ships totalling 11,600 tons were sunk by varying forms of enemy action and seven totalling 16,000 tons were lost by marine risk. At least 36 attacks developed on German and Japanese U-boats and of these 22 were made by warships, 10 by shore based air-craft and four by carrier based aircraft. Six U-boats were sunk or probably sunk (three in the Philippines area) - four by warships, one by shore based aircraft and one by combined carrier based air-craft and Coastal Command.

2. THE RADIO WAR

The article below is summarized from a long and extremely interesting review of the U-boat war from the radio and radar aspects published in the Admiralty Anti-Submarine Report for September 1944:-

Throughout the war the aim of the U-boat hunter has been, by any means, to discover the elusive quarry. Our methods available at the beginning of the campaign, though applicable to small areas where the U-boats might be expected to congregate, such as the neighborhood of a convoy, were, however, not applicable to the wide spaces of open ocean where they spent the period between operations. The use of radio technique has provided two complementary solutions to this problem - H/F D/F and Radar.

H/F D/F

Some time before the beginning of the war the Admiralty appreciated the need for a shore H/F D/F organisation and the important part that it might play in operations. The extensive use of H/F D/F as an anti-U-Boat device could not, however, be foreseen until the U-boat command showed its hand towards the end of 1940 after acquiring the French bases.

The small number of H/F D/F stations, combined with the fact that enemy transmissions were mostly in home waters, made it seem at the end of 1939 that the art had nearly been mastered. Positions were estimated not to degrees but to minutes: one enemy aircraft was plotted and shot down by a patrol which had been vectored on as a result of H/F D/F.

As U-Boats started to operate in numbers on the Atlantic trade routes it was soon apparent that the shore H/F D/F organization could only produce an indication of area, and at best could do no more than provide a warning for a threatened convoy and so assist convoy routeing.

In the summer of 1940 the pattern of U-Boat tactics became discernible and the obvious answer was H/F D/F in the convoy escorts themselves. The first requirement was an H/F D/F outfit for ships which was quick and easy to operate; outfits previously fitted in warships were neither.

The equipment was designed and put into operation. The results from the few ships that were fitted during the second half of 1941 did not give much encouragement. Gradually, however, it was realised that a powerful aid was available; successes became more frequent and, by November, 1942, H/F D/F was accepted as an essential part of the equipment of escort craft.

The Enemy's Appreciation of the Use of H/F D/F against U-Boats

The enemy over-rated the accuracy of shore H/F D/F but for a long time they under-rated - indeed ignored - the danger of ship-borne H/F D/F. This was reflected in their communications, which seemed to be conducted on the principle that W/T silence was to be strictly kept until contact was made with the enemy, but completely relaxed once contact was made. During the attacks on Convoy S.C.118 (4th/9th February, 1943) for example, the U-Boats concerned made 106 transmissions during a period of 72 hours.

The enemy's first enlightenment probably came when a "Y" party in a U-Boat heard intercommunication on 2410 kc/s. The enemy communications tightened up considerably after that; the

length of messages was reduced and the frequencies in use were changed more often (sometimes two or three times per day). This made H/F D/F more difficult but did not seriously affect its use or effectiveness.

H/F D/F could, however, do no more than bring the escorts, if all went well, close enough to the U-Boat to allow other and more accurate methods of location to be used. When the U-Boat command turned its attention to radar, the scene became unruly indeed.

Radar and G.S.R.

The wavelength of the early radar sets was long and, in consequence, the aerial had to be very high above the surface of the sea before any considerable range could be obtained on small objects. This limited the effectiveness against U-Boats of the early radar sets in A.S.V. ships, but not in aircraft, and the value of A.S.V. (first used early in 1941) as a U-Boat detector soon became apparent.

The Germans were fully alive to the possibilities of metre wave radar (in some aspects their development was ahead of ours in 1939) and had two A.S.V. sets planned, the Fu.G.200 and the Fu.G. 213; they were also aided by the capture of a Mark II A.S.V. set in Tunisia in the spring of 1942. They accordingly concluded that A.S.V. was causing the trouble, and tests in the summer of 1942 confirmed that the transmissions were easily detectable by a simple receiver and aerial. The Paris firm of Metox turned out the R.600, the first and for six months the only standard U-boat G.S.R. This set had many vices but its operational success was undeniable; A.S.V. fitted aircraft could be detected at ranges which allowed ample time to dive before they approached. Soon in the Mediterranean no one put to sea without a search receiver in working order.

Centimetric Radar

Meanwhile, all unobserved by the U-boat command, the storm was beginning to gather. The Germans were far from unaware of the possibility of generating radiations of wavelengths around 10 cms. but their experiments had never succeeded in producing any considerable power. The British invention of the strapped magnetron in the spring of 1940 first made this possible. From this seed sprang many valuable pieces of radar equipment, up to Types 275 and 277 and A.S.V. Mark VI and later the 3 cm. equipments. This invention first impinged on the U-boats in February-March, 1943, in the form of A.S.V. Mark III[M]. The sightings and attacks on U-boats now began a steady increase and the proportion of aircraft approaches undetected by the U-boats rose. The first possible

explanation which occurred to the Germans was that we were employing supersonic modulation and they fitted the R.600 with a visual tuning indicator of the "Magic Eye" type. Fortunately Naval aircraft operating from Gibraltar were employing this device and the slight success that the Germans achieved lulled them into a false sense of security. When it was apparent that this was not the solution the next two blind alleys were infra-red and an anti-interception technique in the operation of the A.S.V.

Dull red glows were reported from attacking aircraft which strengthened the argument for infra-red and many U-Boats were coated with a special paint intended to give no reflections of infra-red rays. The sinkings of U-boats continued.

Appreciations June to July, 1943.

Viewed from the Allied side there was at this time no logical reason why the Germans should not solve their puzzle within a very few weeks. Taking an impartial survey of every conceivable method of detecting U-boats, it seemed that they must inevitably be led to the correct answer - shorter wavelength radar. There were indications that a crisis was at hand in the Search/Counter Search competition. It was clear that there was an increasing lack of confidence in the German Search Receiver and U-boats in the Bay of Biscay were surfacing during part of the day and remaining submerged at night when search by aircraft is simplified.

The Great Radiation Scare

Suddenly the Germans had a brainwave. Tests were made on the R.600 receiver and it was discovered that it produced very powerful radiations. Hastily it was withdrawn from service and after a short delay the Wanz G.I. search receiver was introduced. This receiver produced radiations only one twenty-fifth of those produced by the R.600. No decrease occurred in the sinkings of U-boats and a mental stampede began.

The Wanz G.I was withdrawn from service in order that an elaborate and hastily conceived apparatus to reduce radiations still further might be built in. The only result of this modification was to increase the complexity of the set and make breakdowns more frequent. The use of one after another of the standard U-boat communications receivers was banned while extensive tests of their radiations were made and, as sinkings continued, U-boats in the Bay of Biscay were ordered to receive W/T routines submerged, using VL/F and their D/F loop aerial. It would then be a complete theoretical impossibility for any radiation to reach the air above the surface of the sea, let alone a patrolling aircraft. The sinkings still continued.

The next idea was the detector receiver. The Germans decided to accept the drawback of insensitivity of this type of receiver on account of its complete lack of radiations and produced the "Borkum". This was designed to accept all signals in the 75-300 cm. band but could conceivably give an indication of a 10 cm. transmission.

Eventually in September 1943 the U-boat command became aware that 10 cm. radar was in use against them. It is remarkable that the German Air Force had, in March 1943, captured a blind bombing aid H2S working on the 10 cm. band but even this did not give the clue to the German Scientists.

"Naxos"

10cm. radiations are not only difficult to generate, but they are also difficult to receive. As the simplest means, and still under the influence of their obsession, the Germans produced a detector receiver, the "Naxos", for the 8-12 cm. band. The maximum theoretical range of this type of receiver on Mark III A.S.V. is about 5 miles but it is a very delicate instrument liable to damage and, in its early forms affected by spray. The net result was that the U-boats continued to be surprised successfully and the Germans continued to believe that the problem was more complex than it really was.

The Effects on Morale

The effects of these sorts of tactics on morale are obvious and U-boat Command finally sent to sea a U-boat fully equipped to investigate every type of Allied radar and carrying one of their best technichians with operational experience, Dr. Greven. He sailed from St. Nazaire in "U-406" on 5th February, 1944 and was captured when the U-boat was sunk by H.M.S. "SPEY" on 18th February. "U-473" which, similarly equipped, left Lorient on 27th April, 1944 had an even shorter career in this role, being destroyed by H.M. Ships "STARLING", "WILD GOOSE" and "WREN" after nine days at sea.

Improvements in G.S.R.

As the U-boat command came to a clearer appreciation of the true situation, they realised that the first necessary step was to provide the U-boats with an improved search receiver against 10 cms. A.S.V. which would not only give ample warning but provide a margin of sensitivity against inevitable losses of efficiency under operational conditions. A small number of tunable magnetron receivers ("Korfu"), covering 8 to 12 cms., were produced by December 1943, but they have never been used in U-boats probably because of their strong radiation. The Germans remained faithful to the

detector principle and produced an aerial of much greater sensitivity (the Cuba Ia or Fliege) by using a vertical section of parabolic reflector like a slice of an electric fire. This device has probably increased the range of 10 cm. G.S.R. up to 20 miles under the best conditions against Mark III A.S.V. and more against higher powered sets.

The capture of our 3 cm. airborne radars in the form of the blind bombing aid H2X led to the development by May 1944 of the search receiver "Muecke" to cover this lower frequency. The standard U-boat equipment is now "Tunis" which is a combination of "Fliege" and "Muecke".

Radar and Schnorkel

All the centrimetric aerials so far produced by the Germans have had the disadvantage that they would not stand submergence. The production of a suitable pressure tight aerial presents very great technical difficulties. There can bo no doubt, however, that the Germans are doing their best to produce such an aerial with the object of fitting it to Schnorkels. So far the only G.S.R which has been fitted to Schnorkel is the old standard "round dipole" type, designed to cover the meter wave radar in conjunction with Wanz G.2 or Borkum.

Anti-radar Coverings

The large scale appearance of Schnorkel may well have lent an impetus to another device on which the Germans are known to be working, that of the anti-radar screen or camouflage, the object of which is to prevent an object from giving a radar echo at all, or at least to reduce the size of the echo produced. However, so far as we are aware, no operational U-boat has ever been fitted with a complete anti-radar outfit of either of these two types. Schnorkel presents a much easier problem; not only is it much smaller, it is also a simpler shape. We should accordingly be prepared for great efforts on the part of the Germans to produce an anti-radar covering for Schnorkel. Whether they will succeed or not it is not possible to say at present.

Decoys

The two main decoys so far used by U-boats have been the "Aphrodite" (Radar Decoy Balloon) which has never been a serious nuisance and the "THETIS II C" (Radar Decoy Spar Buoy) which was sown extensively but has so far not succeeded in producing a single echo on an Allied radar. It must not be assumed, however, that decoys used by U-boats will always be as ineffective as these.

Conclusions

The elements of confusion have now largely disappeared from the situation. The German Naval Staff have a clear appreciation of the forms of Allied radar in use and have produced workable search receivers, though there is still room for improvement, particularly in Schnorkel G.S.R. It is likely that they are working on a Schnorkel anti-radar device and may later on produce an effective radar decoy.

3. HELLCATS SINK JAPANESE DESTROYERS BY STRAFING

Evidence of the terrific fire power in modern carrier borne fighters is shown in the following extract from the United States Naval Aviation Confidential Bulletin, November, 1944.

"During the past few months there have been at least two reported instances of Japanese destroyers destroyed in strafing attacks by F6Fs. On 12th June in operations against the Marianas, a destroyer of the "FUBUKI" Class, "MAGIRI" Group, was sunk by strafing fire alone. The resulting explosions occurred in the area beneath the No. 3 gun mount and the ship sank in less than fifteen minutes. The A.A. fire had been virtually silenced during the initial strafing runs, all of which were made by divisions in line abreast.

"The second incident occurred on 25th July off Palau. The following excerpt is taken from the report of the VF Squadron Commander:

"'Shortly after this action, a Jake was tallyhoed, approximately 10 miles to the northeast, flying at about 1,500 feet ahead of an enemy destroyer (believed to be of the "FUBUKI" Class), for which it was apparently acting as an anti-submarine escort. One section of fighters attacked, one plane from the right above, and the other from astern, shot down the Jake and then joined the other section in an attack on the destroyer. The latter, which had been proceeding on a course of 030°, at about 15 knots, now adopted evasive tactics.

'After six runs had been made by the fighters, one each of which the ship was severely strafed by .50 cal., it blew up with a terrific explosion and disintegrated. A great cloud of smoke rose to about 1,500 feet and one plane, recovering from an attack at that altitude, was severely damaged by the explosion. The

aircraft was forced to return to base where the pilot made a water landing alongside a destroyer and was taken aboard unhurt. During the course of the attack, flashes on the deck of the enemy vessel, indicated that the planes' fire was being returned, but the hostile gunnery proved wholly ineffective!".

4. "HOLY MOSES"

The United States Naval Aviation Confidential Bulletin for October, 1944 published details of the performance of the 5-inch HVAR U.S.N. aircraft rocket projectile, which is known to its friends as "Holy Moses". The effect of this projectile as an anti-ship weapon may be judged by its performances in England during trials against Allied tanks as related by a U.S. Army officer.

"The 5-inch HVAR will dig a hole five to six feet deep and twelve feet across in fairly firm ground. This gives us the chance to tear up tracks beneath the train. The rockets will destroy a trian or tank easily. While practicing against British and German tanks here, a lucky hit was put through the open door of a Sherman. The turret was torn off and thrown ten feet from the tank. Two similar hits were made on a British Churchill tank. Two inches of very good armour at the side of the engine had been penetrated and large pieces of the rocket head were found in the engine compartment. Had the engine not been removed, it would have been ruined and set on fire. This rocket also lifted the armoured doors off the top of the engine compartment and knocked them about ten feet away."

SECTION VI

MATERIEL

1. THE IMPORTANCE OF RADAR ROUTINE REPORTS

That breakdown was probably at a most inopportune time. Was it serious? What went wrong? Will it happen again? The latter is now the most important question and here are some ways in which you, the user, can help to reduce these unwelcome occurrences.

Radar equipment is not, by any means, simple. The average transmitter handles a peak load of 30 to 170 horsepower. The receiver must be able to magnify the "echo" about a million times. Components just cannot compete with these conditions indefinitely and there are some 500 of these "potential trouble makers" in each set, some worse than others.

In peace time, it is the practice to send preproduction models to sea for extensive tests where teething troubles were overcome and the lessons learnt were incorporated in the production set. Skilled men made and inspected these sets, and there was plenty of time and manpower to correct incipient faults or to supply adequate spares.

In war, new ideas are more plentiful, but time and manpower are limited. Procurement and supply problems become greater, and hence, the set must be given to you the user in a comparatively untried state.

Breakdowns are inevitable but they can be reduced to a minimum by you making your experience available to the designer so the faults can be rectified or in many cases prevented before they become serious.

Every fault and performance report you submit is analysed and checked with those from other sets. Troublesome units or components are replaced if possible, otherwise more spares are supplied.

Merely stating that your sets are giving trouble will not help at all. Give detailed reports on the correct forms so they will get to the right people. Quote serial number of component and unit and its approximate life in hours before it broke down. If convenient, return the offending component to S.N.S.O. Sydney marked "Defective for Radar School, vide my report so and so".

The following is an extract from an actual ship's report No. 2. Note the improvement in reporting useful details which is in its later stages quite satisfactory:

Type No.	Unit	Serial No.	Component	Fault	Corrective Measure
Extract from 1st Report					
A272	Receiver Unit			Pot. R61 F'lty	Replaced
	Transmitter			Echoes Jittery	T.X. tube replaced Life of old tube 150 hours.
	Indicator			Valve V 4, 807 failed	Replaced. Life of old tube 200 hours.
Extract from 2nd Report					
A272	Indicator	29	C.19	Spot disappeared.	Condenser had shorted out. Replaced.
			V6/V7	T.B. Inoperative	V6 and V7 replaced by matched pair of amplifiers. Life of old tubes approx. 400 hours
			Ranging Pot.	Trace was very flickery when moved in either direction.	Pot. was removed and tension of moving arms increased after which the flicker disappeared.
Extract from 3rd Report					
A272	Local Osc.	57	V.3 (CV.35)	No Output	Valve replaced. Life of old valve 780 hours.
	Modulator	55	R.I	Audible Sparking	One of the forty 5,000 ohms resistors comprising R.I. was found to be arcing and was replaced.

(Contd)

Type No.	Unit	Serial No.	Component	Fault	Corrective Measure
Extract from 3rd Report (Contd).					
	Sw. Panel and Power Supply	54	R.I.	R.I. burnt out and open circuited.	Owing to an earth on the C.R.O. H.T divider, excessive current was drawn, this causing the breakdown of R.I. R.I. was replaced and the earth removed.

What is more important, note the improvement in performance of the set as shown in Report No. 3 (below): Ranges given are "reliable ranges".

TARGET	1ST REPORT	2ND REPORT	3RD REPORT
A.M.S.	10,000 yds.	13,500 yds.	14,000 yds.

It is impossible to correct all defects, and so they must be dealt with in order of importance. A most valuable way of assessing relative seriousness of breakdowns is the time off the air due to the particular fault and the total time the set was working for the period covered by the report.

Experience and careful routine checks will aid your mechanic to prevent faults before they occur, so give him every assistance to look after his sets properly, but he alone cannot fix everything so help him further by ensuring that he puts in a detailed report on breakdowns.

What went wrong when that set went off the air? Tell us so we can help you.

2. C.A.F.Os. ON ANTI-SUBMARINE SUBJECTS

C.A.F.O. 1944	Subject	Brief Description
1586	Depth Charges	Introduction of 650-ft. Pattern for Five-Charge Pattern Ships
1587	Mark XII Depth Charge	Action Drill
1601	Bearing Recorders, Patterns A.2097 and A.2247	Excessive Wear on Paper Roller Gears - Cause and Remedy
1602	Recorders A/S 3 and A/S 59 Series	Introduction of New Range Scale
1760	Electro- Hydraulic Depth Charge, Pattern Control System.	Instructions for Fitting to Ships in Service (Amended by C.A.F.O. 2143/44)
1769	Asdic Installation Types 134/A	Introduction of Oscillator Pattern A.2541
1770	Asdic "Q" Attachment	Provision of Locking Plates for Nuts Securing Steady Bearing to Main Oscillator
1954	Anti-U-boat Operations by Surface Craft	Reports.
1980	Depth Charge Communications	Spares for Firing Clocks and Order Instruments
1992	Asdic Depth Prediction Type 147B	Check of Oscillators, Pattern A.2317
1993	Method of Attacking a Bottomed U-boat with Depth Charges	
1996	Training Units, Patterns 3335 and 3572	Substitution of Mark VI Transmitter Attachment, Pattern A.2426 for G.B. Switch Pattern 9523.
1997	A.V.C. Receivers	Additional Ventilation

C.A.F.O. 1944	Subject	Brief Description
2039	Depth Charge Shock	Damage Trials
2055	Bearing Recorders Pattern A.2097 and A.2247	Modification to Stylus Band. Adjustable Sprocket
2060	Junction Box Pattern A.1206	Siting relative to Magnetic Compass-Reports.
2104	Information on Japanese U-boats	
2141	Depth Charges	Minimum Speeds for Firing Depth Charge Patterns - Reports.
2153	Creeping A/S Attack	Method of Finding Time to Fire-Reports
2154	Asdics in Merchant Ships	
2156	L.F. Motor Alternators	Introduction of Remote Control Switch in Asdic Control Room
2218	Repair or Replacement on Damaged Asdic Directing Gear	Stores to be Demanded.
2300	Hedgehog - Fuze 420	Procedure for Testing Safeness and Rendering Safe-Reports.
2312	Electrical Interference in Asdic Sets Type 147B and "Q" Attachment-Reduction	Modification to Panels, Transmitting Patterns A.506 and A.504
2313	Training in Asdic Set Type 147B	
2316	A.V.C. Receiver	Calibration of Tuning Scale.

Attention is also drawn to the following orders.

1588, 1759, 1771, 1772, 1773, 1994, 1995, 1998, 2045, 2057, 2058 2059, 2105, 2106, 2143, 2152, 2214, 2215, 2216, 2217, 2311, 2314 and 2315.

SECTION VII

SHIPPING STATISTICS FOR SOUTH WEST PACIFIC

1. ANALYSIS OF CONVOYS - SEPTEMBER, OCTOBER, 1944

AREA	No. of Ships		Tonnage	
	September	October	September	October
Forward Areas	13	55	117,000	356,663
Thursday Island - Darwin	15	-	66,443	-
Total	28	55	183,443	356,663

2. SINGLE ESCORTED SHIPS - SEPTEMBER, OCTOBER, 1944

AREA	No. of Ships		Tonnage	
	September	October	September	October
North West of Humboldt	18	2	159,590	13,390
South East of Humboldt		6		55,671
Arafura Sea	4	-	8,198	-
Total	22	8	167,788	69,061

3. INDEPENDENT VESSELS, SEPTEMBER, OCTOBER, 1944

AREA	No. of Ships		Tonnage	
	September	October	September	October
Eastern States - Western States	48	47	305,301	291,508
Melbourne - South Australia	100	83	463,657	353,050
Newcastle - Melbourne	200	185	874,995	768,156
Brisbane - Sydney	129	123	532,297	608,849
Barrier Reef - Brisbane	81	83	346,205	319,353
North West of Humboldt	965	202	6,355,940	1,397,287
South East of Humboldt (Including Coral Sea)		682		4,324,544
Arafura Sea	7	23	19,038	85,211
Total	1,530	1,428	8,897,473	8,147,958

4. MONTHLY OUTWARD GROSS TONNAGE - SEPTEMBER, OCTOBER, 1944

PORT	No. of Ships		Tonnage	
	September	October	September	October
Langemak	332	236	2,410,137	1,607,093
Humboldt Bay	131	204	825,306	1,370,391
Sydney	300	296	916,034	859,626
Melbourne	142	155	655,865	647,084
Milne Bay	151	99	903,347	595,711
Newcastle	234	194	503,496	464,792
Fremantle	74	63	494,514	408,011
Brisbane	83	83	377,133	402,688
Biak	38	57	223,776	366,424
Lae	44	54	263,940	330,496
Oro Bay	97	48	611,650	290,928
Wakde	-	46	-	288,862
Townsville	57	53	223,793	201,088
Morotai	-	30	-	200,348
Adelaide	52	57	256,010	185,483
Port Kembla	40	47	130,733	143,296
Cairns	66	60	150,905	114,309
Whyalla	25	22	108,553	93,038
Thursday Island	35	25	108,915	81,151
Port Moresby	25	12	110,301	50,681
Hobart	14	12	47,809	34,649
Darwin	13	8	53,356	26,487