NS/lnb

U. S. NAVAL TECHNICAL MISSION TO JAPAN
CARE OF FLEET POST OFFICE
SAN FRANCISCO, CALIFORNIA

11 January 1946

RESTRICTED

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

Subject: Target Report - Japanese Mines.

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

1. Subject report, dealing with Target O-04 of Fascicle O-1 of reference (a), is submitted herewith.

2. The investigation of the target and the target report were accomplished by Lt. Comdr. L.V. Goldsworthy, RANVR and Lt. Comdr. (L) R.C.R. Brooke, RNVR.

C. G. Grimes

C. G. GRIMES
Captain, USN

JAPANESE MINES

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

FASCICLE O-1, TARGET O-04

JANUARY 1946

U.S. NAVAL TECHNICAL MISSION TO JAPAN

SUMMARY

ORDNANCE TARGETS

JAPANESE MINES

The Japanese received information and assistance from the Germans in developing several types of mines. The other chief foreign source of information was captured U.S. and British mines.

The Japanese did not use sterilizers, long-delay arming devices nor any electrolytic device.

Various attempts were made to develop the induction type magnetic mine, with little success.

Only two types of microphones were developed for use in ground mines.

No pressure mine was under development, although the Japanese were much impressed by the U.S. pressure mine.

The Japanese Navy had two types of aircraft mine which could be laid in 1000 feet of water. Only one type of parachute was used for both of these mines.

There was only one type of moored anti-sweep device and no device similar to the U.S. booster-extender arrangement for use in aircraft-planted mines.

The Japanese had no moored influence mine in service, but did have three types of moored mine using the hydrostat system of depth taking.

There was an obsolete antenna mine, not used in the war.

The following types of Japanese influence mines are described in the report:

Type 0 Ship-Laid Controlled Influence Mine
Type 3, Model 1 Submarine-Laid Magnetic Mine
Type 3, Model 2 Submarine-Laid Acoustic Mine
Type 5 Magnetic Mine
Type P Mine (later called Type 3, Mk. 3, Mod. 1)
Aircraft-Laid Acoustic Mine
Magnetic Acoustic Mine

TABLE OF CONTENTS

LIST OF ENCLOSURES

LIST OF ILLUSTRATIONS

REFERENCES

Location of Target:

Mine Research Laboratory and Mine School, KIRIHAMA.
Aircraft Mine Assembly located at Air Branch of First Technical Arsenal, KANAZAWA.
Naval Technical Department, TOKYO.
Type 92 Controlled Mine Installation, TORIGASAKI.

Japanese Personnel Who Assisted in Gathering Documents and Locating Equipment:

Capt. T. YAMASHITA, Lt. J. SHIMIZU, Lt. M. TSUKAMOTO, Lt. F. YAMAZAKI, Lt. Y. IKEDA

Attached to Mine Research Laboratory (KIRIHAMA Technical Arsenal).

Japanese Personnel Interrogated:

Tech. Lt. Cmdr. M. HIGUCHI was in the Naval Technical Department, TOKYO, and had a fairly extensive knowledge of all types of mines. His technical information was accurate and checked well with information given by other officers more intimately concerned with specific items. He spoke a little English and could understand it quite well.

Lieut. L. YAMAZAKI appeared to have a sound working knowledge of the Type 92 controlled mine installation and its associated gear; had obviously received some detailed knowledge of the working of the installation but had become a bit rusty; attempted to answer all questions but often corrected statements on a subsequent interview, having either looked up a point or talked to someone else.

Lieut. Y. IKEDA was an electrical engineer and knew Japanese influence mines very well. He was fully familiar also with the difficulties which have been encountered in research connected with magnetic mines. The information he has given has been found to be reasonably reliable and thorough examination on any doubtful issue usually cleared any discrepancy.

Lieut. MIZUTA was a technical officer of considerable ability according to Japanese standards. He was well acquainted with influence mine firing systems and was familiar with the means available for obtaining the signatures of ships.

Mr. SHIBATA was a Physics Engineer in the mine research establishment at KURIHAMA. In 1943 he went to the TOKYO Technical Research Bureau, and in May 1945 was transferred to NUMAZU on work connected with magnetic mines. He gave the impression of being a capable technician and was well acquainted with the latest research work on the magnetic-acoustic mine.

Rear Admiral OGATA was head of the mine research establishment at KURIHAMA during the last few months of the war. He knew nothing about mines technically, being purely an administrative head. He had been a naval officer all his professional life, having qualified at ETAJIMA.

Capt. NOZAKI was in charge of the Second Section, design, at the mine research establishment of KURIHAMA, from March 1945. Previous to this he had been at the mine testing station at NAGAURA. He did not appear to know a great deal about mines or mine circuits and was of very little help even for confirming information supplied by other officers.

INTRODUCTION

Target O-04 of Fascicle O-1 of "Intelligence Targets Japan" (DNI) of 4 September 1945 requests general information about Japanese mines and mine firing systems. With one or two exceptions the questions call for a short direct answer, and these answers have been given directly in the report in such a manner as to make the nature of the question obvious.

Influence mines have been described in some detail for the purpose of showing the type of mine the Japanese research establishment was trying to produce, but other mines have been covered by a table which contains all available data.

Part II of this report really covers the whole subject of Japanese mines and, if questions outlined in Target O-04 were answered fully, would render further reports unnecessary. However, the articles have been dealt with in turn and subjects covered in other NavTechJap reports omitted from Part II except when necessary for completeness.

THE REPORT

PART I

ORGANIZATION OF MINE DESIGN ESTABLISHMENT

The Mine Testing Department was under the command of the Yokosuka Navy Yard. No similar organization existed in any other Naval District, although a detachment may have been sent to KURE. This department, lately under the command of Rear Admiral OGATA, was formerly located at NAGAURA harbor in the immediate vicinity of YOKOSUKA, but was destroyed early in 1944. New construction was begun at KURIHAMA. In July, when it was almost completed, all work ceased and the personnel, some of whom were civilians, were dispersed. All documents were burned, but after the surrender Rear Admiral OGATA was at KURIHAMA, as well as Commander SUKIGARA, Lieutenant HIRAYAMA, and Lieutenant MIZUTA, all of whom were well informed on the work of the laboratory. The stated responsibility of this organization was "plans, experimental manufacture, and research and testing of mines, depth charges, sweeps, and related matters."

The Mine School, also at KURIHAMA, was closed several months ago, at which time the commandant was Rear Admiral KIMURE. All books were burned, but copies may have been sent to the Education Bureau of the Navy Ministry. As in the case of the Mine Testing Department, this was the only mine school in Japan. The subjects taught were thought to be assembly and disassembly of mines, mine sweeping, etc.

The Navy Technical Department, at least in regard to mines, was primarily an advisory agency, making recommendations to the Navy Ministry on the acceptance of new types of equipment developed by the Mine Testing Department. In theory, technical matters between Naval Districts were supposed to be routed through the Navy Technical Department, but actually it was usually by-passed due to lack of time, and was informed later. Under it, the Naval Technical Research Laboratory was dispersed in various places, the Acoustics Department, which developed acoustic mine mechanisms, being located at NUMAZU at the head of SURUGA WAN.

After approval by the Navy Ministry, the Naval Ordnance Manufacturing Department at YOKOSUKA received orders to produce the gear, which was then supplied to the Naval Stores Department. It was drawn from naval stores by local defense garrisons and assembled by warrant officers and petty officers.

GENERAL ORGANIZATION CHART
MINE DESIGN ESTABLISHMENTS

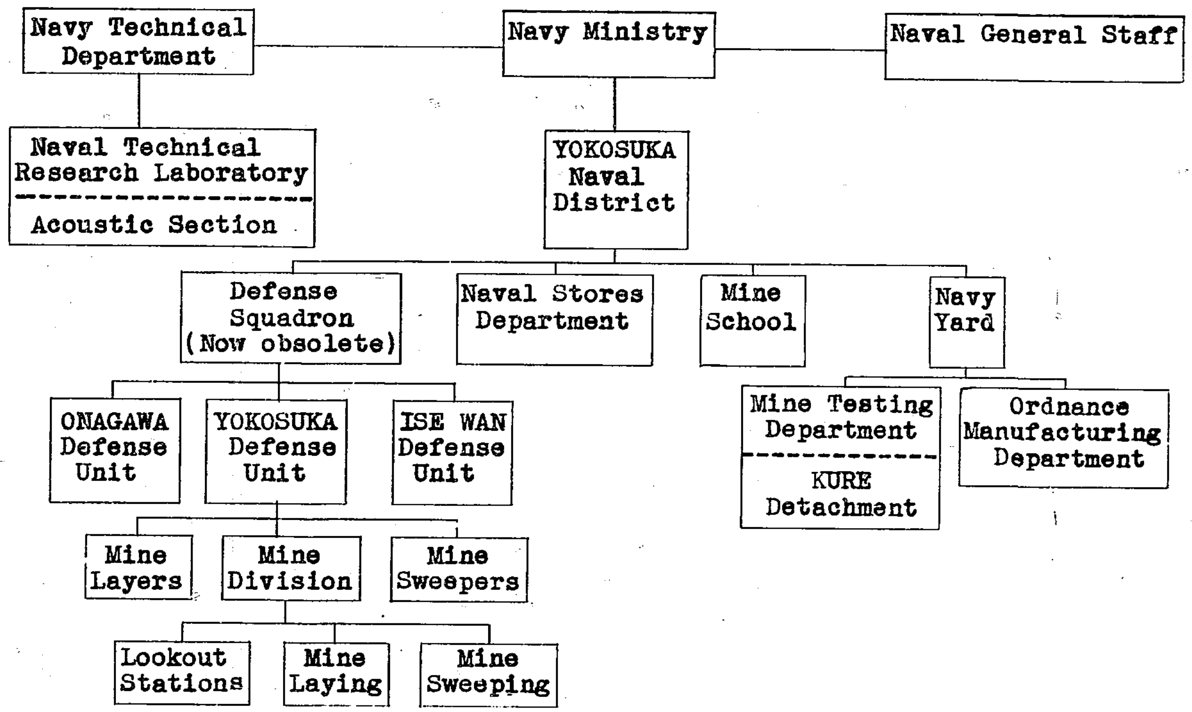

Figure 1

ORGANIZATION CHART
YOKOSUKA NAVY YARD MINE EXPERIMENTAL DEPARTMENT

EXECUTIVE HEAD -- REAR ADMIRAL OGATA

SECTIONS	SENIOR OFFICERS	NO.	CLASSIFICATION	ASST. ENG.	NO.	WORKMEN
BUSINESS	CAPT. I. IKEHATA K. OKADA	2	NAVAL COLLEGE	MASUDA N. ITO M. TSUKAMOTO MAKINO UEDA	5	40
1ST SECT. FUNDAMENTAL DESIGN	CAPT. ENG. K. SATO CIVIL ENG. T. KAWASAKI LT. COM. ENG. T. TAZAMI LT. ENG. J. MIZUTA LT. T. ISHIKAWA LT. Y. IKEDA LT. M. SUGETA LT. ENG. OGURA	8	MACHINE EARTH PHYSICIST ELECTRICS PHYSICIST ELECTRICS ELECTRICS MACHINE MACHINE	K. IRIKAWA K. FURUSHO S. YAMAZAKI KUNO SUZUKI T. NAGASHIMA MORIYA	7	60
2ND SECT. DESIGN	CAPT. ENG. NOZAKI LT. ENG. M. IKEWA LT. ENG. M. TSUKAMOTO LT. ENG. COMA	4	MACHINE MACHINE MACHINE MACHINE			
3RD SECT. MANU-FACT-URE	LT. COM. ENG. T. HIRAYAMA LT. ENG. T. OGATA LT. ENG. WATANABE LT. ENG. KOIDE	4	MACHINE MACHINE MACHINE MACHINE	M. HONDA TAKAHASHI	4	130
4TH SECT. EXPERIMENT	COMDR. K. SUKEGARA LT. K. TAKAHASHI CIVIL ENG. A. KONDO CIVIL ENG. J. SHIMIZU CIVIL ENG. Y. KUREBAYASHI LT. ENG. ANDO LT. ENG. YOWSAKI LT. ENG. MIKI	8	NAVAL COLLEGE NAVAL BARRACKS CHEMIST ELECTRICS NAVAL BARRACKS MATHEMATICS MACHINE ELECTRICS	C. KASAI K. OKAMOTO Y. GOTO	3	70
DECK OFFICERS 4 ENGINEERS 19 CIVILIANS 3 TOTAL 26			MACHINE 12 ELECTRICITY 5 PHYSICS 2 CHEMIST 1 MATHEMATICS 1 NAVY 5 TOTAL 26	TOTAL	19	300

Figure 2

PART II

JAPANESE INFLUENCE MINES

Type 0 Ship-Laid Controlled Influence Mine

Height.................. 5'5"
Diameter ....3'5"
Weight .... 3080 lbs
Charge Type 88 ..... 1760 lbs
Gauge of wheels..........2'5"

The mine was made of bronze and was of bell-shaped construction. The mine contained a relay and a coil rod unit mounted vertically in the center of the charge, and a cable to the shore was taken out through a gland on the top of the mine.

Laying. A group of six mines was laid at one time, and their cables joined to a multicore at a junction box. The mines were pushed over the stern of the laying ship together with a buoyant cable drum which unwound the required amount of cable and then kept the free end afloat until the joining party arrived.

Circuit. The coil rod leads were connected to a mirror galvanometer on shore which reflected a beam of light. When the galvanometer deflected, the beam of light fell on a photo-electric cell causing a relay to give audible warning. The mines could be fired individually by hand.

Operational use. Two fields of six mines were laid at TRUK in 1942, but were not fired operationally owing to water damaging the insulation of the C.R. Unit. No further use seems to have been made of these mines.

Type 3 Model 1 Submarine-Laid Magnetic Mine

Length...................11.1'
Diameter..................1'9"
Case.............Aluminum alloy
Charge, Type 97 or 98...1960 lbs
Sensitivity............. 20 mg

This mine was a direct copy of the German mine circuit M Mark II.

Construction. A number of units were examined, and although they were similar in nearly all respects to the German units, the workmanship was very poor.

Arming. This was carried out by hydrostatic clock, but those constructed in Japan were neither accurate nor reliable. The main trouble appears to have been given by bad gear cutting.

Trials. Sea trials were carried out by laying the mine from a ship with a cable attached and then running ships over the unit. Attached to the floating end of the cable was a lamp which indicated whether or not the firing mechanism functioned.

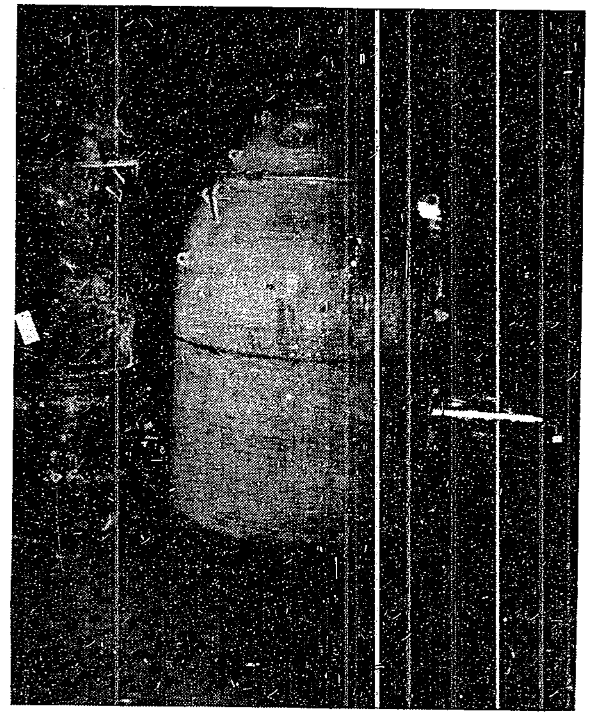

Figure 3

TYPE O MINE

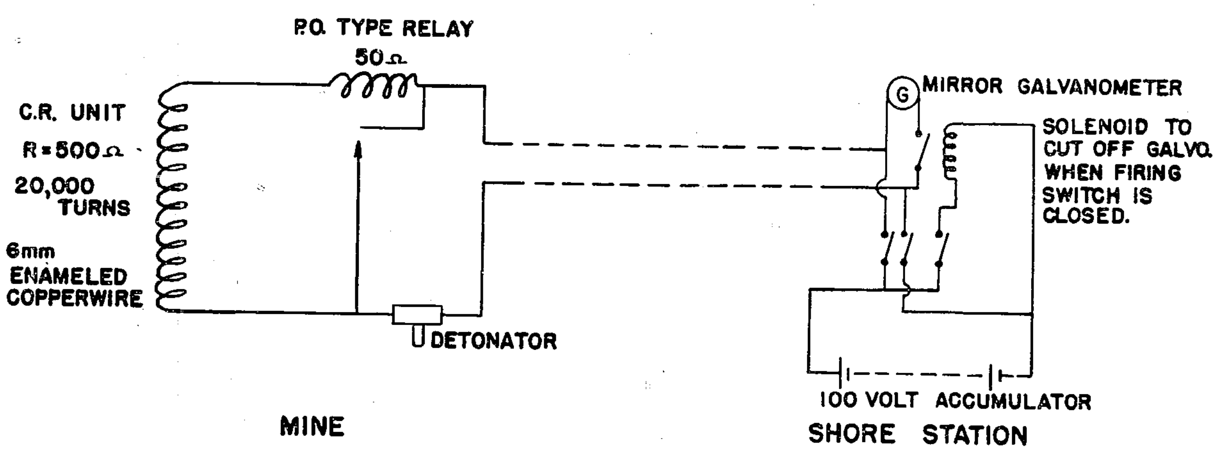

Figure 4

CIRCUIT DIAGRAM OF TYPE O MINE

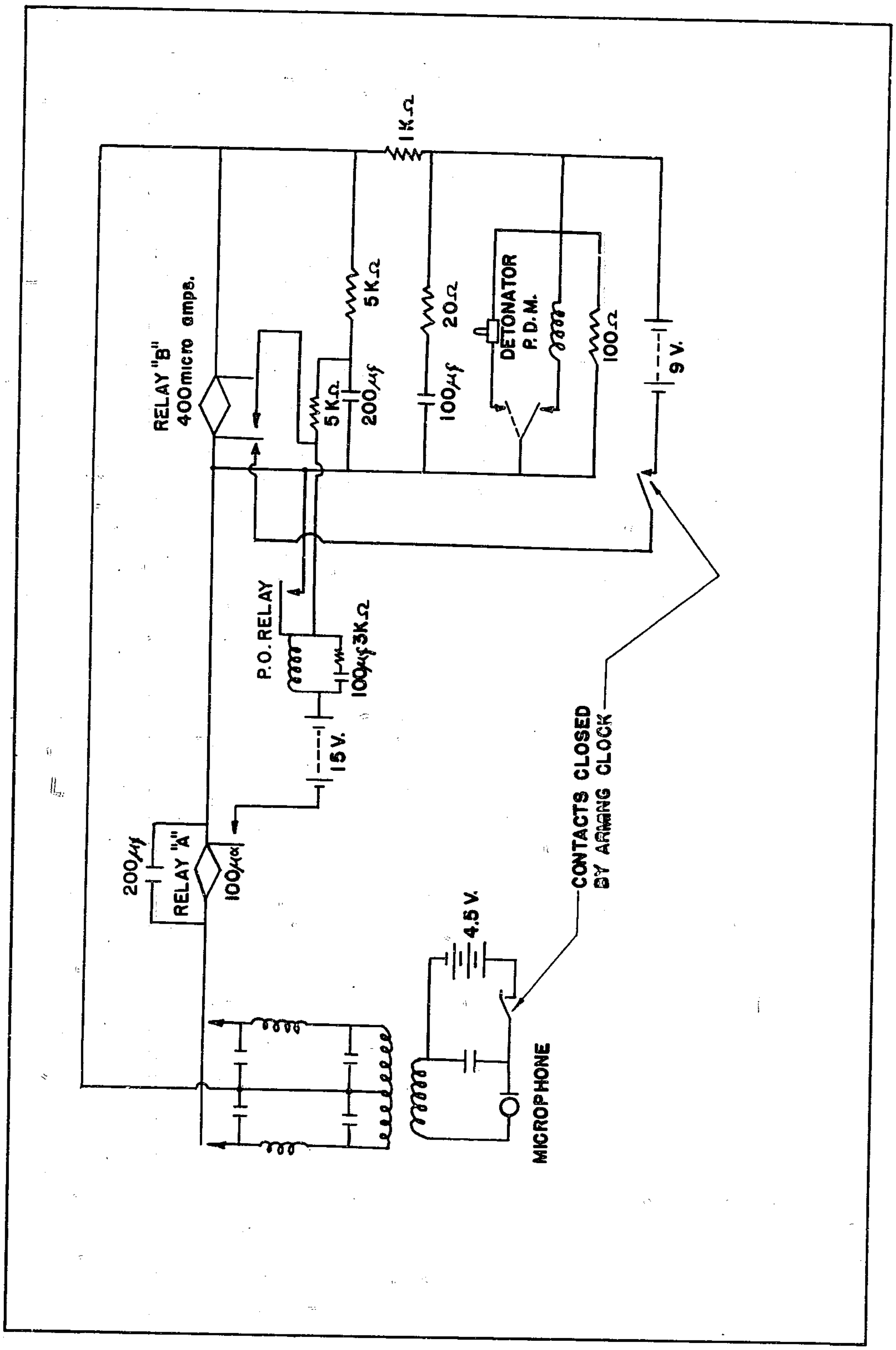

Figure 5
TYPE 3, MODEL 2 MINE

Type 3, Model 2 Submarine-Laid Acoustic Mine

Length	11.1'
Diameter	1'9"
Case	Aluminum alloy
Charge, Type 97 or 98	1960 lbs
Frequency	100-350 cycles

This mine was a direct copy of the German mine and circuit Fab. IIIa.

Construction. The general workmanship was poor, especially where the relays were concerned. All the components were mounted rigidly with the exception of the relays, which were fixed by means of rubber cushions.

Arming. This was the same as Type 3, Model 1.

Trials. These were carried out in the same way as those on the Type 3, Model 1.

Type 5 Magnetic Mine

Length	2'9.5"
Diameter	1'5.75"
Weight	417 lbs
Charge, Type K	220 lbs

This mine was primarily intended for laying on beaches or in shallow water. It was constructed from the case of a depth charge, Type 2, and used the induction type of magnetic unit.

Firing Circuit. The coil rod unit consisted of 10,000 turns of wire on a core made by filling a steel tube with a high permeability alloy called "Sendust." (Sendust was a production of the Tohoku Metal Research Laboratory and was usually used in place of "Permalloy" in Japan.) The coil rod unit was connected to a meter-type relay, arranged to make contact on either side with a current of 20 microamperes. The detonator was fired by a 4.5 volt battery.

Safety Devices. Two hydrostatic switches fitted with soluble plugs (sugar) were provided, one of which maintained a short circuit on the relay until the plug dissolved, and the other maintained a double pole break in the detonator circuit.

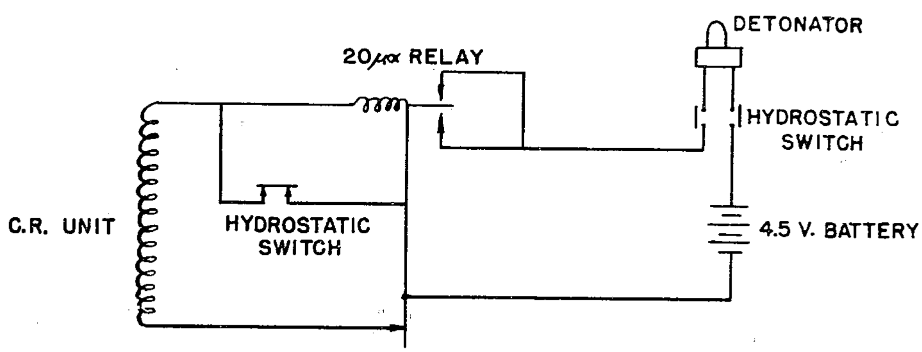

Figure 6
ANTI COUNTERMINING SWITCH - TYPE 5 MAGNETIC MINE

Sensitivity. Trials were carried out in order to obtain details of the sensitivity of the mine with the following results:

100 ton ship at 5 kts, firing distance ... 16.4'
100 ton ship at 8 kts, firing distance ... 19.6'
Medium tank at 5 kts (approx.) .... 9.84'

These distances were expected to inflict damage, but trials were not completed.

Type P Aircraft-Laid Acoustic Mine
(Later to be named Type 3, Mark 3, Model 1).

Length of mine complete	15'4"
Length of forward section (explosive)	6'5"
Length of rear section (mechanism)	4'2"
Diameter of mine	1'5.75"
Diameter of parachute	34'0"
Length of parachute shrouds	34'5"
Total weight of mine	1870 lbs
Weight of charge, Type 97 or 98 explosive	880 lbs
Weight of mine in sea water	572 lbs
Height of laying (minimum)	964'
Speed of laying (maximum)	160 kts
Laying depth	16.4' to 98.4'
Safe distance between laid mines	656'
Length of hinged rods on rear end	17.5"
Diameter of hinged rods on rear end	1"
Acoustic frequency	30-40 kc

The mine was in an advance state of development, and although it had never been used in service, some had been prepared for use and sent to an airfield for laying when the war ended.

The mine had a hollow painted nose which was intended to penetrate the mud or sand on the sea bottom and enable the mine to stand vertically. Alternatively, if the mine hit a hard bottom, the nose would prevent damage to the mine case. When the mine entered the water, four hinged bars in the rear section were released and sprang outward to a position at right angles to the axis of the mine, where they locked. The object of these bars was to keep the acoustic unit clear of the bottom, if the mine fell over on the bottom.

The forward section was joined to the rear section by means of a screw thread, and considerable trouble was experienced in making this joint watertight.

Acoustic Circuit. The acoustic pick-up was a magnetostriction unit mounted in gimbals on the rear end of the mine and exposed to the sea. Connection to the amplifier was by two rubber-covered cables through molded bushings, the cables being clipped to the arms of the gimbal system.

The amplifier was mounted in an aluminum box in the rear section of the mine, and two other boxes contained the batteries, firing relay and clock. The amplifier was constructed on normal commercial lines, no particular precautions being taken against shock or vibration. The whole unit, however, was slid into the rear section and coil springs were arranged to absorb shock along the axis of the mine.

Batteries. There were three batteries in the mine: a 4.5 volt one made up of large capacity 1.5 colt cells for the filaments, a 3 volt one for firing, and an H.T. The total filament current was 0.3 amp. and the batteries are reported to have lasted about one month.

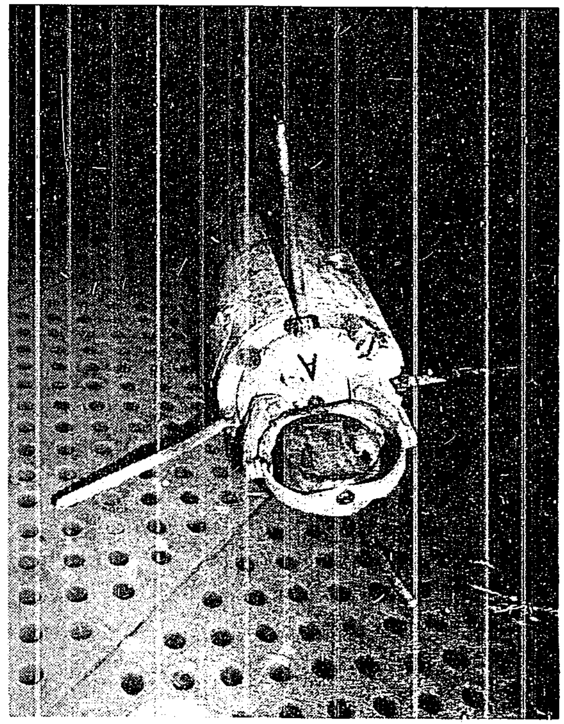

Figure 7
MINE, TYPE P ACOUSTIC PICK-UP END

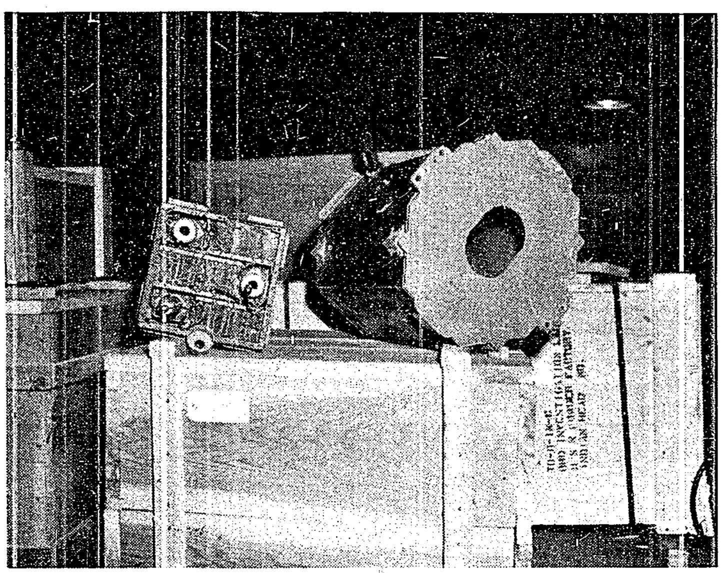

Figure 8
MINE, TYPE P, AMPLIFIER AND BATTERY BOX

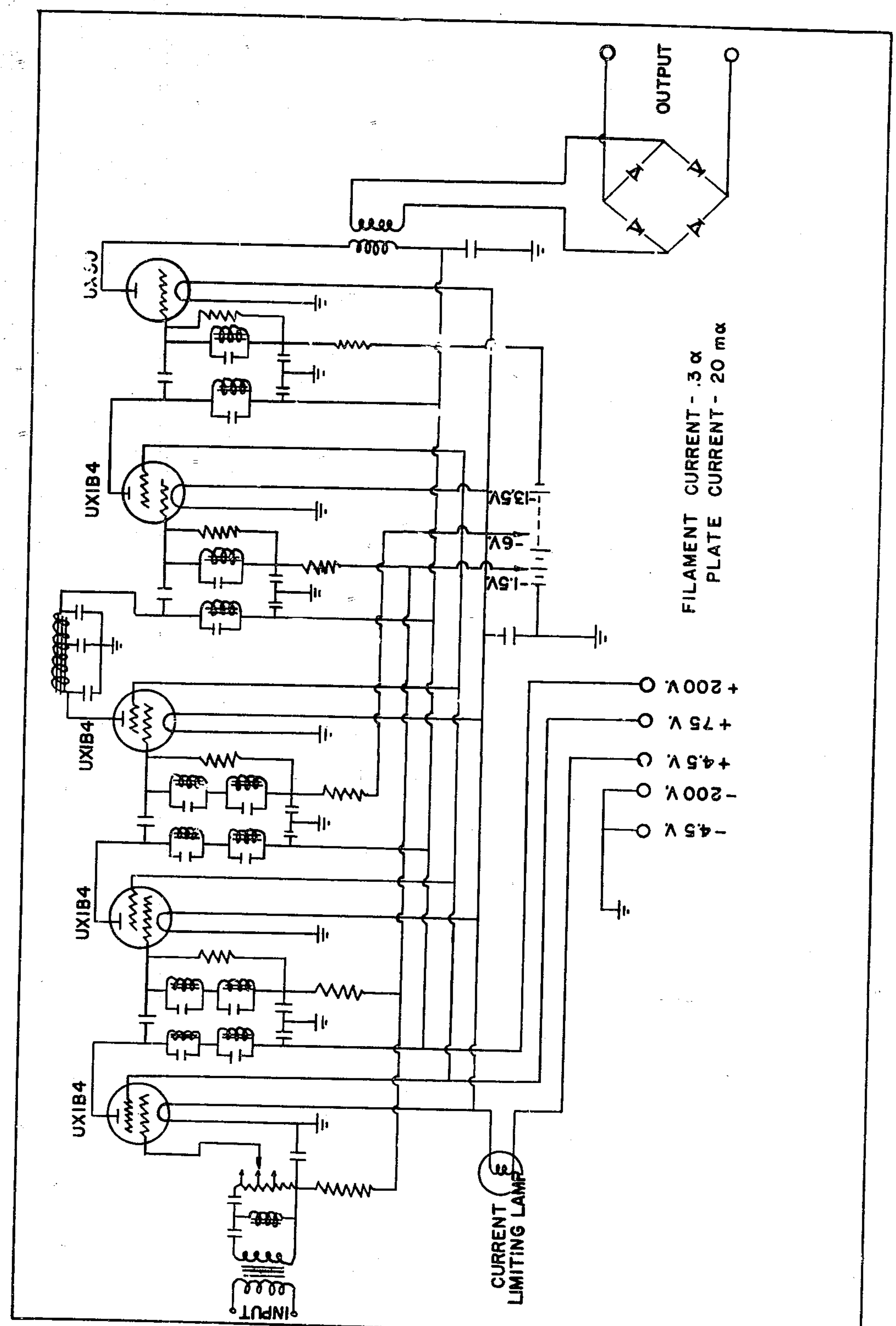

Figure 9
AMPLIFIER CIRCUIT - TYPE F MINE

Arming. The mine was armed by a clock six minutes after leaving the aircraft. The clock was started by the pull of the parachute on a lever mechanism which pressed in on a hydrostatic switch. The detonator was placed as the mine left the aircraft, by the withdrawal of a fuze wire which allowed the detonator to move forward under spring pressure. At the end of six minutes the arming clock started a second clock which switched in the firing relay after one minute and the firing battery ten seconds later.

Laying. The mine could be laid by any torpedo-carrying aircraft fitted with proper racks.

Testing. The firing mechanisms were tested before final assembly. The magnetostriction unit was rubbed by hand and a fire was indicated by means of a lamp. Porosity testing was carried out with air at 28.4 lbs/in^2, soapy water being used to detect leaks.

Frequency. The choice of frequency appears to have been quite arbitrary, as very little research had been carried out on ship's noise. The reason given in two cases for the choice was to make sweeping more difficult, and this information was regarded as top secret. (See NavTechJap Report "Ship Signatures and Related Data," Index No. 0-07).

Anti-countermining. No anti-countermining device was included in the circuit, but a minimum safe distance between laid mines was given.

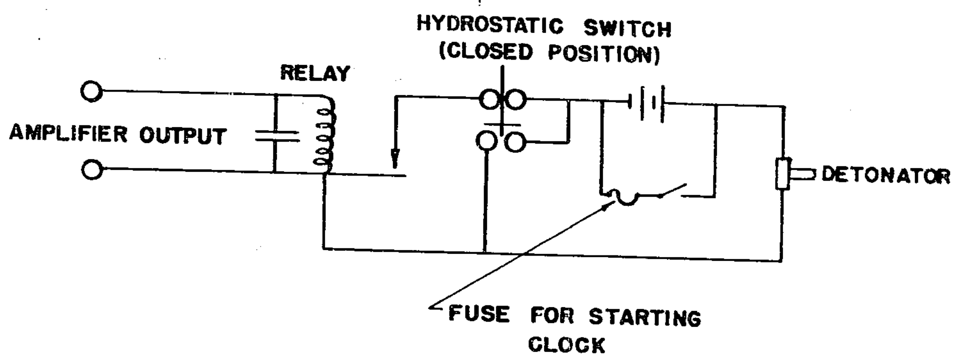

Figure 10
FIRING CIRCUIT – TYPE P MINE

Trials. Dropping trials were carried out by laying the mine from an aircraft with a length of cable connected to the detonator terminals and coiled up against the mine. After the drop, a diver was sent down to recover the free end of the cable and bring it aboard a ship. The mine was actuated by running a ship over the unit. Trials had been carried out using the battleship YAMASHIRO, the carrier SHOHO and a tug.

Trouble was experienced owing to damage to the cable at the time of drop, but by further experiment moderately good results were ultimately achieved.

In order to locate the mine after laying, a small buoy was included in the parachute housing which floated to the surface.

Self-destruction. The hydrostatic switch was arranged so that, if the mine was recovered and the water pressure removed, a circuit was closed to fire the mine.

Magnetic-Acoustic Mine

Towards the end of the war consideration was given to the production of a combined magnetic-acoustic aircraft-laid mine. This was prompted by a rumor, of Russian origin, that the Germans had such a mine. It was also considered likely that the Allies might have thought of this combination too.

The mine was in the very early stages of development and no trial had been carried out upon it.

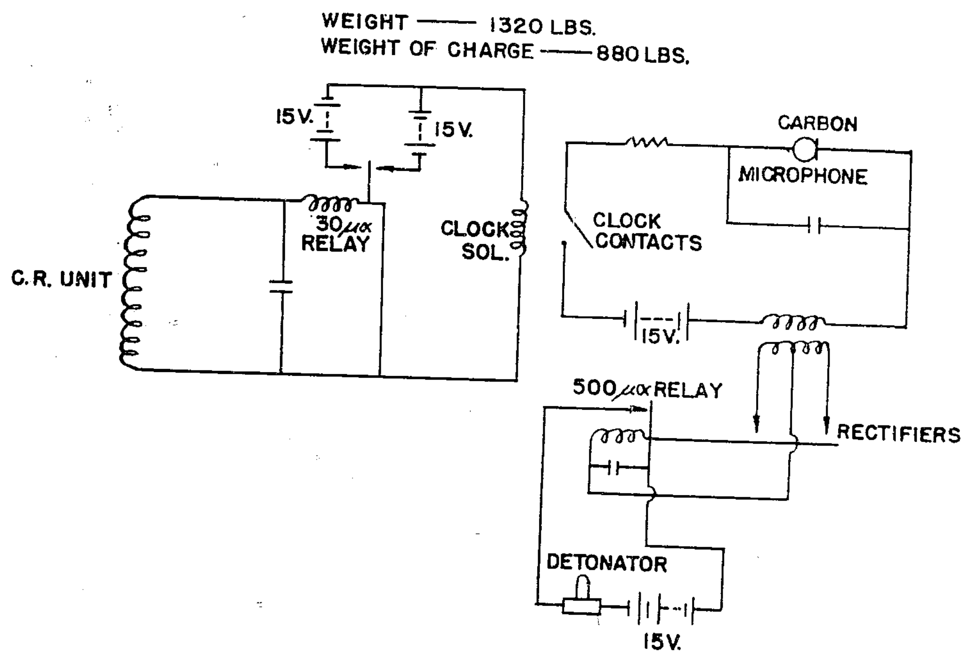

Figure 11
CIRCUIT DIAGRAM - MAGNETIC ACOUSTIC MINE

The above diagram is only a provisional representation of the circuit, which had not been finished. The relays were to be of the converted micro-ammeter type, and the acoustic side of the circuit was a direct copy of the German acoustic circuit.

PART III

MISCELLANEOUS MINES AND MINING

General Mine Characteristics

Japanese Information on Enemy Mines. Information was obtained from the Germans on their submarine-laid acoustic and magnetic mines, and this resulted in the production of the Type 3, Models 1 and 2, which were almost exact copies. The German mine BM 1000 was also known to the Japanese and six had been purchased from Germany, together with ten M101 and three M103 firing units. Work was in progress to copy this mine, but none was completed before the end of the war. Its Japanese name was Type 4, Mark 3, Model 1.

Among the material found at KURIHAMA and YOKOSUKA there were a number of ancient Chinese and Russian mines, but nothing of any intelligence value. Some of these mines have been returned to the U. S. (see Enclosure (B)). No information was obtained about Italian mines.

A rumor was received from Russia that the Germans had a combined magnetic-acoustic mine, and this appears to have started a train of thought on these lines among the mine research personnel at KURIHAMA.

Ship Counters. The only case of the use of a ship counter was in the Type 3, Model 2, which was a direct copy of the German unit. The counter used could be set for up to 12 actuations before firing the mine.

Sensitivity of Mines. Sensitivity of Type 3, Model 1 was 20 milligauss. No information was available regarding the sensitivity of acoustic and induction type magnetic mines. Their functioning data seems to have been found out by a system of trial and error as indicated by the description of various trials in Part II.

Microphones. Only two types were developed for use in ground mines: magnetostriction and carbon. The former was used in the Type P mine and the latter in the Type 3, Model 2. The carbon microphone was a direct copy of the German unit.

Sterilizers. These were not used by the Japanese at all and their use does not appear to have been clear to them. One of the main difficulties in mining seems to have been the rapid deterioration of batteries, and the idea of shortening the already short life of a mine could not be understood by the Japanese.

Delayed Arming Devices. No form of long-delay arming device had been constructed by the Japanese for the purpose of arming mines. A 60-day clock was found at KURIHAMA And later it was learned that this particular mechanism was one constructed by a clockmaker and submitted to the mine research establishment as a sample. The clock was bulky, 5" diameter x 5" long, and quite unsuitable for use in aircraft-laid mine.

No evidence has been obtained of the use of any electrolytic device even in the experimental stages.

Moored Anti-Sweep Device. The Japanese Navy had only one type of moored anti-sweep device (NavTechJap Document No. ND21-4551, page 16). It was comprised of an anchor, blimp-shaped buoy and a single, serrated "V" cutter. The buoy streamed with the tide and the upper jaw of the cutter was fixed to the forward end of it so that the mouth of the cutter was always pointing down tide. The lower jaw of the cutter was shackled to the mooring wire. Depth taking was by plummet and the unit was laid from tracks. The anchor weight was 1320 lbs.

Booster-Extender Arrangement. The Japanese Navy had no device similar to the U.S. booster-extender arrangement for use in aircraft-planted mines. However, a copy of the extender used in the U.S. Mk. X, Mod. 1 submarine-laid, moored contact mine was built into the Japanese Type 2 mine, and a detonator extender working on the same principle was used in the moored contact beach mine.

Enemy Mine Parachutes. Pieces of American parachutes were recovered at Shortland in the Solomons, and complete parachutes were obtained from home waters as used on U.S. Type XII mines. These parachutes were regarded as of thick and heavy construction compared with the Japanese Type K parachute. The securing mechanism was regarded as excellent because of its simplicity. No British parachute was ever recovered.

Japanese Parachutes. Only one type of parachute was used for both the aircraft-laid mines: Type K, for the "K" mine; Type K, Mod. 1, for the "P" mine.

The difference between Type K and Type K, Mod. 1 parachutes was in the method of folding to fit the mines Type "K" (24" dia) and Type "P" (17.7" dia).

Anti-Fouling Paints Used on Mines.

Undercoating - Sabidome-Toryo (anti-rust resin), which is a mixture of iron oxide (FeO) and dryer (linseed oil);

Final coating - Kokushoku-Toryo (black color resin) which is a mixture red lead (Pb_2O_2) and carbon black.

Both were manufactued by Dainihon-Toryo Kaisha (Great Japan Resin Co.), Shinagawa, TOKYO.

It is evident that there was no research into the matter of protective paints in the Mine Experimental Department.

Japanese Mines and Designations

Japanese System of Naval Ordnance Designation

Temporary Designations. During the period of its development an item was known by an alphabetical letter (i.e. Type "P" or "K") or a temporary or provisional designation.

A Type Number indicating the year of its adoption for service use was given after acceptance by the department which was to use it. This might occur a considerable time after the item had been in production and actual use. Until the Showa Era, items were designated by the year of the era (Emperor's reign) or the year of the Empire. The latest ruling was that all items should be designated only by the last figures of the year of the Empire, i.e., Type 88, 98, 02, 05 (or 2, 5), etc.

Mark Number. Where this occurred without being preceded by a type number, the item was old and predated the last rulings. When used after a type number in newer mines, it indicated the item was developed or modified for dropping from aircraft. (Special purpose Navy bombs might have a mark number following the type number.)

Model Number. A change in or addition of a model number indicated an addition to or alteration in the components of the item, a change in its operation or a change in its use; e.g., Type 93 mine adapted for anti-submarine use became Type 93, Model 2 (7 horns) or Model 3 (9 horns).

Alterations in type, mark and model had to be approved by the Navy Technical Department and the Navy Ministry.

Modification Numbers represented a small change in components or explosive filling; e.g., Type 93, Model 3, Mod. 1 had an improved base plate. Modification numbers did not have to be approved by the Navy Technical Department, if they were acceptable to the users of the item.

The above factors seemed to be the basis for classifying Japanese ordnance but the Japanese themselves admitted that the system was full of irregularities and contradictions which they could not explain.

Types of Mines.

A. Magnetic

Type 0
Type 3, Model 1 — For details see Part II
Type 5, Magnetic

B. Acoustic.

Type P (Later named Type 3, Mark 3, Model 1)
Type 3, Model 2
Type 92 Controlled mine. — For details see Part II

C. Contact.

Ground contact
Moored buoyant contact
Drifting buoyant contact

Induction Magnetic Mines. Various attempts were made to develop the induction type magnetic mine. A number of British A Mark I-IV mines were captured at SINGAPORE and the coil rod unit was copied with a moderate amount of success. It was found impossible to copy the relay, however, owing to difficulties with the manufacture of both the field magnet and the coil suspension. Some relays were made but their sensitivity did not approach that of the British relay.

The only two induction type mines were the Type 0 and the Type 5 magnetic, full descriptions of which are given in Part II.

Consideration had been given to the production of an aircraft-laid induction type ground mine, but in view of the difficulties of producing a suitable relay the idea did not develop very rapidly. Further, the induction type mine was not considered so effective as the needle type in harbors and other enclosed waters where ships were likely to move very slowly, probably too slowly to actuate an induction mine.

Needle Magnetic Mine. This was a direct copy of the German mine. It was designated Type 3, Model 1, and two German representatives came to Japan to assist and explain. (For details see Part II.)

Type 2, Submarine-Launched, Contact Mine. This Japanese mine was copied from the U.S. Mark X, Model 1 mine. However, the hydrostatic depth taking device was constructed of steel (not of brass as in the Mark X) and gave considerable trouble in trials. About 600 of these mines were produced, but shortage of submarines and the doubtful functioning of the hydrostat prevented its being put into operational use.

Pressure Mines. No information was obtained by the Japanese from the Germans on the pressure mine. The first information came when a U.S. mine, Mark XXV, Mod. 2, fell on the beach at WAKAYAMA Prefecture, KII Peninsula, KUSHIMOTO. This mine fell on the 5th or 6th of May 1945. About ten mines in all were recovered. Tech. Comdr. YOKOYAMA from KURE carried out the examinations of the first units recovered.

No pressure mine was under development. The Japanese were very much impressed by the U.S. pressure mine, and did not seem to have completely exhausted its implications by the end of the war.

Aircraft Mines. The Japanese Navy had two types of aircraft mine which could be laid in 1000 feet of water. The first - Type 3, Mark 1, Model 1 - was designed to part from its anchor at about 165 feet in deep water so as not to subject the mine case to excessive pressures. (NacTechJap Document No. ND21-4558. The second was Type 93, Mod. 1, modified as follows:

1. The wheeled undercarriage was removed and the plummet release arranged to operate by inertia on striking the water.

2. Two diagonally opposite corners of the anchor were removed so that it would fit on the aircraft, and the base of the anchor was reinforced by a diagonal pattern of U-section channel irons (see Figures 12 and 13).

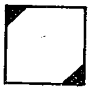

Figure 12
CUTTING OF CORNERS OF AIRCRAFT MINE ANCHOR

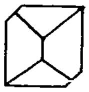

Figure 13
REINFORCEMENT OF MINE ANCHOR

3. Two pad-eyes were welded on the top of the mine case and a combination of parachute-housing and nose-cap of laminated wood was attached to the base of the anchor. A steel cable connected the parachute by shackle to the eyes of the mine case. There was no shock absorbing mechanism in this cable.

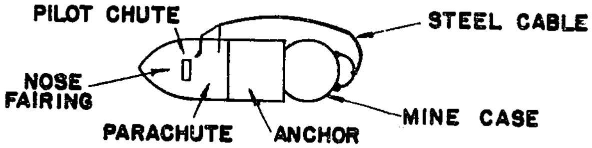

Figure 14
LAYOUT OF AIRCRAFT - LAID MINE

4. On laying, a lanyard attached to the aircraft withdrew the nose-cap pin and, later, the pilot chute. In the water the mine functioned as an ordinary Type 93, Model 1.

5. The Type 97 flying boat could lay two of these mines from about 1000 feet at 120 MPH.

Moored Influence Mine. The Japanese had no moored influence mine in service. Attempts, however, were made experimentally to produce one but were given up owing to the trouble caused by perturbation giving false actuations.

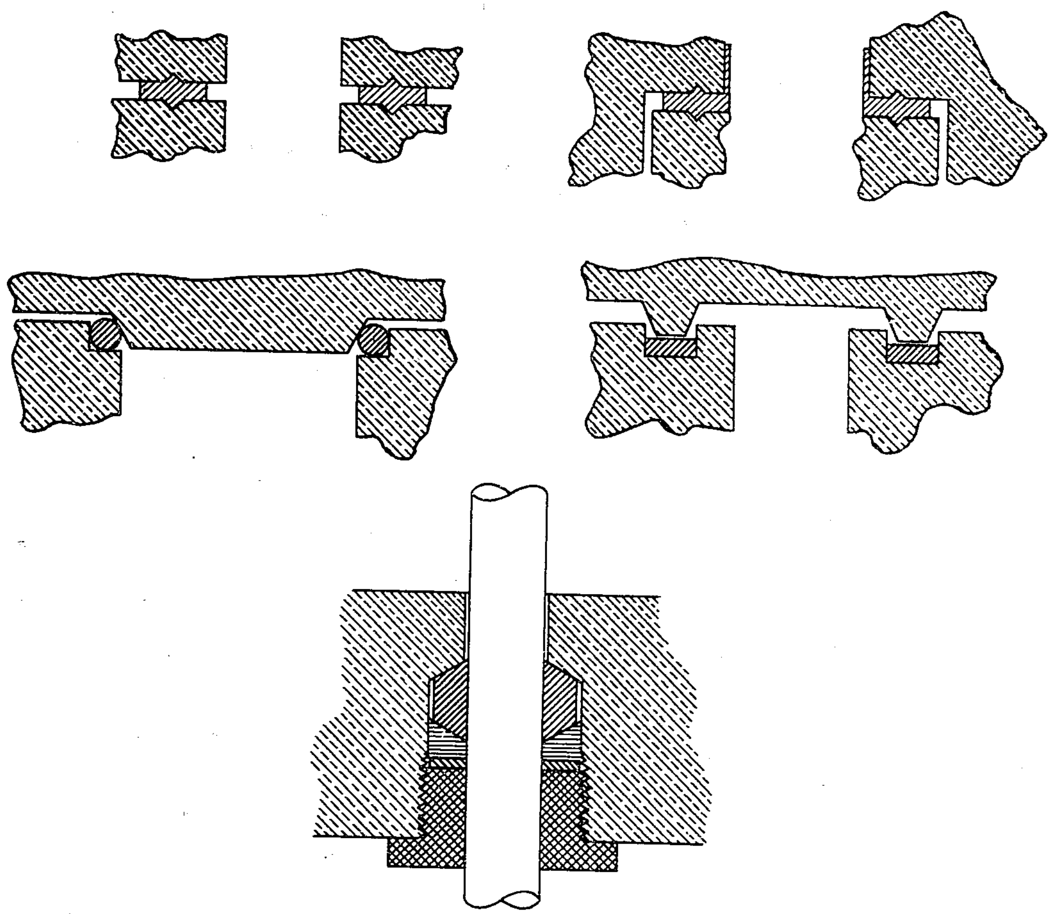

Figure 15
SKETCHES OF MINE GASKETS

Moored Mine Hydrostat System. The Japanese Navy has used three types of moored mine using the hydrostat system of depth taking.

Type 88, Mod. 1 (copied from German Type "U").
Type T3 (copy in steel of U.S. Mk. X, Mod. 1).
Type B, Mark 1, Aircraft Mine Model 1.

Samples have been sent to the United States (see Enclosure B).

Type 91 Mine. This was an obsolete antenna mine which was never used in this war. Experiments, however, were conducted early in the war to find out the reason for premature firing during the 1914-18 war. No laying trial or float release trial was carried out. The mine originally was a copy of the British Vickers antenna mine.

Diameter	3.44 ft
Length	6.26 ft
Weight (Total)	2200 lbs
Charge (Picric acid)	440 lbs

Mine Gaskets. The only types of gasket used in the latest designs of Japanese mines are shown in Figure 15. It is evident that the flat ring was in most general use. The compression ring and packing gland are of standard form.

Controlled Mining. A Japanese C.M. installation was examined at TORIGASAKI and Lieut. F. YAMAZAKI was questioned about the operation of the installation, which was located in caves about 50 yards from the shore, and behind the Port War Signal Station.

The main installation was situated in a cave seven feet high and six feet wide, lined and decked with timber, running parallel to the cliff face. Access was by passages about 20 yards long, of similar dimensions but unlined, spaced at intervals of 25 - 30 yards.

The main entrance passage was run in at an angle and led to a central point in the installation known as the "Commander's Room". In this passage were a number of glass bulb rectifiers for supplying electric current for charging the batteries.

On the right of the Commander's Room were six control desks for Type 97 submarine detectors and on the left, six control desks for Type 92 mines. Behind the latter was a small chamber containing the galvanometers and associated gear connected to the guard loop, and beyond the end of the Type 92 control desks was a battery room for supplying the voltages required to operate the installation.

No attempt seemed to have been made to provide any ventilation in the caves, and the electric gear was showing signs of considerable deterioration due to dampness, No ventilation was provided to the back of the timber wall to prevent rot. Lt. YAMAZAKI admitted that the question of dampness in caves had been overlooked and that considerable trouble had been experienced on account of it in both this and other underground installations.

Type 97 Submarine Detector Apparatus. This equipment consisted of a bell-shaped cage made up of three rings of iron, three meters in diameter, one above the other, supported by vertical legs with splayed feet to insure anchorage in sand and mud, the whole being about three meters high. On the top ring were mounted thirteen moving coil microphones spaced equally around its periphery. These microphones had a diaphragm 12.8cm in diameter, and were tuned to receive at 1000 cycles. Each microphone was connected by twin rubber-covered cable to a junction box and from there a multicore cable ran ashore to the control desk.

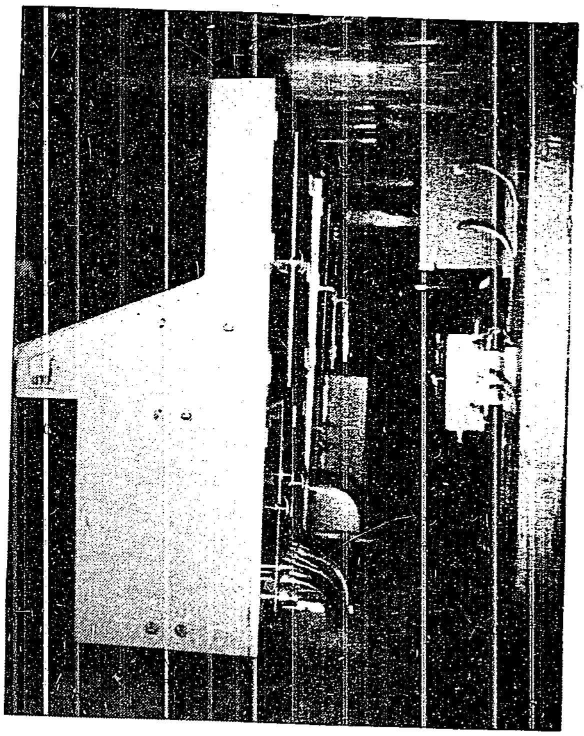

Figure 16
CONTROLLED MINE LISTENING CONTROLLER

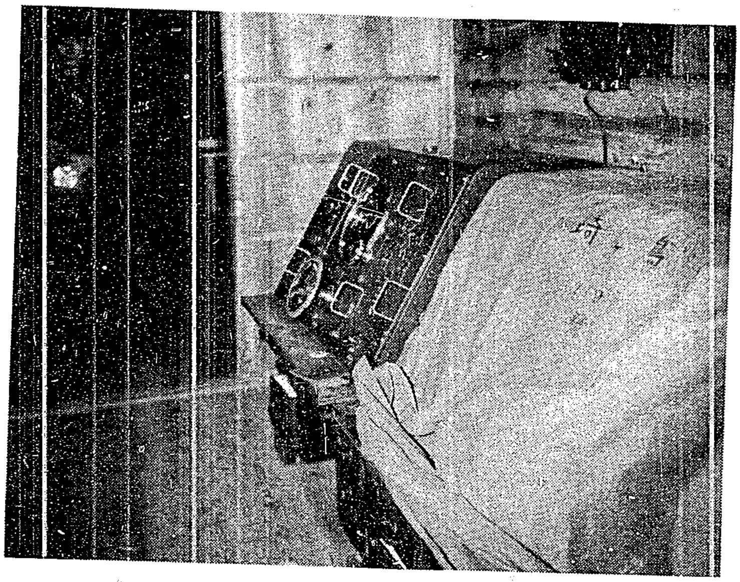

Figure 17
TYPE 97 SOUND DETECTOR CONTROLLER

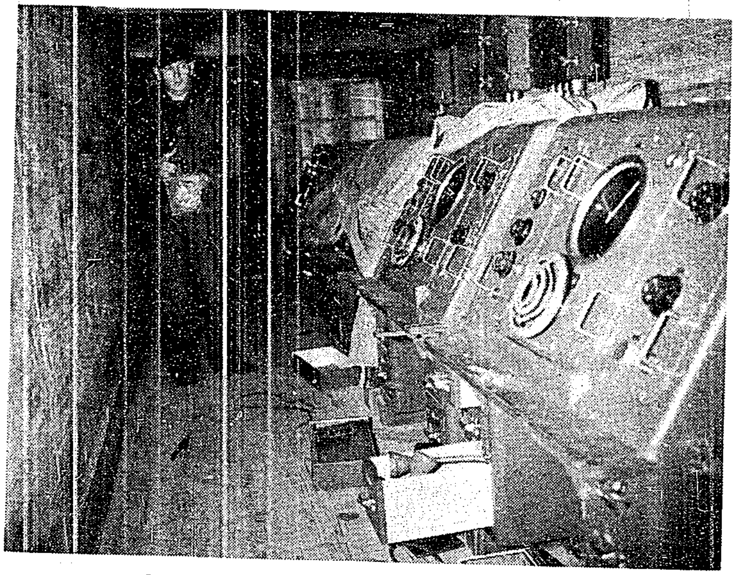

Figure 18
TYPE 97 SOUND LOCATOR CONTROLLER

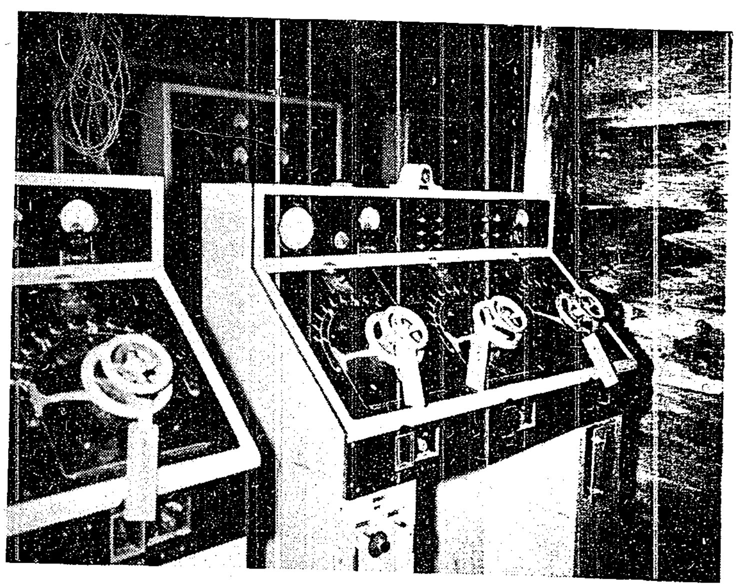

Figure 19
CONTROLLED MINE FIRING CONTROLLER

The apparatus was directional, depending for its action upon the phase difference of the currents from opposite sides of the microphone ring, i.e., the time taken for a sound wave from any given direction to traverse the microphone ring.

To achieve this, the output of each microphone was fed through a transformer to a network of condensers and inductances arranged to bring all in phase. By connecting the condensers and inductances to a commutator arrangement, and the microphone connections to brushes, the equivalent effect of revolving the microphone arrangement on the sea bed was obtained.

The combined output was fed to a three stage resistance-capacity coupled amplifier and the detector was operated by revolving the brush gear on the commutator until a maximum sound was heard, i.e., all outputs were in phase.

No particulars were available concerning the efficiency of this installation.

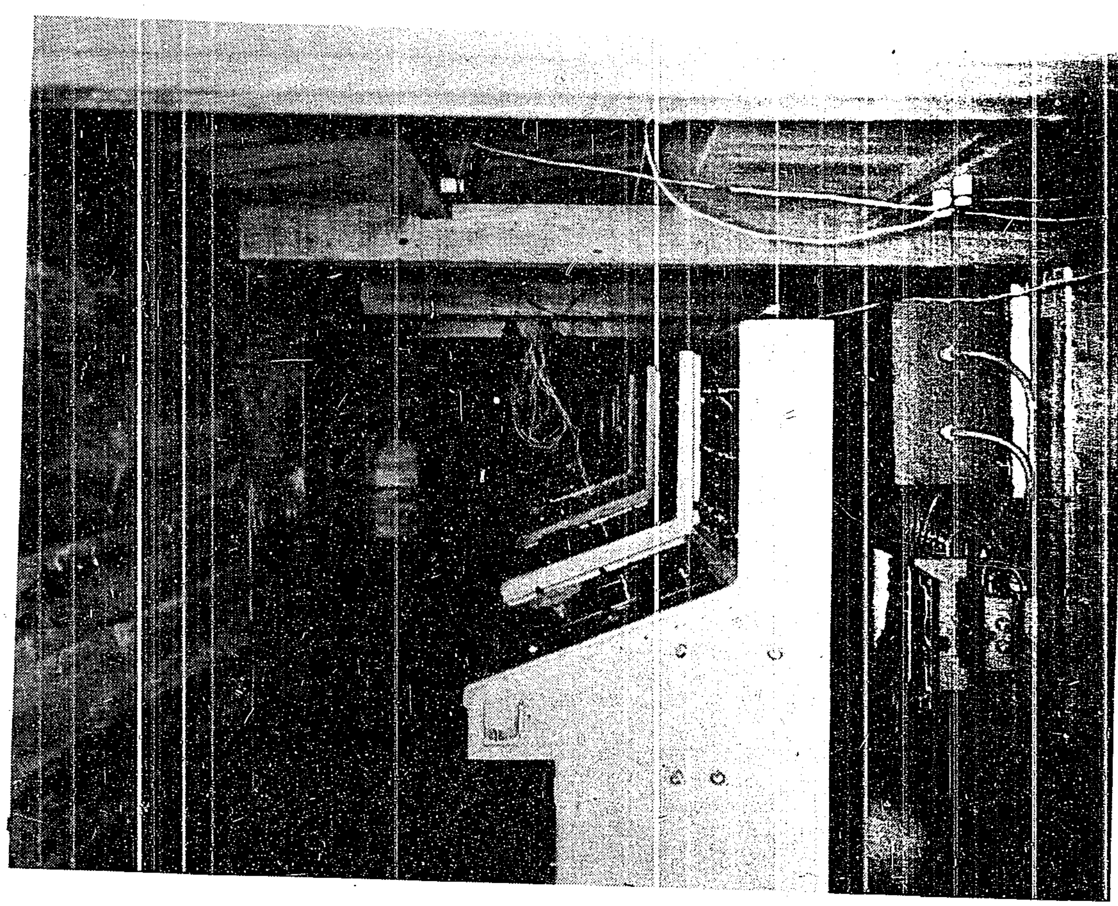

Figure 20
TYPE 92 MINE CONTROLLERS

The guard loop consisted of two rectangular loops laid on the sea bed, corner to corner, in a rough figure of eight. Each loop consisted of three turns (3 core cable) and the two loops were connected in parallel through a resistance box for the purpose of balancing.

The pair of leads from the resistance box were connected to two galvanometers in parallel, arranged as follows:

1. To reflect a light beam on a ground glass screen 1 meter (3.28 ft) away, giving a deflection of 11 mm/ma (.4334 in/ma).

2. To reflect a light beam on to a light sensitive cell 30mm (11.28 in) away.

The former was used when a continual visual watch was being maintained, and the latter when automatic alarm was required only. In practice, both were normally in continuous service.

The light-sensitive cell was arranged to actuate a number of relays, to give audiole and visible alarm when the galvanometer was deflected, and also to actuate a recording relay driven by a spring wound clock.

It was reported that in exercises 90% interception was achieved.

The cable for the guard loops was laid from a ship of approximately 700 tons, being paid out over the stern from a cable drum in the hold of the ship.

The "figure of eight" arrangement was used to overcome the effects of magnetic disturbances in the earth's field.

The following table gives the relation between depth of water and dimensions of loop:

Depth of Sea	Transversal	Longitudinal
260 ft	16,400 ft	492 ft
394 ft	13,120 ft	328 ft
472 ft	9840 ft	164 ft

Length of Leading Cable Less than 47,200 ft

Type 92 Controlled Mines (weight of charge 1100 lbs) These were laid from a minelayer of 750 tons carrying 24 mines; thus a complete section of a field could be completed in one lay. The free end of the cable from each mine was attached to a buoy, and, when the lay was completed, the ends of each group of six were connected together in a junction box and to a multicore cable to the shore.

The normal formation of a group of six mines was in two rows of three, 525 feet apart, with 426 feet between the mines in each row. The rows were arranged across the channel to be protected, and the junction box was in the center of each group. Each mine sinker was equipped with 1280 feet of cable and the experience of mine recovery parties showed that this cable was not shortened before joining to the junction box under normal circumstances. A smoke float was included in the sinker of each mine, controlled by a one minute sugar plug. This float gave off smoke one minute after laying and marked the position of the mine so that bearings could be taken of the exact location of each mine. When the mine left the sinker, about half an hour after laying, the smoke flat rose to the surface, thus indicating that the mine had left the sinker. The floats were picked up as they appeared, being easily seen because they continued to smoke for one hour.

Four groups of six mines were connected to each controller for the purpose of locating the position of the vessel, and three controllers were connected to a firing controller for the purpose of firing the mines, which could be fired only in groups of six.

Each mine was equipped with a moving coil microphone in the top cover plate and a three-core cable connecting each to the controller via the multicore.

The firing circuit was shared by the two acoustic cores on one side.

A semi-rotary selector switch on the controller was used to select any one of the four groups controlled and connect the two rows of three mines to six amplifiers, the output of each of which was recorded on a 0-500 microammeter. A further three-position switch for each row connected each mine of each row in turn to two other amplifiers, the output of each being taken to one earpiece of a pair of headphones, enabling the sound to be compared. By means of observations from several groups the approximate course and speed of a target can be found.

In the field at TORIGASAKI there were 24 groups of mines arranged in three main fields across the entrance of TOKYO Bay.

A figure of 83% was given as a result of the use of the installation during exercises. There is no record of any field being fired operationally.

Firing of a group of mines was carried out by means of a firing controller. The position of each selection switch on each of three controllers was indicated on the firing controller by means of lamps, and a connection from the last pair of amplifiers enabled the operator to check the balance of sound for himself. In order to fire the group, the selector switch corresponding to the controller concerned had to be moved to the group required and the firing button, in the center of the handwheel, pressed. The firing voltage was 500 V, although earlier installations used 300 V. Each controller had its own set of lead-acid batteries.

<u>The tail cables</u> were led in from the sea in iron ducts, and tunnelled through the protective sea wall.

The section of the cave that comprised the battery room was unlined and equipped with racks on either side carrying an assortment of cells and made-up batteries. The cells were of the glass box, open type of about 50 ampere-hours capacity. They were connected in groups of three, each group suppying the needs of one controller. The made-up batteries were in wooden boxes mounted on insulators and were lead-acid type cells of five ampere-hours capacity. The voltage of each box was 100 volts. A further number of batteries which were in mounted boxes were made up of cells of about 2 ampere-hours and were connected to provide 500 volts for firing.

The installation as laid out in the entrance to TOKYO Bay was as follows, starting from the sea:

Type 97 Submarine Detectors.
Guard Loop.
Type 92 Mine Field.

The following further information was obtained from Lieut. YAMAZAKI:

1. In addition to the TOKYO Bay field (TORIGASAKI) controlled mine fields were laid at OMINATO, SASEBO, SAIKI, KII Peninsula, AKKISHI, and MAIZURU.

2. All the above fields were fired after the surrender. There were no miss-fires in the TOKYO Bay field.

3. It was considered that fields would be operationally efficient in depths up to 75 fathoms.

4. Trouble with perturbations in the guard loop due to tramways was acknowledged, but YAMAZAKI stated that this had been overcome.

5. Crossings could not be detected during minor earthquakes.

6. Japanese controlled mine equipment was in no respect based on intelligence of British gear.

7. The policy of moving the control station underground was adopted before the end of the war.

Reference should be made to NavTechJap Document No. ND21-4584 for layout of controlled mine fields.

Type 3, Mark 1, Aircraft Mine Model 1. (See NavTechJap Document No. ND 21-4558 and ND21-4575.) The Type 3, Mark 1 aircraft mine Model 1 anchor was similar to the U.S. Mk. 10, Mod. 1 anchor and operated as follows:

1. On release from the aircraft (Type 1 land-based attack plane carrying one mine), static cords pulled out the safety pins from the detonator placer, nose-cap, and tail-cap in that order. An extension of the tail-cap cord pulled out the pilot parachute, which in turn opened the main parachute. The end of the pilot chute was cut at the plane when the main chute was opened. The main chute parted from the mine at about 30 feet of water when the horn release mechanism operated.

2. The mine and anchor sank to about 160 feet where the two hydrostatic anchor releases operated, separating the mine and anchor. If the total depth of water was less than the operating depth of these hydrostats, soluable plugs at the lower ends of the hydrostats operated to free the mine.

3. After separation, the anchor continued to sink while the mine rose. The sinking rate of the anchor was about ten feet per second. Once the anchor was on the bottom, the mine took its depth in the normal hydrostat-loosebight method. The pawling of the anchor-drum was brought about by a pivoted lever which carried the mooring cable jockey pulley at one end and had its other end projecting into a slot in the pawling disc. While there was tension on the mooring cable the pawling system was held rigid, but, when tension was relaxed, a spring forced the jockey pulley end of the lever downwards. This removed the top from the pawling lever disc and allowed the torsion spring of the pawling system to force the pawl into the sprocket of the cable drum.

4. When the anchor struck bottom, the momentary release of tension on the mooring cable might initiate pawling. To prevent this, an "Anti-Premature Locking Device" was fitted. This mechanism consisted of a perforated plate against which the water exerted a pressure while the anchor was sinking. This force kept the "lever locking pin" housed in the pivoted lever against the pressure of a spring. This spring was housed in a cylinder having a very small inlet, and was attached to the lever locking pin tending to unlock it. Thus when the mine stopped sinking, that is, when there was pressure against the perforated plate, the cylindrical spring took over and withdrew the lever locking pin. This operation was slow enough (because of the small inlet mentioned above) to cover any period of slackness in the mooring cable due to hitting bottom.

Type 1 Drifting Mine. This was a pear-shaped mine with a screw at the lower end for maintaining depth, and was designed for laying in enemy harbors.

Weight of charge .... 154 lbs
Negative buoyancy .... 1.1 lbs

The mine was designed to have an average depth of 9.84 feet, a slight oscillation taking place about this fugure.

Control. The screw for maintaining depth was driven by a 1/5 hp electric motor which obtained its energy from a 35 volt dry battery. The

6. Japanese controlled mine equipment was in no respect based on intelligence of British gear.

7. The policy of moving the control station underground was adopted before the end of the war.

Reference should be made to NavTechJap Document No. ND21-4584 for layout of controlled mine fields.

Type 3, Mark 1, Aircraft Mine Model 1. (See NavTechJap Document No. ND 21-4558 and ND21-4575.) The Type 3, Mark 1 aircraft mine Model 1 anchor was similar to the U.S. Mk. 10, Mod. 1 anchor and operated as follows:

1. On release from the aircraft (Type 1 land-based attack plane carrying one mine), static cords pulled out the safety pins from the detonator placer, nose-cap, and tail-cap in that order. An extension of the tail-cap cord pulled out the pilot parachute, which in turn opened the main parachute. The end of the pilot chute was cut at the plane when the main chute was opened. The main chute parted from the mine at about 30 feet of water when the horn release mechanism operated.

2. The mine and anchor sank to about 160 feet where the two hydrostatic anchor releases operated, separating the mine and anchor. If the total depth of water was less than the operating depth of these hydrostats, soluable plugs at the lower ends of the hydrostats operated to free the mine.

3. After separation, the anchor continued to sink while the mine rose. The sinking rate of the anchor was about ten feet per second. Once the anchor was on the bottom, the mine took its depth in the normal hydrostat-loosebight method. The pawling of the anchor-drum was brought about by a pivoted lever which carried the mooring cable jockey pulley at one end and had its other end projecting into a slot in the pawling disc. While there was tension on the mooring cable the pawling system was held rigid, but, when tension was relaxed, a spring forced the jockey pulley end of the lever downwards. This removed the top from the pawling lever disc and allowed the torsion spring of the pawling system to force the pawl into the sprocket of the cable drum.

4. When the anchor struck bottom, the momentary release of tension on the mooring cable might initiate pawling. To prevent this, an "Anti-Premature Locking Device" was fitted. This mechanism consisted of a perforated plate against which the water exerted a pressure while the anchor was sinking. This force kept the "lever locking pin" housed in the pivoted lever against the pressure of a spring. This spring was housed in a cylinder having a very small inlet, and was attached to the lever locking pin tending to unlock it. Thus when the mine stopped sinking, that is, when there was pressure against the perforated plate, the cylindrical spring took over and withdrew the lever locking pin. This operation was slow enough (because of the small inlet mentioned above) to cover any period of slackness in the mooring cable due to hitting bottom.

Type 1 Drifting Mine. This was a pear-shaped mine with a screw at the lower end for maintaining depth, and was designed for laying in enemy harbors.

Weight of charge	154 lbs
Negative buoyancy	1.1 lbs

The mine was designed to have an average depth of 9.84 feet, a slight oscillation taking place about this fugure.

Control. The screw for maintaining depth was driven by a 1/5 hp electric motor which obtained its energy from a 35 volt dry battery. The speed of the motor was reduced to 60 RPM for driving the screw through a differential, and depth was regulated by varying the screw speed by means of a hydrostatically operated brake on the differential.

Firing. The mine was fired by four Type 97 chemical horns fitted with extensions. These extensions were released shortly after the mine was laid by a drive taken from the motor.

Operation. The mine was intended for laying from an "I" class submarine, but it never was used operationally owing to the failure of the safety gear on the first operational trip, resulting in the loss of the submarine. The mine was stowed in the marker buoy locker of the submarine, and a maximum number of two mines per submarine could be carried.

The life of the mine was about 12 hours, being determined by the life of the dry battery. At the end of its life the mine simply sank to the bottom.

Type 1, Model 2 Mine. Plans were under consideration for the production of a similar mine to the Type 1, but to be laid from submarine torpedo tubes.

Length	8' 2"
Diameter	21"
Weight	660 lb
Weight of charge, Type 1	220 lb
Positive buoyancy	1.1 lb

The operation was to have been similar to the Type 1, except that positive buoyancy was provided to assist in getting the mine to the surface after release. A 48 volt dry battery was to be used, and a relay was included which fired the mine when the battery voltage had fallen to about 5 volts. The case was constructed to withstand an external pressure of 656 feet of water.

YOKOSUKA Type Mine. This was a drifting mine designed about 1933, but never put into production. Very little information was available about it as no development had been carried out since 1933.

Length	18'7"
Diameter	21"
Length of explosive head	6'3"
Length of central section	6'9.5"
Length of battery section	5'9.5"

The mine was intended to float vertically and had slight negative buoyancy. It was intended for laying from submarine tubes.

ENCLOSURE (A)

DESCRIPTION OF OPERATION OF ATTACK LAND MINE

(Translation of Seized Japanese Document)

A. Use. This land-mine is a type of time land-mine with a delay of approximately three seconds or one second. By approaching a moving enemy tank at close quarters or by lying in wait for it on the way and throwing (the mine) in front of the tank's line of advance, it can be used to blow up the tank at the instant when it passes over the mine, and destroy it from below. Furthermore, when used against a stationary tank, the mine will demolish it in the same fashion, if inserted in the tank's lower portions.

B. Summary of Construction. It consists of a case, bursting charge, stability frame, base plate, etc. The bursting charge is always placed inside the case. The fuze is attached at the bottom. Usually they are grouped in the storage box, four units to the box. The fuze foxes are placed in the center and there are either four boxes of the three-second type or four boxes of the one-second type.

C. Order of Assembly.

1. Attachment of stability frame: Unscrew the four lock nuts which are attached to the case. Fit the stability frame into place. Tighten the lock nuts. At this time, do not unfasten the lid of the case or take out the bursting charge.

2. Attachment of the fuze: Remove the plug which is in the fuze pocket of the base plate. Screw in gently but sufficiently the fuze taken from the storage box. As stated in the section on USE, either a three-second fuze or a one-second fuze may be used.

3. Do not throw away the plug; save it, so that in case the mine is not used, the plug can be used a second time.

D. Method of Use.

1. Just before you undertake the attack or while lying in ambush, pull out the safety pin of the fuze. When you are close to the target, judging your opportunity, vigorously pull the fuze firing cord and immediately throw the mine in front of the tank. Withdraw quickly.

2. Since the mine explodes three seconds - or one second - after the fuze firing cord has been pulled, the position from which the mine will be thrown must be chosen with reference to the line of advance of the tank. Furthermore, in the case of the one second type, it is permissible to attach a long cord for pulling (the fuze cord).

3. The fuze firing cord is to be pulled until the striker retaining pin comes loose. If the striker retaining pin is not pulled out, the mine will not function.

4. Caution.

a. When pulling the safety pin, untie the stop cord and gently draw it out.

b. When the safety pin has been removed, insofar as possible, do not throw it away in order that it may be used a second time in the

ENCLOSURE (A), continued

Figure 1(A)
ATTACK LAND MINE
(Mine in position for use. Wire hoops are the stability frame which causes mine to roll over and lie rightside when thrown.)

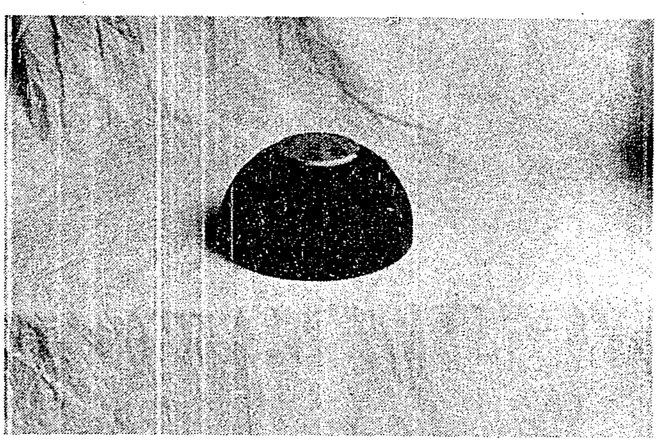

Figure 2(A)
ATTACK LAND MINE

ENCLOSURE (A), continued

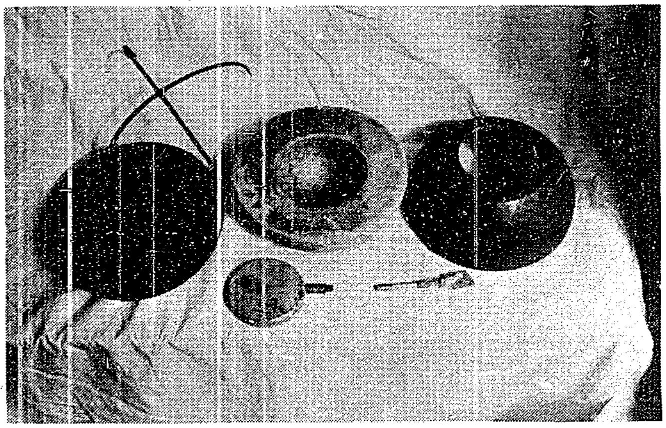

Figure 3(A)
ATTACK LAND MINE
(Disassembled)

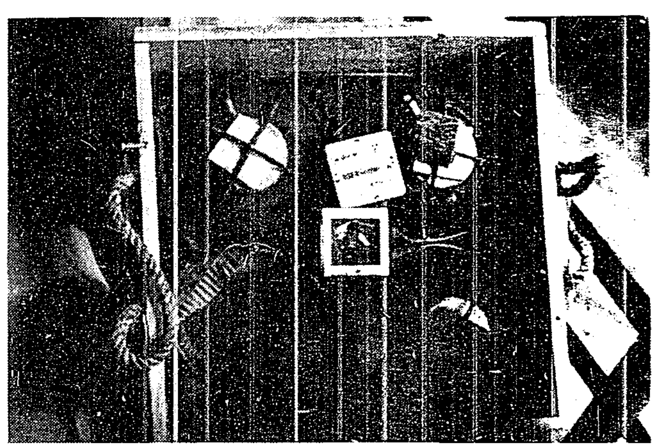

Figure 4(A)
ATTACK LAND MINE
(Method of packing)

ENCLOSURE (A), continued

event that the mine is not actually used.

c. The fuze firing cord is white in the case of the three-second type, and is red in the case of the one-second type.

E. Disassembly.

1. In case the mine has not been used, first insert the safety pin. Then withdraw the fuze from the mine, fit in the (storage) plug, detach the stability frame, and place (the mine) in the storage box as it was at first. At this time, be sure not to pull strongly on the fuze firing cord.

2. Do not disassemble the fuze or the bursting charge.

F. Precautions in Handling.

1. The radius of danger due to the blast of the mine's explosions is approximately six meters, but beware of the flying fragments. After tossing the mine, withdraw as far as possible, lie down with your head facing away from the mine. Furthermore, plug up your ears temporarily with cotton, bits of cloth, etc., or cover your ears with your fingers.

2. Handle the fuze gently, and never confuse the safety pin's stop cord with the firing cord.

3. When the safety pin has been withdrawn, the fuze firing cord can be pulled with very little force (approximately 2.4 kilograms); therefore special attention is required.

4. Within the fuze there is a charge consisting of the primer and delayed action charge. If you drop the fuze or impart a violent shock to it, there is danger that it will shake loose and function immediately. Therefore, caution must be used.

5. When the mine has once been assembled but for the time being an opportunity to use it has not developed, disassemble it, place it in its former state in the storage box, and keep it in a place as free from moist air as possible. In particular, store the fuze by wrapping it in a sufficient amount of waxed paper, and screw the storage plug into the fuze pocket.

ENCLOSURE (B)

List of Equipment Shipped to Ordnance Investigation Laboratory, Naval Powder Factory, Indian Head, Md.

NavTechJap Equipment No.	Equipment
JE21-4530-1	Mine, Type P
JE21-4508-1	Mine, Type 1
JE21-4558-1	Mine, Type 3, Model 2
JE21-4536-1	Mine, Type 0
JE21-4517-1	Mine (aircraft), Type 3, Mk. 1, Model 1
JE21-4515-1	Mine, Type 92
JE21-4545-1 through 28	Firing Unit for Mine Type 3, Model 1
JE21-4518-1	Mine, Type 3, Model 1
JE21-4501-1	Mine, Type 93, Model 1
JE21-4502-1	Mine, Type 93, Model 3
JE21-4503-1	Mine, Type 93, Modification 1
JE21-4504-1	Mine, Type 94, Model 2
JE21-4505-1	Beach Mine
JE21-4506-1	Small Type Mine, Model 1
JE21-4506-1	Small Type Mine, Model 2
JE21-4509-1	Mine, Type 88, Modification 1
JE21-4512-1	Mine, Type 4
JE21-4513-1	Mine, Type 5
JE21-4514-1	Mine, Type K-2
JE21-4516-1	Mine, Type 2
JE21-4519-1	Mine, Mark 5, Modification 1
JE21-4531-1	Mine, Mark 6, Model 1
JE21-4522-1	Mine, Mark A
JE21-4532-1	Mine, Type 5
JE21-4535-1	Mine, Type 6, Model 3
JE21-4543-1	Mine, Type 96, Modification 1
JE21-4544-1	Mine, Type 96

ENCLOSURE (C)

List of Documents Forwarded to WDC through ATIS

(ATIS No. 3140)

NavTechJap Document No.	Description
ND21-4550	Organization of Experimental Mine Department.
ND21-4551	Schedule of Mines.
ND21-4552	Measurement of Ship's Magnetism.
ND21-4554	Mine Researches at KURIHAMA.
ND21-4557	Mine K-2.
ND21-4558	Mine K. Type 3, Mk 3, Model 1, Mod. 1.
ND21-4559	Type 5 Mine (FUKURYU unit).
ND21-4560	Details of Japanese Chemical Horn.
ND21-4561	Type 5 Moored Mine.
ND21-4573	Mines and Shipping List.
ND21-4574	Principal Items of Aircraft-Laid Mines.
ND21-4575	List of Mines and Development.
ND21-4577	Mine Experimental Dept. Report.
ND21-4578	Soluble Plugs.
ND21-4580	Type "JR" Depth Charge (magnetic).
ND21-4582	Depth Charges, Throwers, Nets., etc.
ND21-4583	Type 92 Mine.
ND21-4589	Type 92 Mine and Type 97 Sound Locater.

ENCLOSURE (D)

ORDNANCE TECHNICAL INTELLIGENCE REPORT ON JAPANESE ATTACK MINE

A. Physical Characteristics. This mine was first found at the Naval Ammunition Storage Area at SASEBO. It is an anti-tank mine but due to the light pull required to fire the fuze it could be employed as an anti-personnel mine. It has an overall color of flat black. The case is of pressed sheet steel (16 ga.). The mine is hemispherical, 3½" tall and 6½" in diameter. The base is of pressed steel (16 ga.) with a 3 3/8" hemispherical cavity welded to the bottom plate. The bottom is fastened to the mine by four lag screws. These screws also fasten the wire "stability frame" to the mine. This wire frame will cause the explosive to position itself correctly by rolling it to the bottom so the cavity is pointing upward. The fuze seat is of turned steel 3½" in diameter and ½" thick. From one side of this piece a tube extends 3/4". This receives the fuze. The center of the fuze seat on the inside of the case is a well into which is screwed (L.H.) the detonator. Above the detonator inside the fuze seat is a pellet of black powder to insure igniting the detonator. The fuze seat is fastened to the mine case by four lag screws. The mine weighs 9.46 pounds and contains 5.5 pounds of Picric acid.

B. This mine was to be used as a hand placed charge. It has two fuzes, one with a white pull cord indicating a delay of approximately three seconds, and one with a red pull cord indicating a delay of one second. When a moving tank approached, the mine was to be thrown underneath the body of the tank after the fuze was fired. On a stationary tank the mine was to be placed in the tank's lower portions and fired. This mine could undoubtedly penetrate the bottom of the tank and would cause casualties to the personnel inside.

C. Packaging. The mine is packed in a wooden box which holds four mines and eight fuzes. The fuzes are in a smaller wooden box surrounded by a soft felt to protect them from shock.

D. Functioning. The fuze is a tube 2" long and 5/16" in diameter. At the top is a raised knurled section 1/4" long and just below this is a threaded (R.H.) portion used to seat the fuze in the mine. The safety pin is inserted through the knurled portion of the fuze body and through the striker release pin. The striker is connected to the release pin by a notch and held backward by the force of the compressed spring which is trying to drive the striker into the percussion cap. Below the striker is a percussion cap which ignites the delay train. The lower portion of the fuze containing the percussion cap and delay is connected to the upper part of the body by internal threads. To fire the fuze a pull of from five to six pounds withdraws the release pin from the fuze body, releasing the striker, which hits the percussion cap and ignites the delay train. When the delay burns through it flashes into the pellet of black powder just over the detonator. This pellet fires the detonator, which fires the booster of tetryl, and the booster fires the main charge. The two fuzes can be distinguished by their external markings. The three-second delay has a white pull cord and a plain body while the one-second delay has a red pull cord and a red strip painted over the delay at the base of the fuze.

	Designation	Characteristics	Laid By	Cable Kind Wires Strands	Cable Dia. mm	Cable Length mm	Case Shape	Case Dia. mm	Case Length mm	Horn Number	Horn Type	Horn Location	Charge Weight kg	Charge Type	Type of Firing Unit	Total Weight of Armed Mine Case kg	Buoyancy kg	Safety Devices	Type of Anchor	Anchor Weight (kg)	Anchor Size (mm)	Maximum Capable Depth Case Depth (m)	Maximum Capable Depth Sea Depth (m)	Depth Setting Mechanism	Remarks and NavTechJap Document Numbers
X	Mark 1	Combined floating mine	Surface Ship	24 x 6	9	100		500	1250				100	Shimose	Inertia Type	?	57	Delay arming and sinking (12 hours after by clock)				9			6 mines in 1 group
X	Mark 2	Moored Mine	Surface Ship	24 x 6	9	160		740	740				31.9	Shimose	Inertia Type	395	45.4	Circuit safety for arming and floating by over-turning of mine case.	Conical Automatic mooring anchor	220	858 x 740	7	170	plummet	Mine case upside down on anchor.
X	Mark 3	Moored Mine	Surface Ship	24 x 6	9	160		740	934				46.89	Shimose	Inertia Type	432	56	Circuit safety for arming and floating by over-turning of mine case.	Conical Automatic mooring anchor	220	858 x 740	7	170	plummet	Mine case upside down on anchor.
X	Mark 4	Moored Mine	Surface Ship	24 x 6	9	160		830	869				61.9	Shimose	Inertia Type	443	86	Circuit safety for arming and floating by over-turning of mine case.	Square Automatic mooring anchor	220	920 x 720 x 620	7	170	plummet	Mine case upside down on anchor.
X	Mark 5	Moored Mine	Surface Ship	24 x 6	9	160		830	853				80	Shimose	Inertia Type	510	100	Circuit safety for arming and floating by over-turning of mine case.	Square Automatic mooring anchor	300	920 x 720 x 620	7	170	plummet	Mine case upside down on anchor.
O	Mark 5 Modif. 1	Moored Mine with horns	Surface Ship	24 x 6	9	160		830	853	4	Type 91	Topside	83	Shimose	Chemical horn	520	100	Fuse safety by soluable plug on mooring switch spindle.	Square Automatic mooring anchor	300	920 x 720 x 620	7	170	plummet	ND 21-4551. M.D. hb
O	Mark 6 Model 1	Moored Mine with horns	Surface Ship	24 x 6	10	300		1050	1150	4	Type 91	Topside	215	Shimose	Chemical horn	1,156	195	Fuse safety by soluable plug on mooring switch spindle.	Automatic mooring anchor	721	1000 x 1000 x 1045	30	330	plummet	M.D. hb
O	Mark 6 Model 2	Moored Mine with horns	Surface Ship	24 x 6	10 8	205 355		1050	1021	4	Type 91	Topside	200	Shimose	Chemical horn	1,080	200	Fuse safety by soluable plug on mooring switch spindle.	Automatic mooring anchor	670	1050 x 1050 x 1025	25	230-380	plummet	M.D. hb
O	Model 2 Modif. 1 Mark 6	Moored Mine with horns	Surface Ship	19 x 6	6	1000		1050	1021	4	Type 91	Topside	200	Shimose	Chemical horn	1,080	200	Fuse safety by soluable plug on mooring switch spindle.	Automatic mooring anchor	670	1050 x 1050 x 1025	20	1020	plummet	
	Mark 6 Model 3	Moored Mine with horns	Surface Ship	24 x 6	8	300		1050	1095	6	Type 91	4 Topside 2 Bottom	200	Shimose	Chemical horn	900	205	Fuse safety by soluable plug on mooring switch spindle.	Automatic mooring anchor	480	850 x 850 x 725	60	360	plummet	
X	Type 88	Moored Mine with horns	Submarine	24 x 6	8	250		860	1164	4	Type 88	Topside	180	Shimose	Chemical horn	960	150	Circuit delay arming by glycerin leakage due to water pressure fuse pulled out when tension on mooring cable is released.	Automatic mooring anchor	559	860 x 600	20	270	hydrostat	Copy of German 'U' mine ND 21-4551. M.D. hb
O	Type 88 Modif. 1	Moored Mine with horns	Submarine	24 x 6	6.5	425		860	1164	4	Type 97	Topside	180	Shimose	Chemical horn	960	150	Circuit delay arming by glycerin leakage due to water pressure fuse pulled out when tension on mooring cable is released.	Automatic mooring anchor	559	860 x 600	20	350	hydrostat	Copy of German 'U' mine ND 21-4551. M.D. hb
X	Type 89	Moored Mine with horns	Surface Ship	24 x 6	8 6.5	183 365		860	850	6	Type 91	4 Topside 2 Bottom	70	Type 88	Chemical horn	718	150	Fuse safety by soluable plug on mooring switch	Automatic mooring anchor	493	900 x 900 x 800	60	243-425	plummet	
X	Type 89 Modif. 1	Moored Mine with horns	Surface Ship	24 x 6	8 6.5 5	183 365 900		860	850	6	Type 91	4 Topside 2 Bottom	70	Type 88	Chemical horn	710	150	Fuse safety by soluable plug on mooring switch	Automatic mooring anchor	493	900 x 900 x 800	60	243-425-960	plummet	
X	Type 90	Net Mine with Pendulum firing mechanism	Net Layer					510	1045				80	Type 88	Pendulum switch type	173	0~-4	Circuit safety by weight inclination and soluable plug.				20	150		
	Type 91	Moored Antennae Mine	Surface Ship	24 x 6 19 x 6	10 5	220 1000		1050	1908	4	Copper Horn	Topside	200	Shimose	Sea Cell	1,000	190	Relay safety by tension on cable and mooring switch.	Automatic mooring anchor	370	1000 x 1000 x 800	71	1101	plummet	Copy of British Vickers' antenna mine.
O	Type 92	Controlled Moored Mine with Sound Detector	Surface Ship	Electric Cable	25	300		1050	1480				500	Type 88	Control switch ashore	1,300	150	Firing switch ashore	Fixed anchor	520	1020 x 800	60	120	Fixed amount of cable	ND 21-4551. Antenna upper 6mm-25m down 11mm-30m
O	Type 92 Model 1	Controlled Moored Mine used with guard loop	Surface Ship	Electric Cable	25	300		1050	1480				500	Type 88	Control switch ashore	1,300	150	Firing switch ashore	Fixed anchor	520	1020 x 800	60	120	Fixed amount of cable	M.D. hb
O	Type 93 Model 1	Moored Mine with horns	Surface Ship	24 x 6 14 x 6 19 x 6	12 10 5	150 220 1000		860	860	4	Type 97	Topside	100	Type 88	Chemical horn	700	120	Fuse safety by tension of cable on mooring switch	Automatic mooring anchor	480	About 900 x 900 x 800	72	222-292-1072	plummet	Also developed for A/C laying. M.D. hb ND 21-4551 & 4557
O	Type 93 Model 2	Moored Mine with horns	Surface Ship	24 x 6 14 x 6 19 x 6	12 10 5	150 220 1000		860	860	7	Type 97	4 Topside 3 Bottom	100	Type 88	Chemical horn	700	120	Fuse safety by tension of cable on mooring switch	Automatic mooring anchor	480	About 900 x 900 x 800	72	222-292-1072	plummet	Anti-Sub use.
O	Type 93 Model 3	Moored Mine with horns	Surface Ship	24 x 6 14 x 6 19 x 6	12 10 5	150 220 1000		860	860	9	Type 97	6 Topside 3 Bottom	100	Type 88	Chemical horn	700	120	Fuse safety by tension of cable on mooring switch	Automatic mooring anchor	480	About 900 x 900 x 800	72	222-292-1072	plummet	Anti-Sub use.
O	Type 93 Model 4	Moored Mine with horns	Surface Ship	24 x 6 14 x 6 19 x 6	12 10 5	150 220 1000		860	860	4	Type 97	Topside	110	Type 1	Chemical horn	710	110	Fuse safety by tension of cable on mooring switch	Automatic mooring anchor	480	About 900 x 900 x 800	72	222-292-1072	plummet	
△	Type 93 Model 5	Drifting Mine	Surface Ship					860	860	4	Type 97	Topside	110	Type 1	Chemical horn	?	?	Fuse safety by tension of cable on mooring							
	Type 94 Model 1	Bottom Mine for river	Small Ship					860	1150	4	Type 91	Settled on buoy	80	Type 88	Chemical horn	240	-145	Circuit Safety by soluable plug.				20	20		ND 21-4551
	Type 94 Model 2	Controlled Bottom Mine for river	Small Ship					860	1150				80	Type 88	Controlled	240	145	Firing switch ashore.				20	20		4 mines in 1 group M.D. hb
X	Type 96	Net Mine with tension firing mechanism	Net Layer					510	690				50	Type 88	Tension	108	0	Actuating rod safety by pressure and soluable plug.				75	150		ND 21-4551
O	Type 96 Modif. 1	Net Mine with tension firing mechanism	Net Layer					510	690				55	Type 88	Tension	108	0~-4	Actuating rod safety by pressure and soluable plug.				75	150		
△	Type 0	Magnetic Controlled Bottom Mine	Surface Ship					1200	2000				1000	Type 88	Switch on shore	2000	?	Control switch on land					100		6 mines in 1 group induction magnetic indicator ND 21-4577
□	Type 1	Floating Mine with horns	Submarine					about 720	about 1240	4	Type 97	Topside	75	Type 88	Chemical horn	310	-1~-4	Fuse safety by delay gearing to main motor.				7	75		Sinks when batteries have exhausted (12 hours) ND 21-4577
□	Type 2	Moored Mine with horns	Submarine	24 x 6	8	160		530	2057	3	Special Model with Extenders	Topside	130	Type 97	Chemical horn	670	120	Fuse and circuit safety by pressure (and clock) for laying and when adrift.	Automatic mooring anchor					Hydorstat	Copy of American Type 10 model 1 ND 21-4551 and 4577
□	Type 3 Model 1	Magnetic Bottom Mine	Submarine					532	3384				890	Type 97	Magnetic	1060	-600	Fuse safety by hydrostat. Circuit safety by soluable plug.							Copy of German TH with Se-Bik unit
□	Type 3 Model 2	Acoustic Bottom Mine	Submarine					532	3384				890	Type 97	Acoustic	1060	-500	Fuse safety by hydrostat. Circuit safety by soluable plug.							Copy of German TM with Fab IIIa unit. ND 21-4551
O	Type 4	Moored Mine with horns	Surface Ship	24 x 6	10	200		about 500	about 1000	3	Type 97	Topside	40	Type 88 or Type 1	Chemical horn	?	100?	Fuse and circuit safety by pressure for laying and drifting.	Fixed anchor					Fixed amount of cable	ND 21-4577
O	Type 5	Moored Mine with horns	Surface Ship	24 x 6	10	200		720	720	3	Type 97	Topside	40	Type 1	Chemical horn	?	100	Fuse and circuit safety by pressure for laying and drifting.	Fixed anchor		810 x 420			Fixed amount of cable	

□	Type 3 Model 2	Acoustic Bottom Mine	Submarine					532	3384				890	Type 97	Acoustic	1060	-300	Fuse safety by hydrostat. [illegible] soluable plug.							Copy of German [illegible] unit. ND 21-4551
○	Type 4	Moored Mine with horns	Surface Ship	24 x 6	10	200		about 500	about 1000	3	Type 97	Topside	40	Type 88 or Type 1	Chemical horn	?	100?	Fuse and circuit safety by pressure for laying and drifting.	Fixed anchor					Fixed amount of cable	ND 21-4577
○	Type 5	Moored Mine with horns	Surface Ship	24 x 6	10	200		720	720	3	Type 97	Topside	40	Type 1	Chemical horn	?	100	Fuse and circuit safety by pressure for laying and drifting.	Fixed anchor		810 x 420			Fixed amount of cable	
△	Magnetic Type 5	Magnetic Bottom Mine for beach	Small Ship or personnel					450	775				100	Mark K	Magnetic	190	-70	Fuse and circuit safety by soluable plug.				6	6		
○	Small Beach Mine	Moored Mine with horns	Small Ship	24 x 6	10	50		600	600	4	Type 97	Topside	40	Type 88 or Type 1	Chemical horn	?	50	Fuse and circuit safety by pressure for laying and drifting.	Fixed anchor				50	Fixed amount of cable	ND 21-4551 and 4561
○	Aircraft Type3 Mark 1 Model 1	Moored Mine with horns	Airplane	24 x 6	6	300		600	3370	4	Type 97	Topside	80	Type 97	Chemical horn	640	98	Mooring switch. Horn extension release by soluable plug.	Automatic mooring anchor	315	600 x 720	10	300	Hydrostat	Life 6 months. M.D. hb ND 21-4551 and 4558 and 4574
○	Aircraft Type3 Mark 2 Model 1	Drifting Mine with horns	Airplane	24 x 6	6	300		360	1850	3	Electric Switch Horn	Topside	50	Type 97	Chemical horn	135	5	Scuttled by soluable plug in apex of cone. Fuse safety by safety pin loosed by dropping from airplane. Circuit by tension of connecting cable.				1.5			Life 4 days. M.D. hb ND 21-4551 and 4557 and 4574
□	Aircraft Type3 Mark 3 Model 1	Acoustic Bottom Mine	Airplane					450	4665				400	Type 97	Acoustic (Supersonic)	850	?	Fuse safety by pin loosed by droping from airplane. Circuit safety by clock.				5 30			Temp. Desig. 'P' Mine. Life 1 month. ND 21-4551 and 4555 and 4574
	Aircraft Type4 Mark 3 Model 1	Magnetic Bottom Mine	Airplane	(had not been designed except trial of copy-manufacturing of firing mechanism)											Magnetic										Copy of German BM 1000 and M 103 unit.
□	"A" Mine	Attack Mine for Suicide Swimmer Service	Carried by personnel					300	?				50	Type 97	Time delay switch by soluable plug	?	?	Electric safety by use of sea-water battery. Delay firing by soluable plug.							ND 21-4577
△	"B" Buoy	Released by Submarine against Surface Ships	Submarine					450	?				80	Type 97	Electric switch	?	?	Safe when upside down. Armed by impeller. Dunamic firing safety by pressure on flap.							Fires on breaking surface or on contact with ship. ND 21-4577
△	Attack Mine Type 5	Fukuryu Corps Service Attack Mine with horn for Suicide Diver.	Carried by personnel					240	566	1	Type 97 Modif.	Topside	15	Type 97	Chemical horn	25	-0.5~-1	None							ND 21-4559
○	Small Mine Model 1	Beach Mine	Personnel					520	267	2	Type 97	Topside	20	Type 88 or 97	Chemical horn	50	-20	Circuit safety switch and safety pin.					20		ND 21-4551. M.D. hb
○	Small Mine Model 2	Beach Mine	Personnel					178 362	260	1	Type 97	Topside	15	Type 88 or 97	Chemical horn	30	?	Circuit safety switch and safety pin.							ND 21-4551. M.D. hb

Note:

(1) In the line of size of anchor, length x breadth x height or diameter x height is shown.

(2) X Shows obsolete names.
□ Shows mines, manufactured for service but not used.
○ Shows mines, used in service.
△ Shows mines, only in experimental stages.

(3) M. D. Hb. means item is illustrated and described in "Mine Disposal Handbook".

TABLE OF PRINCIPAL ITEMS OF JAPANESE NAVAL MINES

O-04

ENCLOSURE (E)