6 December 1945

RESTRICTED

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

Subject: Target Report - Ship Signatures and Related Data.

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

1. Subject report, covering Target 0-07 of Fascicle 0-1 of reference (a), is submitted herewith.

2. The report was prepared by Lt. Comdr. L.V. Goldsworthy, RANVR, and El. Lt. Comdr. R.C.R. Brooke, RNVR.

\[\text{Signature}\]
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SHIP SIGNATURES AND RELATED DATA

"INTELLIGENCE TARGETS JAPAN" (DNI) OF 4 SEPT. 1945
FASCICLE O-1, TARGET O-07

DECEMBER 1945

U.S. NAVAL TECHNICAL MISSION TO JAPAN
SUMMARY

ORDANCE TARGETS
SHIP SIGNATURES AND RELATED DATA

The object of the investigation was to obtain as much information as possible in connection with the magnetic, acoustic, and pressure signatures of Japanese ships, together with the methods used to obtain this data.

Interrogation has revealed that no serious effort had been made to obtain accurate information on this subject for mining purposes and showed also that the methods used were quite elementary.

Charts of the magnetic field in the Pacific have been obtained, but these are reported to be based on U.S. charts obtained before the war.
TABLE OF CONTENTS

Summary ................................................................. Page 1
References ................................................................. Page 3
List of Enclosures .................................................... Page 4
List of Illustrations .................................................. Page 4

The Report

Magnetic Signatures .................................................. Page 5
Acoustic Signatures .................................................. Page 8
Pressure Signatures .................................................. Page 8
Magnetic Field at Points in the Pacific ......................... Page 8

Enclosure (A) .......................................................... Page 9
Enclosure (B) .......................................................... Page 10
Enclosure (C) .......................................................... Page 11
REFERENCES

Japanese Personnel Interrogated:

Tech. Lieut. Comdr. M. HIGUCHI, IJN, Naval Technical Department, TOKYO.

Lieut. MIZUTA, IJN, Lieut. IKEDA, IJN, Lieut. TSUKAMOTO, IJN, and Mr. SHIBATA, all of YOKOSUKA Mine Research Laboratory, KURIHAMA.

All the above men are familiar with mines of the magnetic and acoustic type and have been interrogated very closely upon the subject of ship signatures. There was no reason to believe that they were deliberately withholding information about this subject. Lieut. MIZUTA and Mr. SHIBATA can be regarded as very capable technical men and are familiar with all aspects of magnetic and acoustic mine research.
LIST OF ENCLOSURES

(A) "Magnetic Variation in Waters near Japan" - #6024.
(NavTechJap. Document Number ND 50-3200)

(B) "Magnetic Dip in Waters near Japan" - #6043.
(NavTechJap. Document Number ND 50-3201)

(C) "Magnetic Horizontal Force in Waters near Japan" - #6044.
(NavTechJap. Document Number ND 50-3202)

(Note: The originals of the above enclosures have been forwarded to the Washington Document Center via ATIS. They have been assigned ATIS Document Number 3085.)

LIST OF ILLUSTRATIONS

Figure 1. Circuit Diagram of MITSUBISHI Magnetic Field Measuring Instrument.

Figure 2. Connection Diagram of Oscillator for Weak Magnetic Field Measurement Instrument.

Figure 3. Example Magnetic Field of a Destroyer (SHIOKAZE).
THE REPORT

1. Magnetic Signatures

Information regarding magnetic fields was obtained in two ways. The first and most used method was the employment of the MITSUBISHI type field-measurer, and the second was the ordinary ground loop method.

The MITSUBISHI instrument utilizes the change of reluctance of Permalloy with change of field intensity.

CIRCUIT DIAGRAM OF MITSUBISHI INSTRUMENT

FIG. 1

P - Permalloy core (Under water unit).
O - Oscillator 4000 cycles.
A - Ammeter for detecting change of field.
I - Ammeter for reading D.C. field current.
R, r1, r2, r3 - resistances.
A circuit diagram, supplied by the Japanese, giving details of the oscillatror ("O", above) follows:

**CONNECTION DIAGRAM OF OSCILLATOR FOR WEAK MAGNETIC FIELD MEASUREMENT INSTRUMENT**

![Circuit Diagram](image)

**FIG. 2**
The magnetic signatures of Japanese ships were obtained by taking a series of readings of field strength on meter "A", Fig. 1. These readings were taken at equal intervals of time while the ship passed over the measuring unit at a constant speed. The readings were then plotted on a graph showing ship's field versus ship's position relative to the unit. No actual records of any ship's signature were available as all had been burned; however, an example sketch, Fig. 3, shows the type and form of records made by the Japanese for magnetic signatures.

**EXAMPLE MAGNETIC FIELD OF DESTROYER-SHIOKAZE**

![Diagram of magnetic field measurements for a ship](image)

**Fig. 3**
2. **Acoustic Signatures**

The measurement of acoustic signatures was carried on at MAIZURU using a microphone and amplifier, the output of which was measured on a suitable meter, indicating the sound output in dynes/cm². Readings were plotted on a graph, in the same manner as was done for magnetic signatures, showing sound output against ships' position relative to the microphone.

Apparently no attempts had been made to obtain details of sound frequency, sound intensity only being considered. The choice of 30 and 40 K.C. firing frequency for the Japanese type "P" mines was purely by guesswork. (See NavTechJap report on "Japanese Mines", Index No. 0-04.). As in the case of magnetic signatures, all records of actual acoustic signatures had been destroyed.

3. **Pressure Signatures**

No research work had been carried out by the Japanese on the subject of ship's pressure signatures. Efforts were directed towards sweeping the U.S. pressure mine, and the use of a wood-filled ship was under consideration for this purpose.

4. **Magnetic Field at Points in the Pacific**

Charts giving details of the earth's magnetic field were obtained from AMERICA before the war and seem to have formed the basis of charts used by the Japanese.

Magnetic investigations have been carried out during the last three years, but the information has not yet been collected for publication. It is expected that the information will be available in about six months.

A book entitled "Investigation on the Disturbance of the Earth's Magnetic Field Due to a Magnetic Mass" was written by Mr. SHIBATA of the Mine Research Laboratory.