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INDEX NO. S-19



SHIP AND RELATED TARGETS

JAPANESE SUBMARINE EQUIPMENT

U.S. NAVAL TECHNICAL MISSION TO JAPAN

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From: Chief, Naval Technical Mission to Japan.
To : Chief of Naval Operations.

Subject: Target Report - Japanese Submarine Equipment.

Reference: (a) "Intelligence Targets Japan" (DNI) of 4 Sept.
1945.

1. Subject report, covering Targets S-19, S-20, S-21, S-22, S-23, and S-70 of Fascicle S-1 of reference (a), is submitted herewith.

2. The investigation of the targets and compilation of reference to other reports were accomplished by Comdr. Theo. H. White, USN.



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Captain, USN

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S-19

JAPANESE SUBMARINE EQUIPMENT

"INTELLIGENCE TARGETS JAPAN" (DNI) OF 4 SEPT. 1945

FASCICLE S-1, TARGETS S-19, S-20, S-21, S-22, S-23, AND S-70

JANUARY 1946

U.S. NAVAL TECHNICAL MISSION TO JAPAN

SUMMARY

SHIP AND RELATED TARGETS.

JAPANESE SUBMARINE EQUIPMENT

The equipment installed in Japanese submarines, while of a practical nature, does not as a whole present any new features of which the United States Navy has not been cognizant. However, one piece of equipment of interest was the Celestial Observation Calculator. A description of the instrument and method of use is incorporated in NavTechJap Report - "Characteristics of Japanese Naval Vessels, Article 7 - Submarines - Supplement II" - Index No. S-01-7.

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REFERENCES

A. Location of Target:

Japanese submarines located at ports on the islands of HONSHU and KYUSHU; principally at KURE, YOKOSUKA and MAIZURU on HONSHU, and SASEBO on KYUSHU.

B. Pertinent NavTechJap Reports:

1. Characteristics of Japanese Naval Vessels, Article 1 - Submarines; Article 6 - Submarines - Supplement I; Article 7 - Submarines - Supplement II; Index Numbers S-01-1, S-01-6, S-01-7, respectively.
2. Japanese Optics, Index No. X-05.
3. Japanese Naval Photography, Index No. A-39.
4. Aero, Surface and Submarine Medicine and Research in the Japanese Navy, Index No. M-06.
5. Japanese Navigational Aids, Index No. E-09.
6. Japanese Sonar and Asdic, Index No. E-10.
7. Japanese Radio, Radar, and Sonar Equipment, Index No. E-17.
8. Japanese Torpedo Fire Control, Index No. O-32.

C. Japanese Personnel Interviewed:

1. Capt. Constructor NAKAMURA, IJN - Head of Submarine Design Section, Navy Technical Department.
2. Lt. Comdr. T. TSUKUDO, IJN - Former CO of submarine, and instructor at Submarine School.

LIST OF ENCLOSURES

- (A) List of Documents Forwarded to the Washington Document Center via ATIS for Transmission to the Bureau of Ships.

INTRODUCTION

At the time of the preparation of this report most of the information desired had been gathered and incorporated into other reports. Some of these reports were submitted by units of the Naval Technical Mission to Japan and are components of the final report of the Mission. Another part of the information was submitted by Commander Submarine Squadron 20 and Commander Submarine Squadron 13 in their reports to Commander Submarine Force, Pacific. The technical sections of these latter reports were extracted and compiled into NavTechJap Report - "Characteristics of Japanese Naval Vessels, Article 7: Submarines - Supplement II" - Index No. S-01-7.

To avoid unnecessary duplication where it was known that a detailed description of items within the cognizance of this report had been given in other reports, reference was made to those reports and only such additional information as was pertinent was added.

THE REPORT

1. Periscope Developments - Including Periscope Photography

There were apparently no significant periscope developments in Japanese submarines. Reference B-2 contains a short discussion of the optical systems of both the large periscopes and the smaller ones, installed in the midget submarines. A complete set of optics for each periscope has been shipped to the United States for study, and several samples of periscopes of various types have been shipped to the United States by Submarine Squadron 20.

The only indication of any development in the field of periscope photography by the Japanese was a sketch of a camera to be manufactured, which was shipped to the United States for study in connection with Reference B-3, which report includes periscope photography. The only cameras found were of German manufacture. Six of these cameras were shipped to the United States by Submarine Squadron 20.

2. Automatic Ballast Control - Hovering

A description of the installation of this equipment on I-400, which is typical of all installations, is contained in Reference B-1 (Index No. S-01-7).

The only additional information available was in connection with the attitude of personnel toward the equipment. Whereas in a description of the installation, a commanding officer was of the opinion that the equipment was very noisy, a later interrogation of a former commanding officer (Lt. Comdr. TSUKUDO) revealed that the equipment had been used to good advantage during patrols in Aleutian waters where excessively long periods of daylight necessitated long submerged patrolling.

3. Underway Depth Control

A typical installation as found on a Koryu Type Midget Submarine is fully described in reference B-1 (Index No. S-01-7).

Installation of this equipment had been tried on larger submarines but was found impracticable, and was discarded from all classes of submarines larger than Koryu.

4. Submarine Rebreathers

This subject, while pertinent to submarine equipment, was covered in reference B-4. Additional information from an interrogation of Capt. NAKAMURA, Head of Submarine Design Section, Navy Technical Department, brought out the information that oxygen for revitalizing the air after a long period of submergence was carried in flasks similar to those in use in U.S. submarines. The tubing from these flasks led through a control bleeder valve and a water seal to the recirculating supply line. Oxygen was bled into the supply line when necessary, to keep the oxygen percentage above 17.

Capt. NAKAMURA also reported that CO₂ was removed from the exhaust section of the recirculating line by filters in the system. The chemical employed in the filter was sodium-hydroxide. The filters were so mounted in the system that they could be by-passed when not needed to keep the CO₂ content of the air below 3%. A later development consisted of placing strands of a material known as "Alka-Cellulose" on the deck throughout the submarine. While believed to be effective, this method had not replaced the sodium-hydroxide filters.

5. Electronic Equipment

Electronic installations on submarines are adequately treated in references B-5, 6 and 7. These reports describe the equipment in detail and refer to the material shipped to the United States for further study and evaluation.

6. Special Devices

Neither the Bathythermograph, or any similar instrument, was installed in Japanese submarines, nor is it believed that the use of such equipment was understood. Some information was obtained regarding charts that had been prepared showing water temperatures to be expected at various places and at various depths, but there is nothing to show that they were ever used.

No instrument for continuous density measurement of water was located, but one commanding officer stated that water densities were taken to be used in computation of ballast water for fine trim. Samples were taken every four hours in a glass container and a hydrometer was used to determine the density.

There were no Depth Charge Indicators or Proximity Indicators installed. However, it was reported that attempts were made, with little success, to use the hydrophone equipment to get approximate bearings of explosions.

Reference B-6 contains information on bubble targets and decoys.

A Torpedo Data Computer was not installed. The nearest approach to the TDC was a Torpedo Angle Solver with an automatic input of relative bearing from the periscope.

Reference B-8 covers this instrument, and in connection with that report a sample instrument was shipped to the United States for study. Sonar equipment was used in the fire control system as a source of information to be fed manually into the angle solver. The hydrophone installation gave the bearing, and the echo ranging equipment was a source of range and bearing. Lt. Comdr. TSUKUDO reported that even though the use of sonar exclusively for obtaining data for firing, i.e. sound shots, was taught at the submarine school by himself, nevertheless, he had never fired one, nor heard of any other commanding officers having done so.

There was no equipment installed on Japanese submarines for mine and torpedo detection.

The Japanese had been working on an Underwater Charging Apparatus, or Schnorkel, prior to 1944, but had no installations in submarines. In 1944 they saw the German equipment on a German submarine in Singapore and copied as necessary from it. Instead of using the hinged system, they had adopted a hydraulic hoist system for raising and lowering. They had three uses in mind when designing it: (1) storage battery charging, (2) air flask charging, and (3) propulsion at slow speed. Although the maximum design speed underway in some installations was as high as seven knots, the maximum speed actually obtained was in all cases no higher than five knots. A float valve was fitted in the suction side of the Schnorkel, but Capt. NAKAMURA reported that it was undesirable since it interfered with the air flow.

The tabulation below gives the data on the installation and uses of the Schnorkel in Japanese submarines as of 9 May 1945.

Column (1) - Class of submarine, or submarines existing of class, on 9 May 1945.

Column (2) - Main engines, type and number installed.

Column (3) - Auxiliary engines, horsepower and number installed.

Column (4) - Engines that can be operated on Schnorkel.

Column (5) - Engine RPM.

Column (6) - Diameter of air inlet pipe in millimeters.

Column (7) - (a) Time required to charge battery, not underway.

(b) Time required to charge battery, underway at stated speed.

Column (8) - Maximum designed speed.

Column (9) - Height of top of raised periscope above top of raised Schnorkel, in meters.

Column (10) - Stroke of hydraulic piston for hoisting, in meters.

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)
						(a)	(b)			
	Type X No.	HP X No.	No-Type	R.P.M.	mm	hrs:min	hrs:min-kts	Kts	m.	m.
I - 400	22-10 X 4	400 X 2	2 - Aux.	570	260	14:00	30:00-2	3.7	1.6	2.9
I - 13	22-10 X 2	450 X 2	2 - Aux.	570	260	8:40	10:20-2	3.7	1.6	2.9
I-36,44	2-10 X 2	450 X 1	1 - Aux.	570	160	16:30	24:30-2	3.0	-	2.7
I-53,56,58	22-10 X 2	450 X 2	2 - Aux.	570	260	8:40	10:20-2	4.5	2.9	3.3
I - 351	22-10 X 2	400 X 1	1 - Aux. *1 - Main	570 300	260	14:30	18:30-2	4.0	2.9	3.6
I-361,373	23- 8 X 2	None	1 - Main	300	200	10:00	13:00-2	6.0	1.4	1.5
I - 201	Man-1 X 2	None	1 - Main	250	260	8:40	11:00-3	7.0	.3	3.3
43,46 Ro-45,50	22-10 X 2	None	1 - Main	300	260	7:00	8:20-2	6.3	.5	3.6
Ha - 101	Mid 400 X 1	None	1 - Main	415	160	5:40	17:10-2	5.0	.6	2.7
Ha - 201	Mid 400 X 1	None	1 - Main	385	160	7:40	10:00-2	7.5	.5	1.5

* This use on main engine was initial experiment for main engine application.

ENCLOSURE (A)

List of Documents Forwarded to the Washington Document Center via ATIS
for Transmission to the Bureau of Ships:

<u>NavTechJap No.</u>	<u>Title</u>	<u>ATIS No.</u>
ND50-1196	Miscellaneous plans of piping arrangement for automatic ballast con- trol of submarines.	3536