

JAPANESE UNDERWATER ORDNANCE



20 APRIL 1945

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NAVY DEPARTMENT
BUREAU OF ORDNANCE
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ORDNANCE PAMPHLET 1507

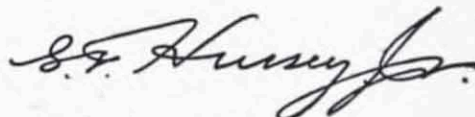
JAPANESE UNDERWATER ORDNANCE

1. Ordnance Pamphlet 1507 contains a summary of the more important items of Japanese underwater ordnance. It is designed to aid in identifying the items, to give their tactical characteristics, and to outline precautions to be taken, as required.

2. This publication is not intended to give instructions regarding the disposal of such ordnance. The operations remain the duty of specially trained personnel.

3. This pamphlet does not supersede any existing publication. The information contained herein was gathered with the assistance of the U. S. Navy Mine Disposal School.

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G. F. HUSSEY, JR.
Rear Admiral, U. S. Navy
Chief of the Bureau of Ordnance

Chapter I JAPANESE MINES

Section 1—GENERAL

Designation

The U. S. Navy makes two classifications of Japanese mines. The first covers those that have been recovered and officially identified. The second includes those that have not been identified. An identified mine carries a two-letter designation. NAVORD OC 100-44 dated 8 November 1941 states that the first letters shall be J to indicate the nationality and the second letters shall indicate the mine. These letter designations are assigned by the Bureau of Ordnance only.

A mine which has not been thus investigated will be identified by a short fruit name. The circular letter, mentioned previously, provides that field units may assign the name if desired. If the Bureau of Ordnance establishes that the fruit-named mine is a new type, it will assign an appropriate two-letter designation to supersede the temporary appellation.

The instructions further authorize assignment of fruit names to those mines which have not been recovered but are known to exist on the ground, as captured documents and prisoner statements.

Explosive Charge

Explosives used in Japanese mines recovered or reported to date have been one of the following: Shimose, Type 88, Type 98 and Type 1 Temporary. Shimose and Type 98 are toxic and must never be handled by the bare hands.

General characteristics of the explosives are as follows:

Type 88—Composed of almost pure trinitrochlorate used in a cast form in a main charge. It has a non-yellow coloring. It may also be used as a booster charge in granular or pressed form. Shimose melts at a temperature of 122° to 123° C. because of impurities which form plastic compounds. Shimose detonates in rapid succession. It is slightly more powerful than TNT.

Type 88—Composed of ammonium perchlorate

75%, ferro-silicon 16%, powdered wood 6%, crude oil 1%. It is used in a granular form in main charges, and has a dark grey coloring. Composition of the explosive may vary by 10%. Type 88 decomposes rapidly at high temperatures and is very sensitive to friction. More powerful than TNT, it combines favorably with explosives containing aluminum.

Type 98—Composed of Hexanitrodiphenylamine 40%, and Trinitroanisole 60%. It is used in a cast form in main charges, and has a dark yellow coloring. Type 98's power is approximately that of TNT. It melts at 68° to 70°.

Type 1, Temporary—Composed of Ammonium Picrate 81%, Aluminum 16%, Powdered Wood 2% and crude oil 1%. It is used in a granular powder form in main charges, and is greenish brown in color. The explosive has a distinctive "dry" odor. It does not melt on heating, but detonates at a temperature of about 200° C. Jap reports indicate that it compares in power with Torpedex which is approximately a third more powerful than TNT.

The explosives described above are sensitive to bullet impact and may detonate when struck by .30 and .50 cal., and 20 mm projectiles. Caution, therefore, should be observed when sinking floating mines by gun fire. CNO has directed that any ship or vessel attempting to sink a floating mine by gunfire should not approach closer than 100 yards. Personnel should not be exposed on weather decks since there is danger of being struck by fragments.

The following general safety precautions should be observed when dealing with Japanese mines:

Do not permit damage any horizontal surface. Do not move or jar the mine except from a safe distance. Do not take strain on any line or cable which may be attached externally to the mine.

Bear in mind that safety disarming devices may fail to operate as designed.

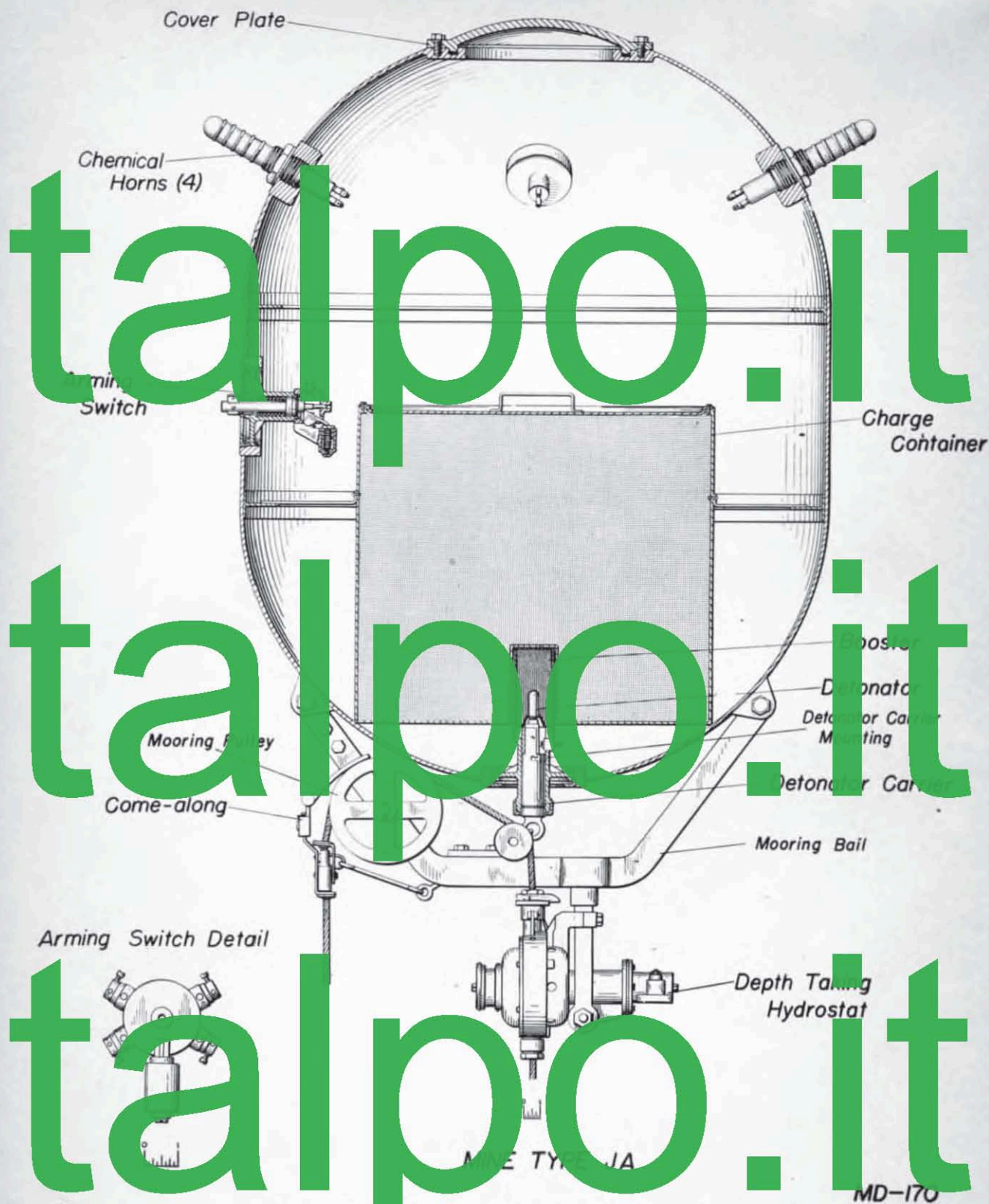


Figure 1—Cross-sectional drawing of mine Type JA.

Section 2—MINE TYPE JA

This mine apparently is obsolete; only a few specimens have ever been encountered. It is submarine laid, moored and fired by contact. The mine case design is Type 88, Modification 1. The mine may be laid in water with a maximum depth of approximately 176 feet; the depth may be set to a maximum of 66 feet. Japanese documents state that the minimum spacing between mines is 100 feet.

The physical characteristics of the mine are as follows:

Case

Shape—Two hemispheres, 33.79 in diameter, joined by a 12" cylindrical mid-section.

Color—Black.

Material—Steel.

Charge—396 lbs. of block-fitted Shimose.

Total Weight—847 lbs.

External Fittings

Horns—Four, electrochemical, equally spaced about the upper hemisphere and 16" from the top center of the mine.

Cover Plate—12.5" diameter, in the center of the upper hemisphere, secured by 16 bolts. In place of the plate, the mine may be fitted with a circular man 17" deep.

Arming Switch Housing—5" in diameter, on the mid-section, below upper hemisphere, secured by a keep ring.

Detonator Carrier—5" in diameter, in the center of the lower hemisphere, secured by a keep ring. It protrudes about 2" from the mine case.

Lifting Lugs—Two, on the upper hemisphere, 180° apart and 7.775 from the top center.

Depth-taking Hydrostat—12" long, hinged to extension on the mooring bail.



Figure 1—JA mine without anchor.

Mooring Bail—A 27" span, bolted to two lugs on the lower hemisphere.

Mooring Pulley—6"25 in diameter, attached to the mooring bail.

Come-along—Fitted to the mooring bail and secured by a shear pin.

Mooring Cable—147' of 8 mm diameter (0'31) cable, with 4' of 2 mm diameter (0'078) rope attached to bitter end of cable.

Operation

The detonator is manually housed in the mine. The mine is laid on the bottom. Upon being launched from a submarine, the assembly mine and anchor sink to a depth of 328' where they separate. In less than 328' the mine and anchor separate some time after the assembly reaches the bottom. Mooring cable then reeves out of the anchor, over the mooring pulley, and through the depth-taking hydrostat with the bitter end secured to the anchor. At a

pre-set depth, the hydrostat clamps the cable to moor the mine. Fifteen to twenty minutes later, the spring-loaded arming switch closes, delay being caused by an oil dashpot. It should be noted that there are two cables descending from the mine when it is moored, one taut and the other slack.

The mine fires when one of the hydrostat bent glass tubes break its glass vial thereby allowing an electrolytic solution to run into a battery cup generating sufficient current to fire the detonator.

Safety Precautions

The mine is designed to disarm, if the mooring cable breaks, by having a come-along pull out the detonator carrier when the mooring cable reeves back through the hydrostat and over the mooring pulley. The design, however, is by no means dependable and the mine should always be assumed to be in a dangerous condition if found adrift or on the beach.

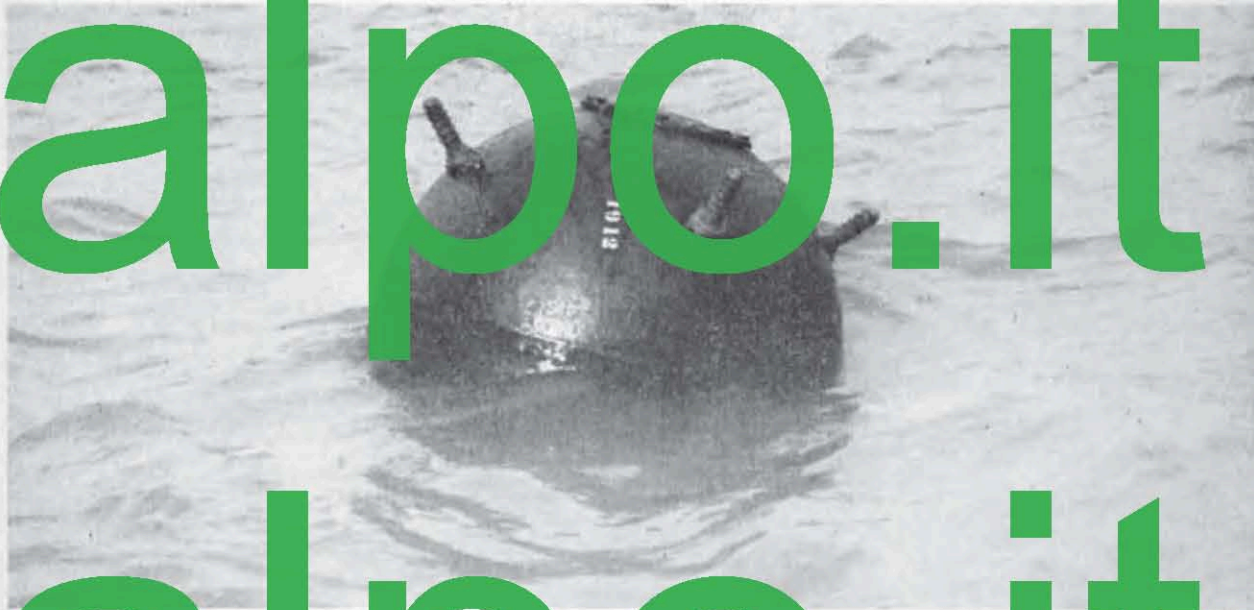


Figure 1. A mine, floating with its mooring cable cut.

Section 3—MINE TYPE JB

This is a moored, contact mine with several variations, but the Japanese designations for all models is "Type 93." Up to the present time Type 93, Model 1; Type 93, Model 2; Type 93, Model 3; Type 93, Model 3, Modification 1; and Type 93, Model 4 are known to have been used.

These mines are laid by surface craft as offensive or defensive mines against submarines or surface craft. The maximum depth of water in which they can be planted is 352 feet; the minimum depth is 10 feet (approximately the maximum draft of the mine case when moored is 246 feet).

With the exception of the Type 93, Model 3, Modification 1, which is described in detail in Section 7, the physical characteristics of the mines are as follows:

Case

Shape—Spherical, 34" in diameter.

Color—Black.

Material—Steel.

Charge—Type 93, Model 1—220 lbs. Type 88 and 20 lbs. Type 88
Type 93, Model 2—explosive
Type 93, Model 3—unknown
Type 93, Model 3, Modification 1—220 lbs. Type I, temporary explosive
Total Weight—184 lbs.

External Fittings

Horns—Type 93, Model 1—Four, electrochemical, 90° apart around the upper hemisphere, spaced alternately 16" and 11" from the top center of the case.

Type 93, Model 2—Same as Model 1 with additional 3 spaced equally around the lower hemisphere.

Type 93, Model 3—Nine, electrochemical, equally spaced on the upper hemisphere and 5 on the lower hemisphere.

Type 93, Model 3, Modification 1—Nine, electrochemical, spaced regularly on the upper hemisphere and 5 on the lower hemisphere.

Cover Plate—Type 93, Model 1—5"25 diameter, in the center of the upper hemisphere. This plate is recessed (Other models believed to be the same).

Lifting Lugs—Type 93, Model 1—Two on the upper hemisphere, 180° apart, 13" from top center of the case, and one on the lower hemisphere, 18" from bottom center of case (Other models believed to be the same.)

Base Plate—Type 93, Model 1—11"75 diameter in center of lower hemisphere (Other models believed to be the same.)

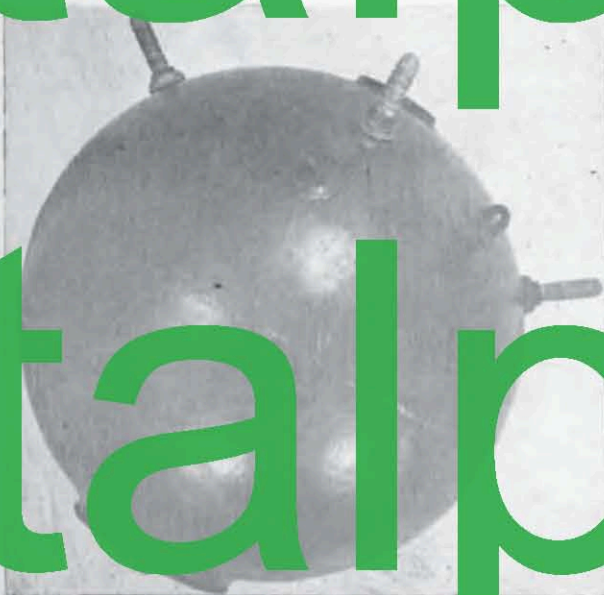


Figure 4—The spherical JB case.

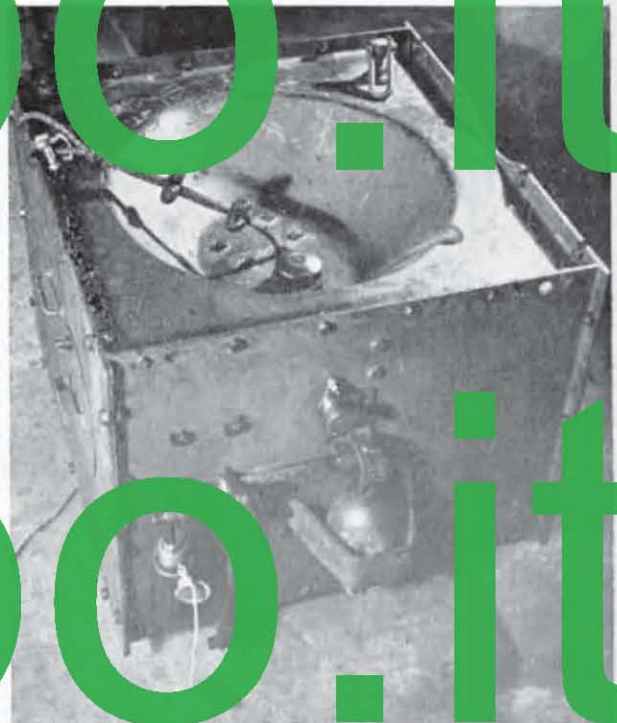
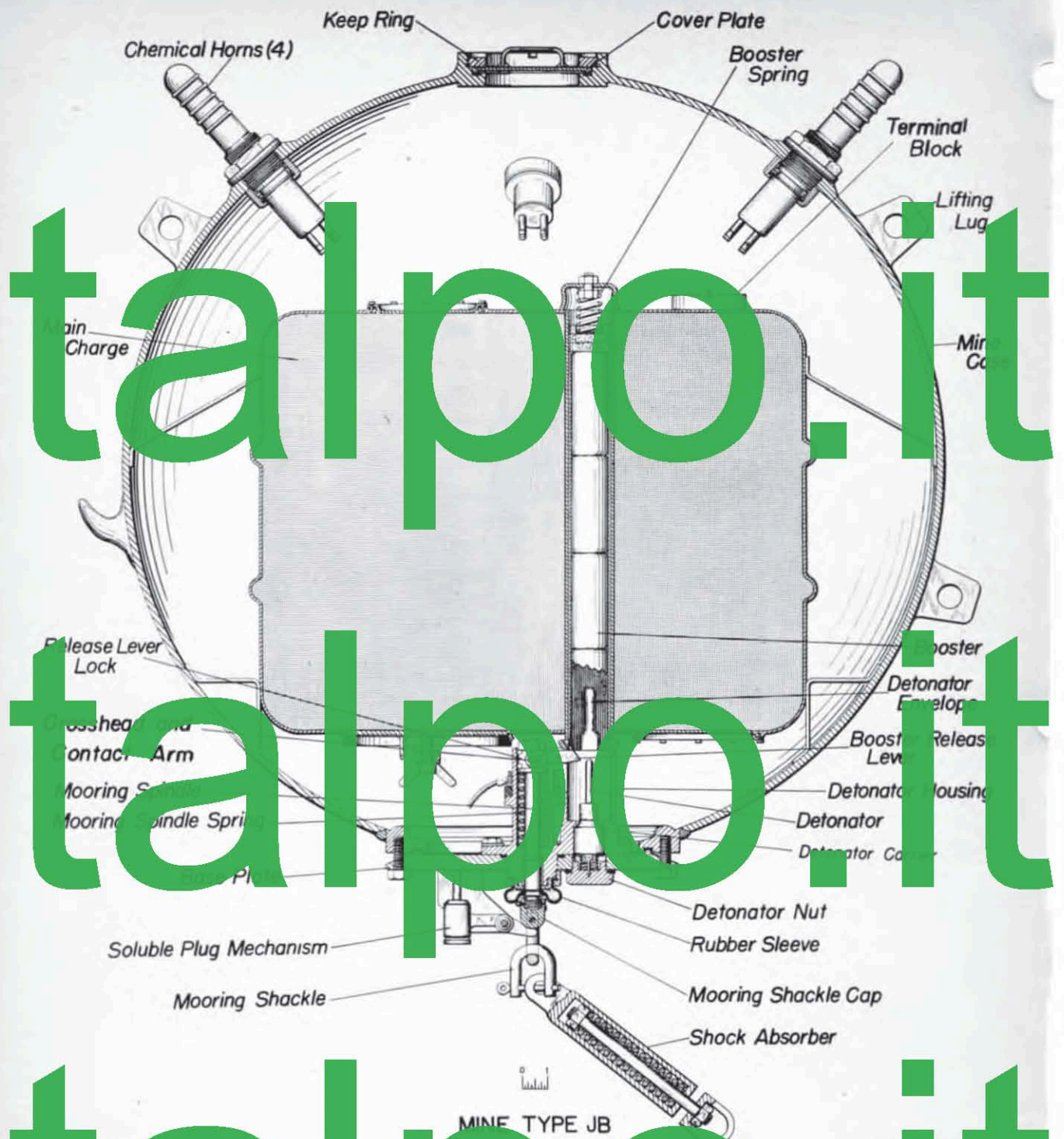


Figure 5—JB mine anchor. The same anchor is suitable for any of the various JB types.



MINE TYPE JB

MD 66

Figure 6—Cross section of MINE TYPE JB mine.

Mooring Spindle and Shackle Type 1, Model 1. Operation
Protruding from the center of the case plate. (The mine is believed to be the same.)
Anchor—1089 lbs. (494 kg) x 33" x 5 1/2"
Cable—10mm (.39") or 15mm (.59") or 260m of 10mm (.39") or 700m of 6mm (.24")

Operation
Shortly after the mine assembly strikes the water upon being, a metal plummet drops away from the anchor, reeling in a plummet cable. It sinks. When the plummet reaches a depth pre-set on the cable drum, the drum locks and the anchor separates from the mine case and sinks, reeling out

mooring cable from a drum. Weight of the plummet holds a spring-loaded pawl from engaging a ratchet on the mooring cable drum. When the plummet touches bottom, release of tension on the plummet cord allows the pawl to engage the ratchet, locking the rotating drum. The mine is then pulled downward and moored at a depth below the surface equal to the length of the plummet. Tension on the mooring spindle in the base plate closes a mooring safety switch and causes the booster charges to detonate, thus arming the mine.

The mine fires when one of the horns is bent sufficiently to break the glass and thereby allowing electrolyte to run into a battery cup and generate sufficient current to fire the detonator.

Safety Precautions

The mooring safety switch is designed to open and disarm the mine when tension is removed from the mooring spindle. This feature, however, is not dependable.

"TYPE 93, MODEL 3, MODIFICATION 1"

A moored, contact mine laid by a surface craft for use as an anti-air or defense weapon against submarines and surface craft. The depth of water in which the mine may be placed and these depths

are the same as Type 93. This mine was first recovered on Djaul Island in the Southwest Pacific.

The general characteristics of the mine are as follows:

Case

Shape—Spherical, 34" in diameter.

Color—Black.

Material—Steel.

Charge—220 lbs. Type 88 explosive.

Total Weight—about 300 lbs.

External Fittings

Horns—Has receptacles for eight, electrochemical, cells regularly placed on the upper hemisphere with one top cover plate, two bosses on the lower hemisphere.

Cover Plate—5 7/8" diameter, in the center of the upper hemisphere.

Lifting Lugs—Two, on the upper hemisphere.

Base Plate—11 7/8" diameter in the center of the lower hemisphere.

Mooring Spindle—Horizontal lever type on the base plate.

Anchor and Cable—Same as "Type 93."

Operation

This mine operates in the same manner as "Type 93" described on the preceding pages.

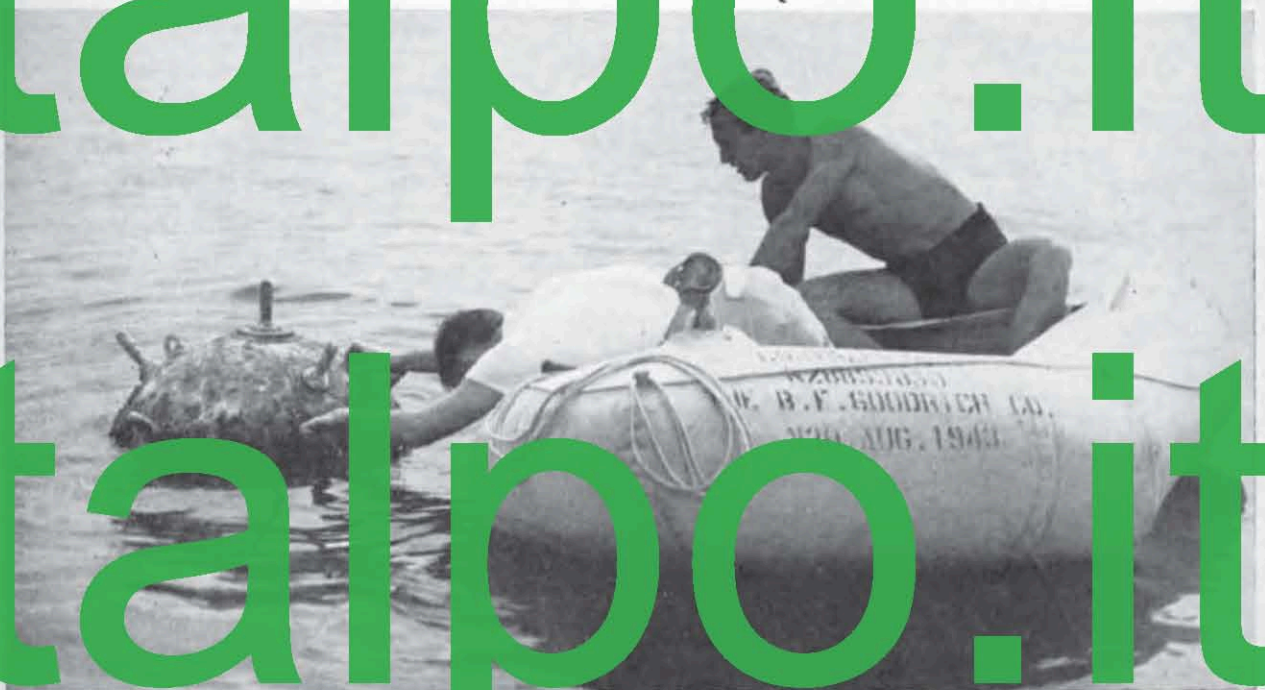


Figure 7—The JB Modification 3 Model 1 floating. Note the horn in the cover plate.

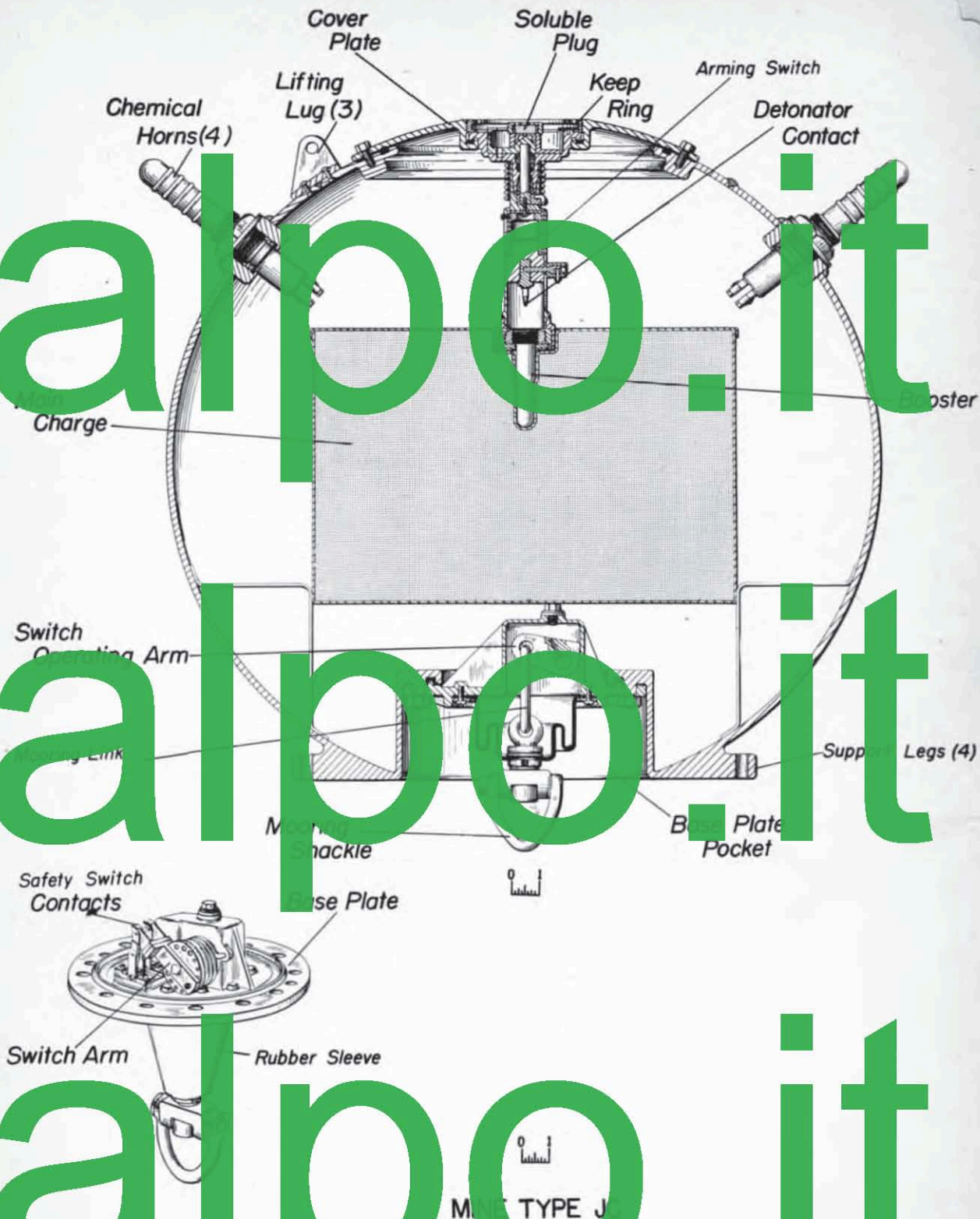


Figure 8—Cross section of the JC mine.

Section 4—MINE TYPE JC

A moored, contact mine laid by surface craft as a defensive weapon against other submarine or surface craft, and designated by the Japanese as Mark 5, Model 1. The maximum depth to which it can be floated is 9 feet. Minimum depth is approximately 55 feet. The maximum depth of the mine when moored is 164 feet. The JC mine and in the Central Pacific has had limited use.

Its design is such as to cause an external detonation follows:

Case

Shape—Spherical, 32 7/8 in diameter.

Color—Black.

Material—Steel.

Charge—182 lbs. block-fitted Shimose.

Total Weight—456 lbs.

External Fittings

Horns—Four, electric chemical, 90° angle, four on the upper hemisphere.

Cover Plate—15 1/2 in diameter, in the center of the upper hemisphere secured by 18 bolts.

Lifting Lugs—Three, equally spaced around the upper hemisphere, the edge of the cover plate.

Base Plate—10 7/8 in diameter in the center of the lower hemisphere.

Support Legs—Four, equally spaced around the lower hemisphere near the base-plate pocket.

Anchor—Not recovered.

Mooring Cable—525' of 0 7/32 in diameter cable.

Operation

Details of neither the anchor nor the detaching mechanism are known. Shortly after the

mine is launched, however, two switches close to arm it. First, tension on the mooring cable closes the mooring safety switch; second, dissolution of a soluble plug allows a spring-loaded arm to close in the cover plate. The mine is then armed. The mine fires when one of the horns is bent sufficiently to break its glass vial, allowing an electrolyte to run into a battery cup and form a small cell. The resultant current fires the detonator.

Safety Precautions

The mooring safety switch is designed to open and disarm the mine when tension is released from the mooring spindle. This feature, however, is not dependable.



Figure 2—Mine type JC

Section 5—MINE TYPE JD

Two types of this mine are known to exist, both designated by the Japanese as "Mark 2 Explosive Hook." Only the "Mark 2 Explosive Hook, Modification 1" has been recovered. The "Mark 2 Explosive Hook" has been reported from several sources.

The intended use of the JD is an explosive mine for minesweeping. It has been used, however, as a controlled buoy mine. When used as a mine it is towed behind a ship and when it snags a mine mooring line, the Explosive Hook is fired electrically from the ship. When used as a controlled mine it is planted on beaches and approaches to beaches and is fired electrically from an observation post.

General characteristics of the mine are as follows:

Case

Shape—Cylindrical, 8" in diameter, with rounded ends. Eight projecting grabels are attached with a maximum space of 11" and a towing bracket on each end.

Length—Diameter all 30".

Color—Gray.

Material—Steel.

Charge—Type 88 explosive, 28 to 39 lbs.

Total Weight—28 to 39 lbs.

External Fittings

Detonator Carrier—1 7/8 in diameter in the middle of the body.

Filling Holes—One on each end, 2 7/8 in diameter.

Pad Eye—One, on the top center line next to the detonator-carrier keep ring.

Towing Swivel—Two, one attached to each towing bracket.

Operation

This mine is armed during assembly. When used as a mine, a steel wire serves as a towing cable and a rubber cable is maintained by a pendant. The mine is electrically connected to the

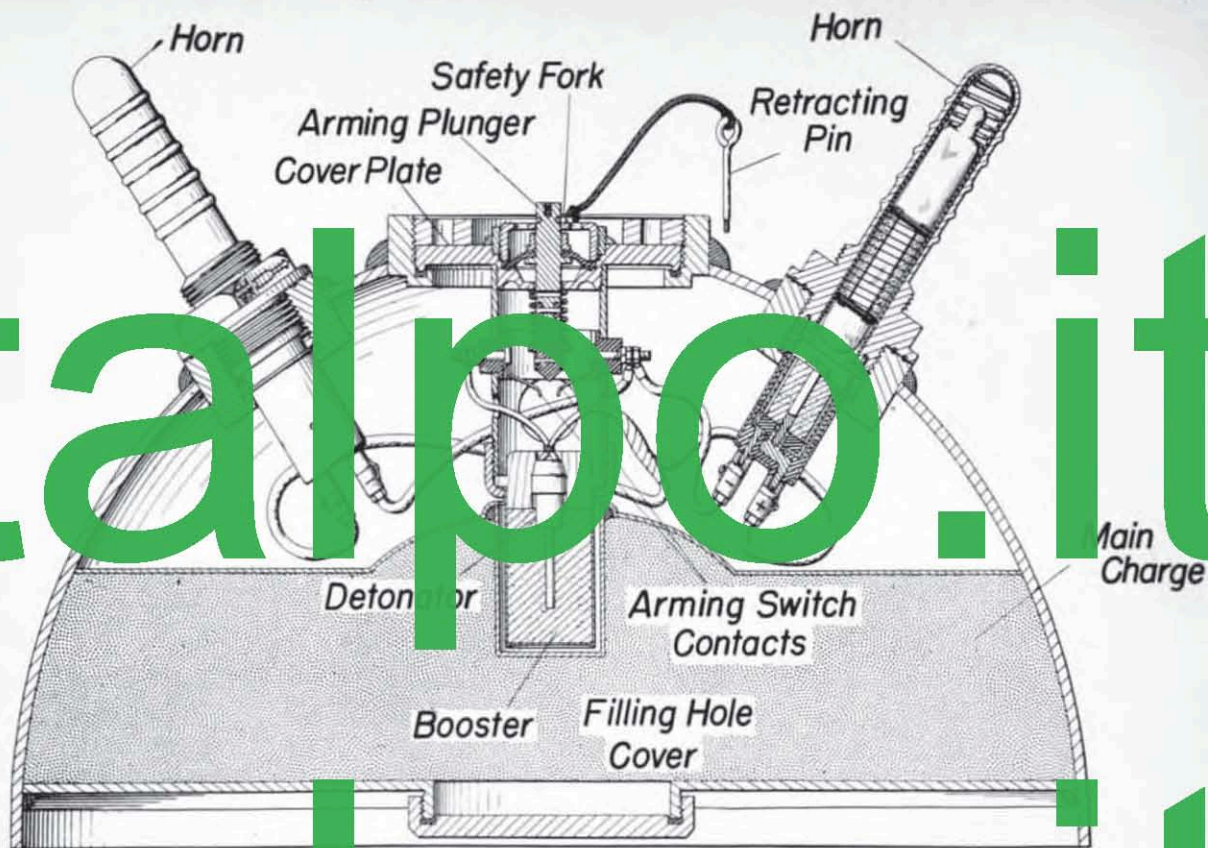
towing ship by a rubber covered cable stopped off on the towing cable. When an object is cleared, an observer on the towing boat fires the charge electrically. The only difference between the Mark Modification 1 and Mark 2 is that the latter is fired both electrically and automatically when an additional tension of 55 lbs is put on the mine.

Safety Precautions

Neither type has any disarming features.



Figure 11—View of Type JD "the explosive book."



MINE TYPE JE
Figure 13—A cross section of mine Type JE.

MD-3

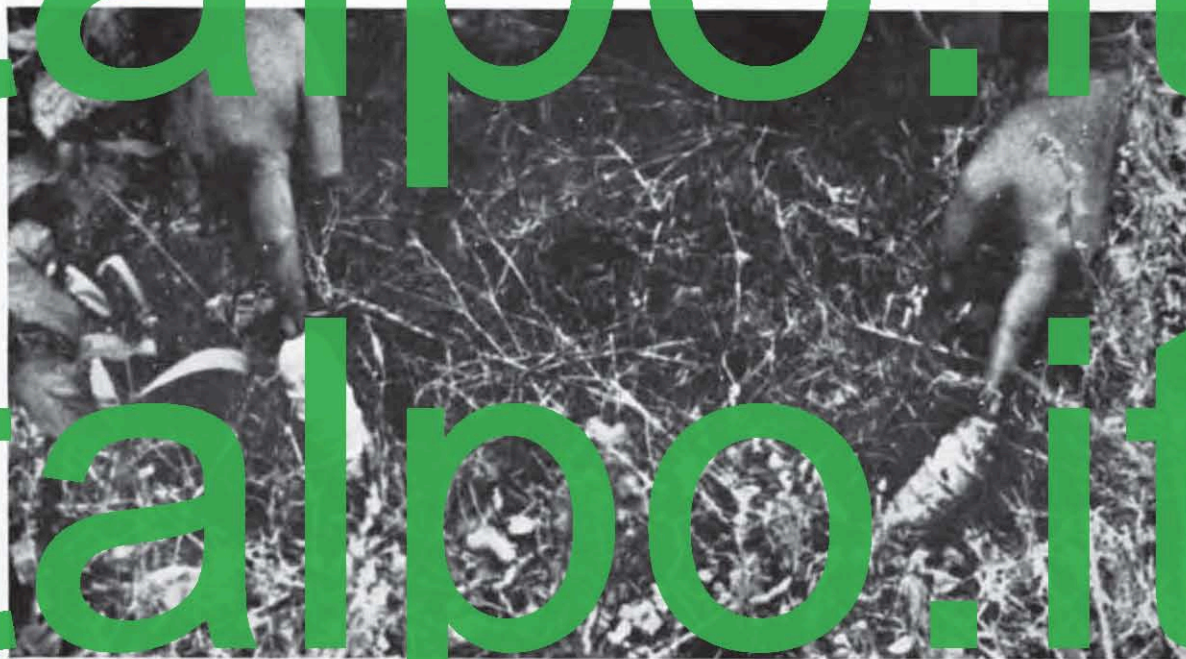


Figure 13—The JE is often placed as a land mine, as well as for beach defenses.

Section 6—MINE TYPE JE

A manually laid hemispherical, contact mine used both on beaches and on land, and designated by the Japanese as "Small Mine, Model 1." Two electrochemical horns protrude from the mine case; sometimes a strip wire may be attached to the horns.

Extensive use has been made of the JE in shallow water approaches to beaches and on reefs on beaches above the high-water mark and along roads and landing strips of air fields.

The characteristics of the mine are as follows:

Case

Shape—Hemispherical, 20 $\frac{1}{2}$ in diameter and 10 $\frac{1}{2}$ in high.

Color—Black.

Material—Steel.

Charge—44 lbs. of cast TNT 98 explosive.

Total Weight—110 lbs.

External Fittings

Horns—Two, electrochemical, 18 $\frac{1}{2}$ in apart and 5 $\frac{1}{2}$ in from the top center of the case.

Cover Plug—3 $\frac{1}{2}$ in diameter, in the top center of the case.

Arming Plunger—2 $\frac{1}{4}$ in diameter, spring loaded, the top of the cover plug. The plunger is grooved and is held up by a safety fork.

Carrying Handles—Two, 180° apart, 90° from the horns and 7 $\frac{1}{2}$ in from the center of the case.

Filling Hole Cover—3 $\frac{1}{2}$ in diameter, in the center of the base.

Operation

The detonator is housed in the booster when the mine is assembled. The mine, however, is not armed until the safety fork is removed from the

arming plunger which moves down under spring pressure and bridges the contacts in the arming switch in the firing circuit.

The mine fires when one of the horns is bent sufficiently to break its glass vial, allowing the electrolyte to run into the battery cup and form a cell. The resulting current fires the detonator.

Safety Precautions

The mine contains no self-disarming device. It has been found with the horns wired so that when the arming plunger is down it shunts out the detonator, and retracting the plunger arms instead of disarms the mine.

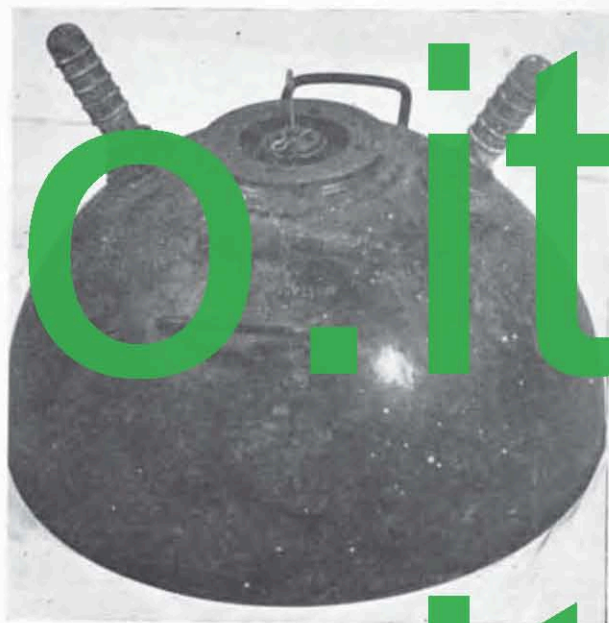


Figure 14—The JE mine. Note the safety fork in place.



Figure 15—Mine Type JE.

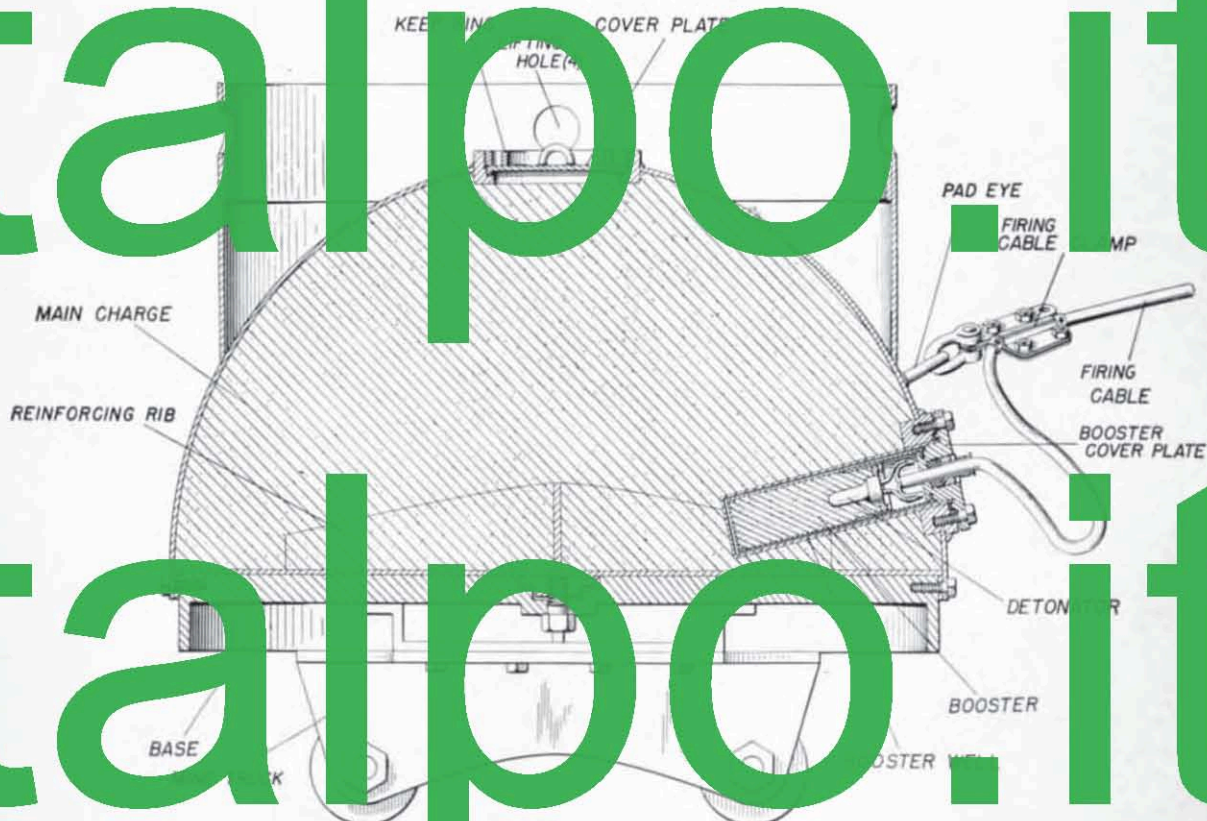


Figure —Cross section of mine Type JF.

Section 9—TORPEDO TYPE 93

A 24" torpedo powered by a two-cylinder double-acting reciprocating steam engine and launched from destroyers and cruisers. The use of oxygen in place of compressed air eliminates practically all bubbles, giving the torpedo a nearly invisible trail. This gives the torpedo a high speed and long range. Only one type of this torpedo, designated by the Japanese as Type 93, Model 1, Modification 1, has been reported to date.

The physical characteristics of the torpedo are as follows:

Description

Length Overall—29'6".

Length of Warhead—4'7".

Length of Airflask—18'1".

Length of Afterbody—6'10".
(Including Tail)

Diameter—24".

Total Weight—6000–6500 lbs.

Charge—1080 lbs. Type 97 explosive.

Tail Fins—4.

Operation

As the torpedo travels through the water, pressure compresses the air on the exploded ramjet, which, via a trigger, rotates the impeller. This causes the exploded ramjet to impact with the target. The exploded ramjet places the trigger in a position which, driven downward under spring pressure, strikes the detonator, firing the charge.

Safety Precautions

Should this torpedo be found in shallow water or on the beach, it must be considered dangerous. Movement of the torpedo might actuate the exploder, firing the charge.



Figure 1—This 24" destroyer or cruiser launched torpedo is one of the largest underwater ordnance items used by the Japanese. It is powered by oxygen instead of compressed air and is able to travel with practically no visible wake.

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