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ORDNANCE PAMPHLET 1507

JAPANESE UNDERWATER ORDNANCE



A BUREAU OF ORDNANCE PUBLICATION

20 APRIL 1945

EugeneLeeSlover.com

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NAVY DEPARTMENT
BUREAU OF ORDNANCE
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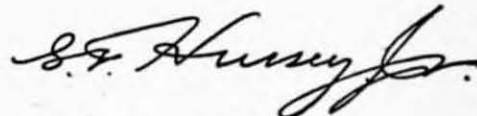
JAPANESE UNDERWATER ORDNANCE

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. These 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.

4. This publication is RESTRICTED and shall be safeguarded in accordance with the security provisions of the U. S. Navy Regulations, 1920, Article 76.



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

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JAPANESE MINES

TYPE	JAP DESIGNATION	DIAMETER	HEIGHT	CHARGE	METHOD OF FIRING	DESCRIBED ON PAGE
JA	Type 88, Modif. 1	33".9	45"8	396#	4 chemical horns	3
JB	Type 93, Model 1	34"	34"	220#	4 chemical horns	5
JB	Type 93, Model 2	34"	34"	220#	7 chemical horns	5
JB	Type 93, Model 3	34"	34"	220#	9 chemical horns	5
JB	Type 93, Model 3, Modif. 1	34"	34"	220#	8 chemical horns	7
JB	Type 93, Model 4	34"	34"	220#	9 chemical horns	5
JC	Mark 5, Modif. 1	32"7	32"7	182#	4 chemical horns	9
JD	Mark 2, Explosive Hook, Modif. 1	8"	10"	8-19#	Electric control	11
JD	Mark 2, Explosive Hook	8"	10"	8-19#	Electric control and tension	11
JE	Small Type Mine Model 1	20"5 Hemisphere	10"5	44#	2 chemical horns	13
JF	Type 94, Model 2	28"4	25"6	190#	Electric control	15
JG	Small Type Mine Model 2	14"5 Truncated cone	10"25	22#	1 chemical horn	17
JH	Mark 6, Model 1	41"4	41"4	478#	4 chemical horns	19
JH	Mark 6, Model 2, Modif. 1	41"4	41"4	440#	4 chemical horns	19
JI	K-2	14"	6'1"	123#	4 switch horns	21
JJ	Unknown	24"	52"5	Unknown	4 chemical horns	23
Apri-cot (Net Mine)	Type 96	20"1	27"2	121#	300# or more tension	24
Grape-fruit	Type 96, Modif. 1	20"1	27"2	132#	300# or more tension	24
Avo-cado	Unknown	32"5	32"5	170#	Pendulum-im-pact-inertia	24
Banana	Unknown	33"5	33"5	275#	4 chemical horns	24
Pear	Type 3, Mark 6	35"5	45"5	440#	4 chemical horns	25
Plum	Type 3, Mark 1, Aerial Mine Model 1	Un-known	Un-known	Un-known	Unknown	25
Pome-gran-ate	Unknown	41"	41"	Un-known	6 chemical horns	25
Quince	Type 92	Unknown	48"9	1100#	Electric control	26

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.

An identified mine carries a two-letter designation. NAVORD OCLM21-44 dated 8 September 1944 states that the first letters shall in all cases 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 the assignment of fruit names to those mines which have not been recovered but are known to exist only through evidence such as captured documents and Prisoner-of-War testimony.

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:

Shimose—Composed of almost pure pieric acid. It is used in a cast form in main charges and has a lemon-yellow coloring. It may also be used as a booster charge in a granular or pressed form. Shimose melts at a temperature of 122° to 123° C. Because of impurities which form pierate compounds, Shimose may detonate on rapid heating. It is slightly more powerful than TNT.

Type 88—Composed of ammonium perchlorate

75%, ferro-silicon 16%, powdered wood 6% and crude oil 3%. It is used in a granular form in main charges, and has a dark grey coloring. The 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 compares 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 Pierate 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 "oily" odor. It does not melt on heating, but detonates at a temperature of about 300° C. Jap reports indicate that it compares in power with Torpex 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 gun-fire 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 bend or damage any horns.

Do not move or jar the mine except from a safe distance.

Do not take a strain on any lines or cables which may be attached externally to the case.

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

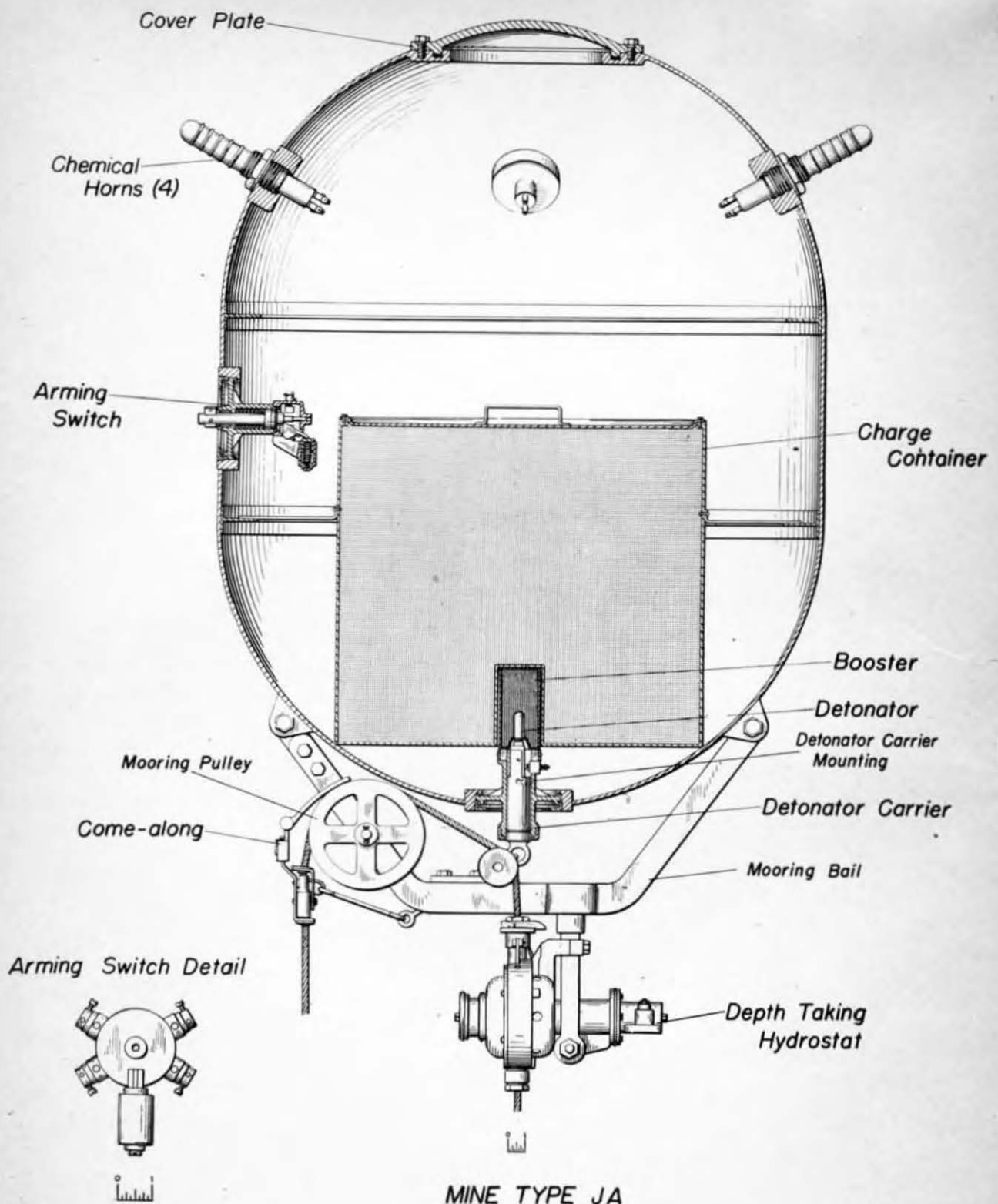


Figure 1—Cross-sectional drawing of mine Type JA.

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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 Japanese designate it as Type 88, Modification 1.

The mine may be laid in water with a maximum depth of approximately 1476 feet; the case depth can be set to a maximum of 66 feet. Japanese documents state that the minimum spacing between mines is 160 feet.

The physical characteristics of the mine are as follows:

Case

Shape—Two hemispheres, 33"9 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"75 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 pan 17" deep.

Arming Switch Housing—5" in diameter, on the mid-section, 2"75 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"75 from the top center.

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



Figure 2—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—1476' of 8 mm diameter (0"31) cable, with 492' of 2 mm diameter (0"078) tail rope attached to bitter end on cable drum.

Operation

The detonator is manually housed in the booster prior to laying. Upon being launched from a submarine, the assembled 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 horns is bent sufficiently to 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 JA 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 3—JA 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 weapons against submarines or surface craft. The maximum depth of water in which they can be planted is 3527 feet; the minimum depth is 25 feet (approx.). The maximum depth 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 on page 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—

and 220 lbs. Type 88

Type 93, Model 2— explosive.

Type 93, Model 3—Unknown.

Type 93, Model 4—220 lbs. Type I,

Temporary explosive.

Total Weight—484 lbs.

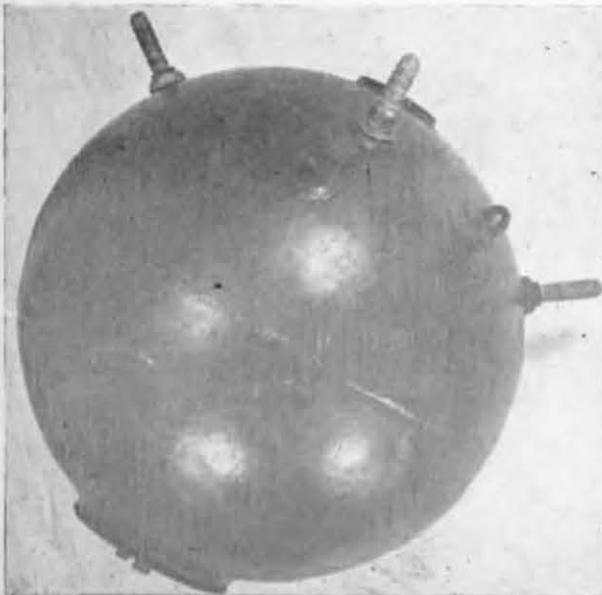


Figure 4—The spherical JB mine.

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 an additional 3 spaced equally around the lower hemisphere.

Type 93, Model 3—Nine, electro-chemical; 4 equally spaced on the upper hemisphere, and 5 on bosses equally spaced on the lower hemisphere.

Type 93, Model 4—Nine, electrochemical; 6 spaced irregularly on the upper hemisphere and 3 on bosses 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.)

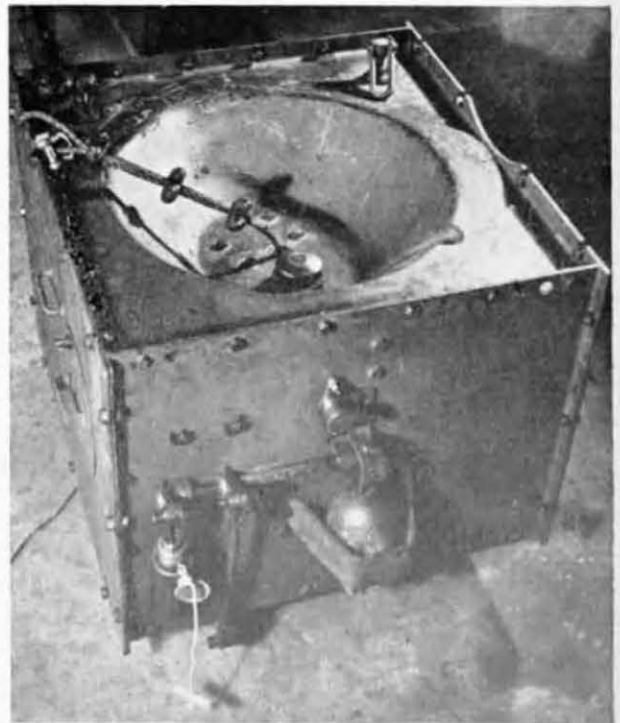


Figure 5—JB mine anchor. The same anchor is suitable for any of the various JB types.

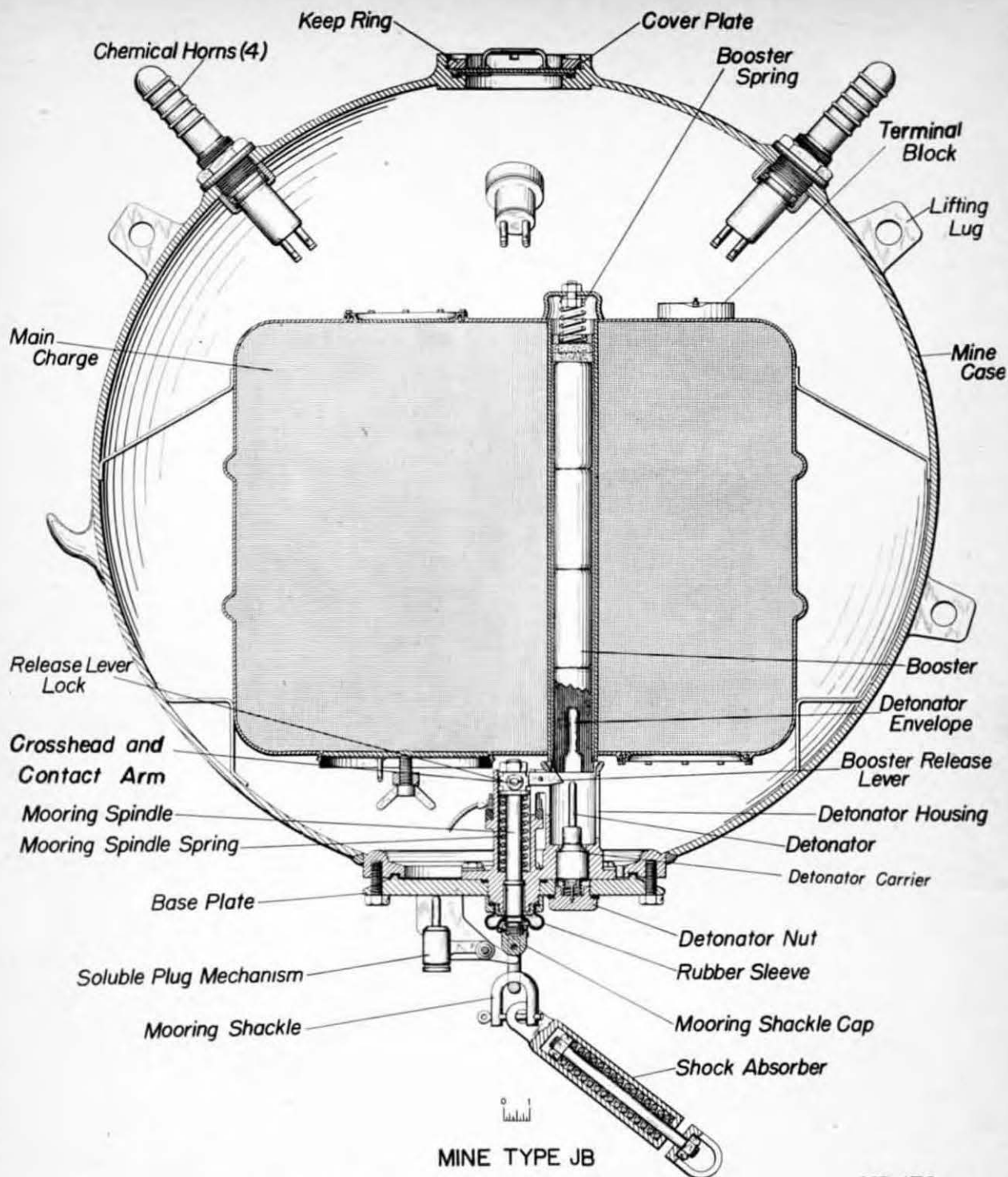


Figure 6—A cross section of the JB mine.

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Mooring Spindle and Shackle—Type 93, Model 1—Protruding from the center of the base plate (Other models believed to be the same.)

Anchor—1089 lbs., 33" x 33" x 35"

Cable—155m of 13mm (.51") or
260m of 10mm (.39") or
700m of 6mm (.24")

Operation

Shortly after the mine assembly strikes the water upon laying, a metal plummet drops away from the anchor reeling out a plummet cable as 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 moors at a depth below the surface equal to the length of the plummet cord. Tension on the mooring spindle in the mine base plate closes a mooring safety switch and houses the booster charge over the detonator, thus arming the mine.

The mine fires when one of the horns is bent sufficiently to break its glass vial 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 either as an offensive or defensive weapon against submarines and surface craft. The depths of water in which the mine may be planted and case 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—500 lbs.

External Fittings

Horns—Has receptacles for eight, electrochemical, 6 irregularly spaced on the upper hemisphere with one on the top cover plate, two on bosses on the lower hemisphere.

Cover Plate—5"25 diameter, in the center of the upper hemisphere.

Lifting Lugs—Two, on the upper hemisphere.

Base Plate—11"75 diameter in the center of the lower hemisphere.

Mooring Spindle—Horizontal lever type on the base plate.

Anchor and Cable—Same as "Type 93."

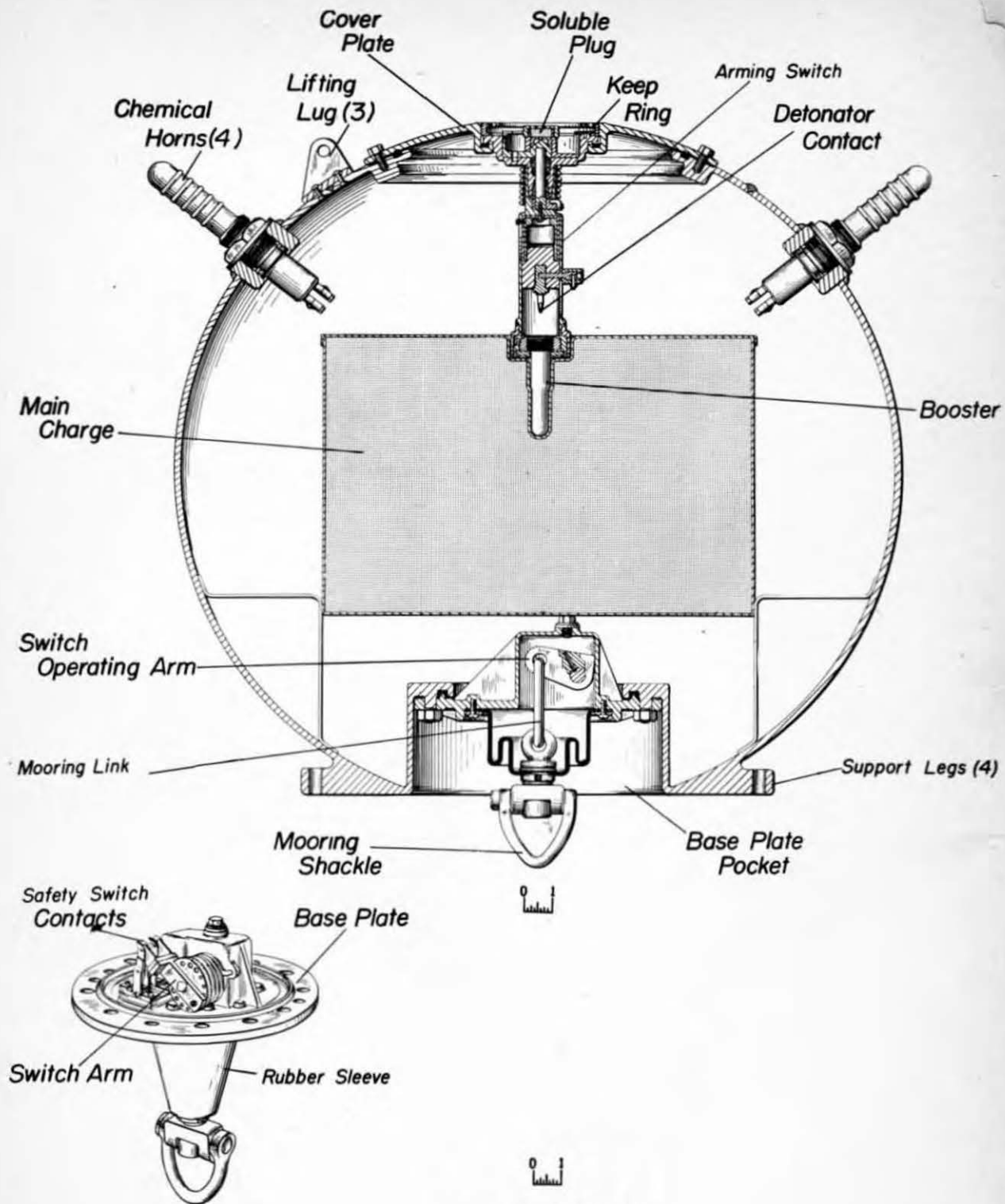
Operation

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.

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MINE TYPE JC

Figure 8—Cross section of the JC mine.

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Section 4—MINE TYPE JC

A moored, contact mine laid by surface craft as a defensive weapon against either submarine or surface craft, and designated by the Japanese as "Mark 5, Modification 1." The maximum depth in which it can be planted is 689 feet; minimum depth is approximately 55 feet. The maximum depth of the mine case when moored is 164 feet. The JC, found in the Central Pacific, has had limited use.

A description of the case and external fittings follows:

Case

Shape—Spherical, 32" in diameter.

Color—Black.

Material—Steel.

Charge—182 lbs. block-fitted Shimose.

Total Weight—456 lbs.

External Fittings

Horns—Four, electrochemical, 90° apart around the upper hemisphere.

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

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

Base Plate—10" 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"35 diameter cable.

Operation

Details of neither the anchor nor the depth-taking mechanism are known. Shortly after the

mine is launched, however, two switches close to arm it. First, tension on the mooring spindle closes the mooring safety switch; second, dissolution of a soluble plug allows a spring-loaded arming switch in the cover plate to close. The mine is then armed.

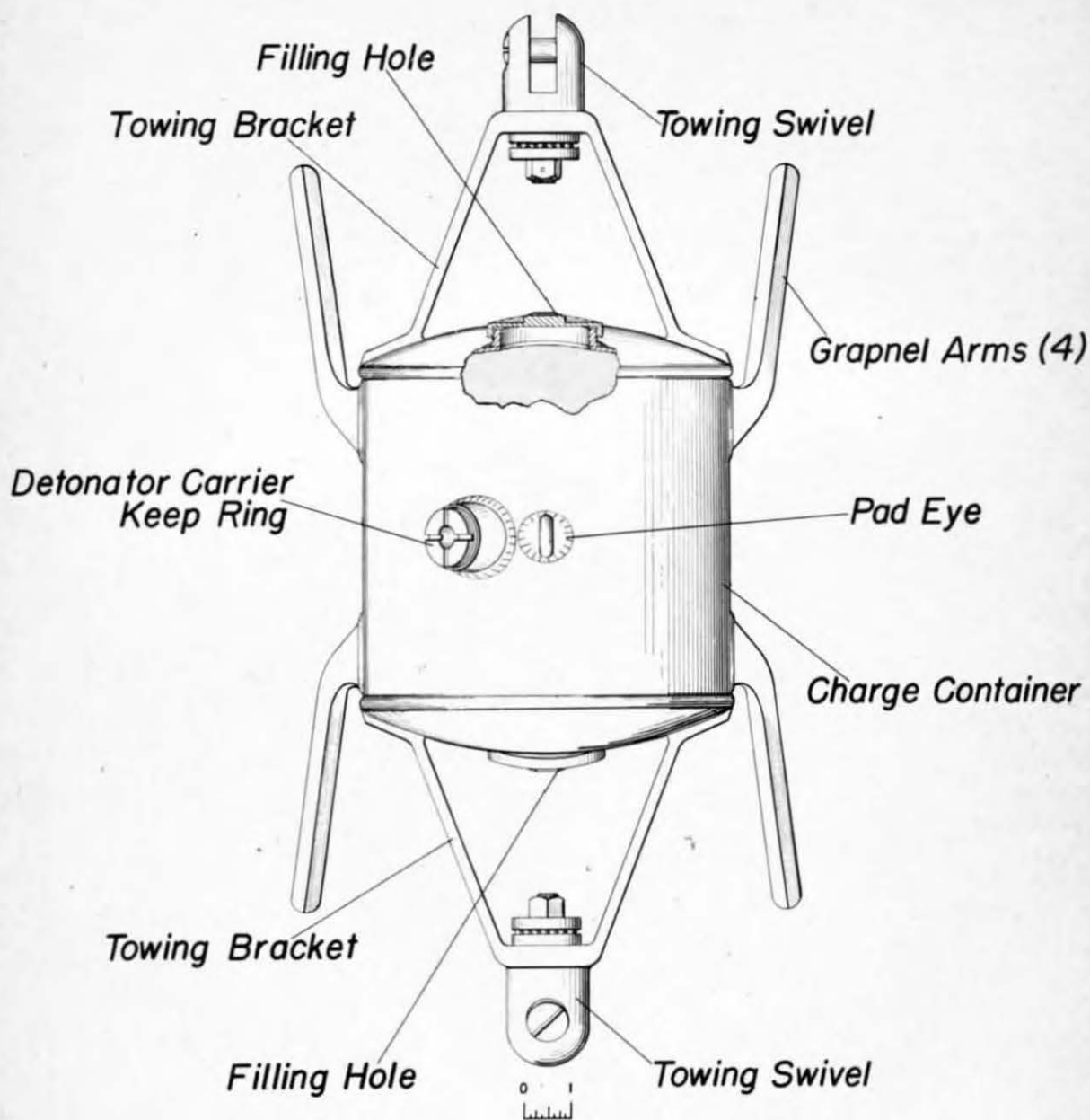
The mine fires when one of the horns is bent sufficiently to break its glass vial, allowing an electrolyte to run into a battery cup and form a small cell. The resultant current fires the detonator.

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 9—Mine type JC.



MINE TYPE JD

MD-174

Figure 10—Mine type JD.

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 intelligence sources.

The intended use of the JD is an explosive grapnel for minesweeping. It has been used, however, as a controlled beach mine. When used as a grapnel it is towed behind a ship, and when it snags a mine mooring cable, 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. Fitted with 4 projecting grapnel arms with a maximum span of 11'5, and a towing bracket on each end.

Length—Body 10"; Overall 25".

Color—Gray.

Material—Steel.

Charge—8 to 19 lbs. cast Shimose, or granular Type 88 explosive.

Total Weight—28 to 39 lbs.

External Fittings

Detonator Carrier—1'5 in diameter in the middle of the body.

Filling Holes—One on each end, 2'5 in diameter.

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

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

Operation

This mine is armed during assembly. When used as a grapnel, a sweep wire serves as a towing cable and proper depth is maintained by suspending the mine from a minesweeping float on a float pendant. The mine is electrically connected to the

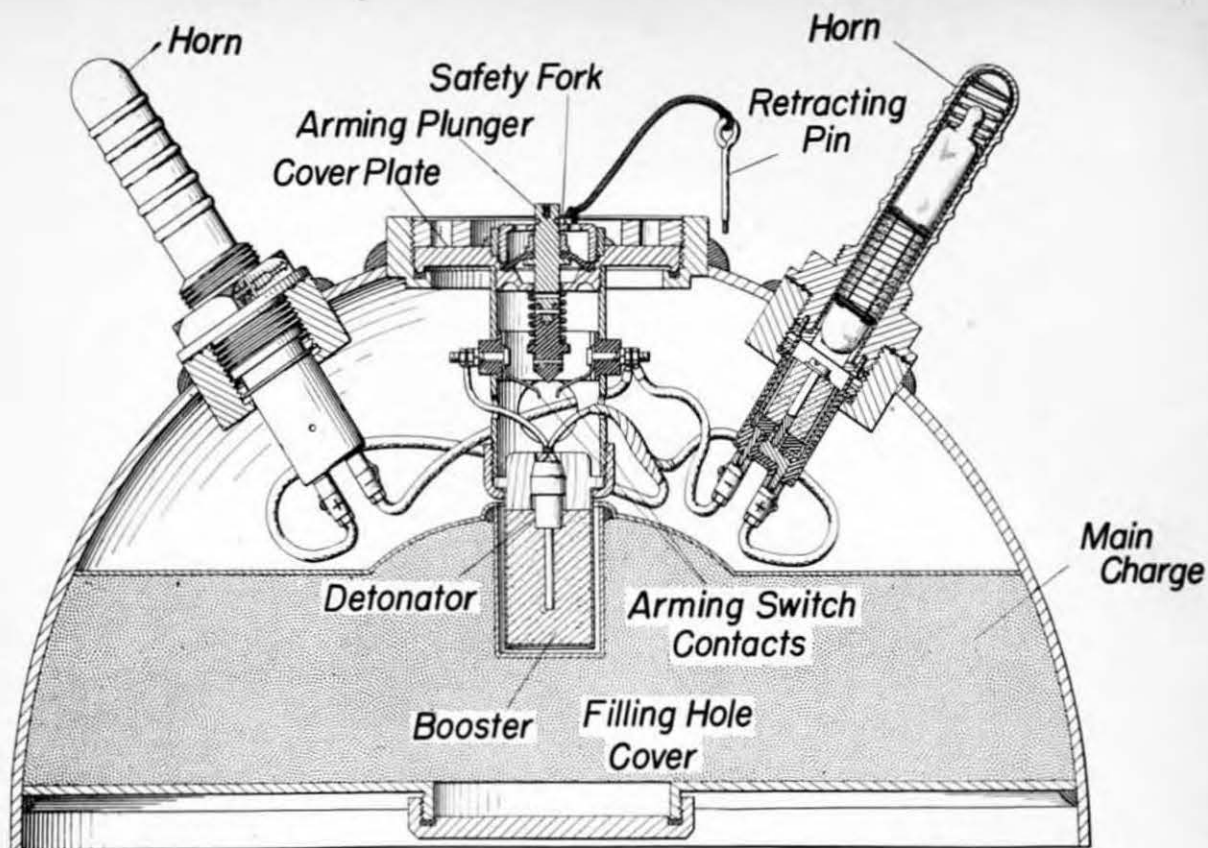
towing ship by a rubber covered cable stopped off on the towing cable. When an object is snared, an observer on the towing boat fires the charge electrically. The only difference between the Mark 2, Modification 1 and Mark 2 is that the latter fires both electrically and automatically when an additional 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 hook."



MINE TYPE JE

MD-93

Figure 12—A cross section of mine Type JE.



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 Type Mine, Model 1." Two electrochemical horns protrude from the mine case; snag lines and trip wires 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" in diameter and 10" high.

Color—Black.

Material—Steel.

Charge—44 lbs. of cast Type 98 explosive.

Total Weight—110 lbs.

External Fittings

Horns—Two, electrochemical, 180° apart and 5" from the top center of the case.

Cover Plate—5" in diameter, in the top center of the case.

Arming Plunger—0"45 in diameter, spring-loaded, in the center of the cover plate. The plunger is grooved and is held up by a safety fork.

Carrying Handles—Two, 180° apart, 90° from the horns and 7" from the center of the case.

Filling Hole Cover—3" 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 of 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 a battery cup and form a small cell. The resultant current fires the detonator.

Safety Precautions

The mine contains no self-disarming devices. 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.

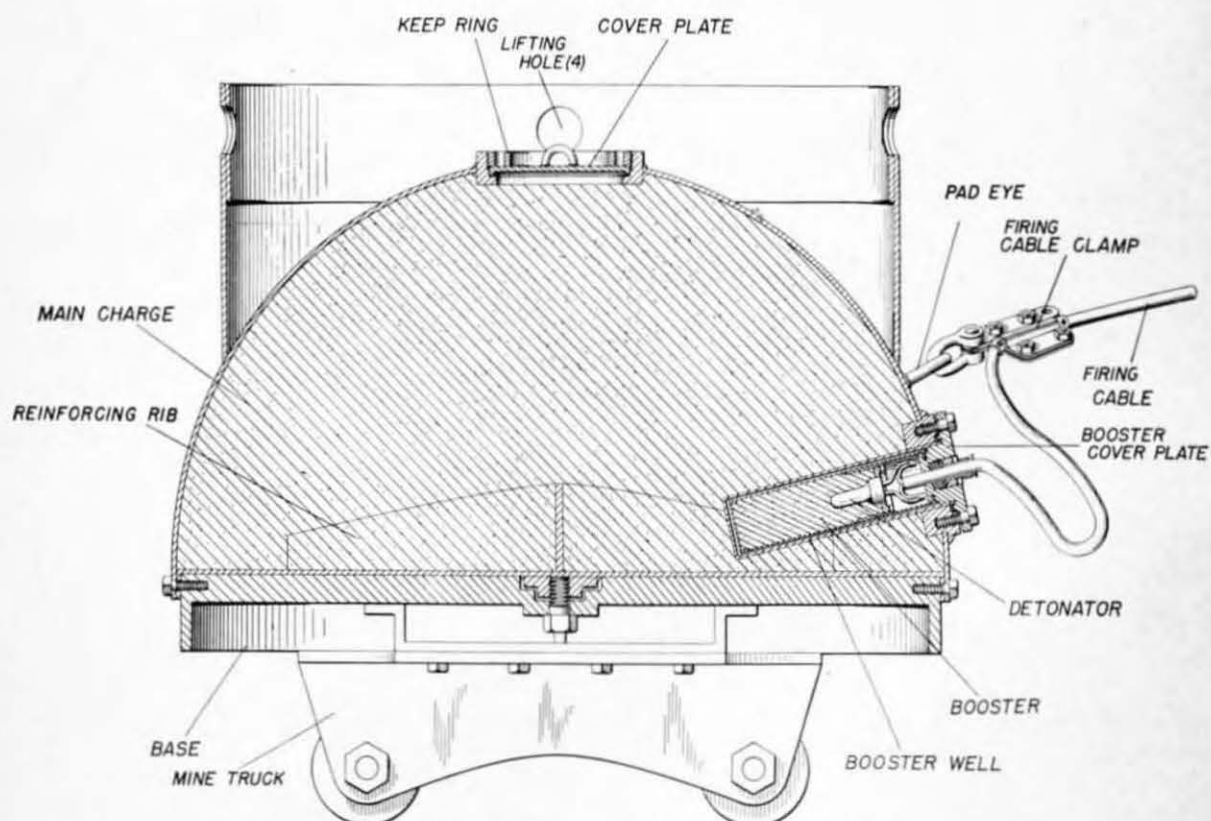


Figure 16—Cross section of mine Type JF.

Section 7—MINE TYPE JF

A controlled, ground mine designated by the Japanese as "Type 94, Model 2." It is used defensively and laid from surface craft in harbors or harbor entrances and controlled from observation posts on the shore. It was used, however, on Adak, Alaska, as a controlled land mine. It may also be used as a controlled mine planted in shallow water approaches to beaches.

General characteristics of the mine are as follows:

Case

Shape—Hemispherical, 28" in diameter, 25" high, with a steel skirt 9" high and 24" in diameter, welded around the top. The mine is bolted to a four-wheeled cast-iron anchor truck.

Color—Black.

Material—Steel.

Charge—190 lbs. (approximately) granular Type 88 explosive.

Total Weight—580 lbs. (approximately).

External Fittings

Booster Cover Plate—4" in diameter, on side of case, 3" below edge of skirt, secured by six bolts.

The firing cable enters through a stuffing box in the center of this plate.

External Fittings

Lifting Holes—Four, 1 1/2 in diameter, on the skirt, 90° apart and 1" below the top.

Cover Plate—5 1/2 in diameter in the top center of the case.

Pad Eye—One, on the case, 13" below the upper edge of the skirt.

Cable Clamp—Shackled to the pad eye. This prevents strain on the cable from being transmitted to the detonator.

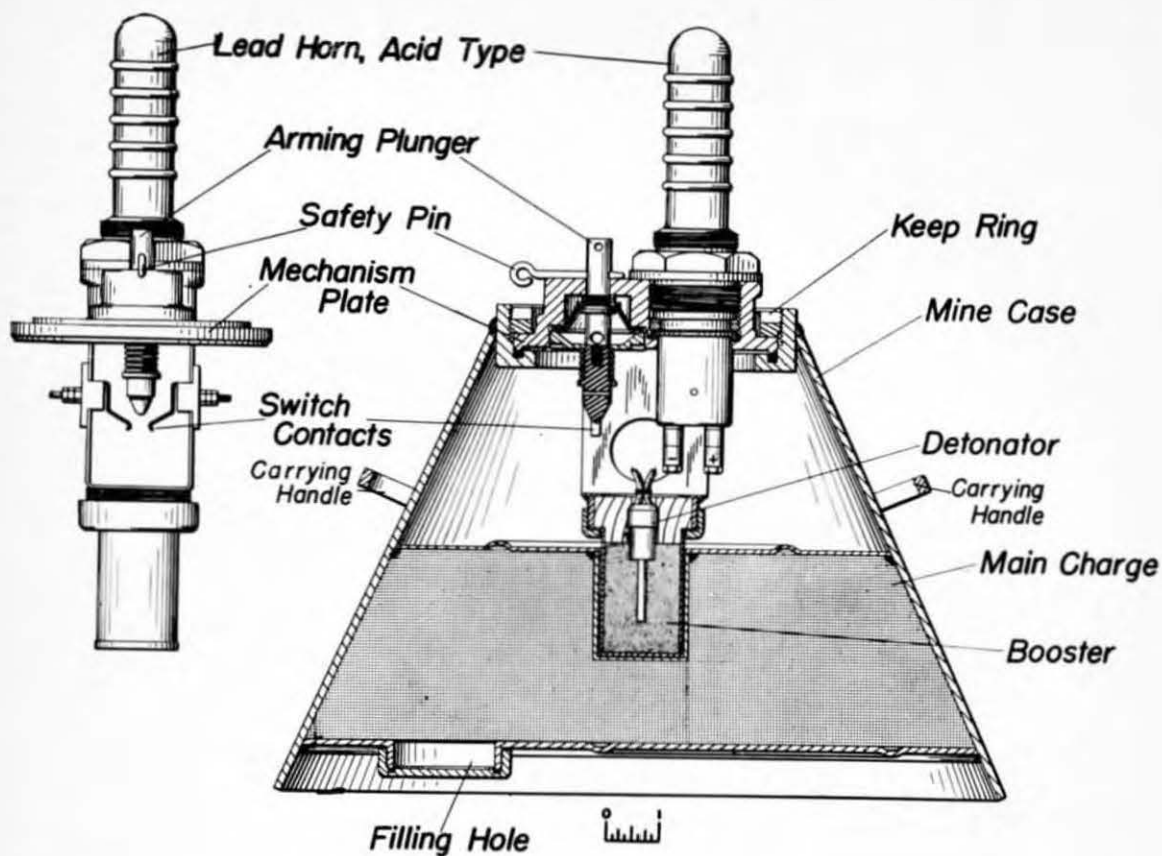
Mine Anchor Truck—Rectangular, cast iron, fitted with four wheels.

Operation

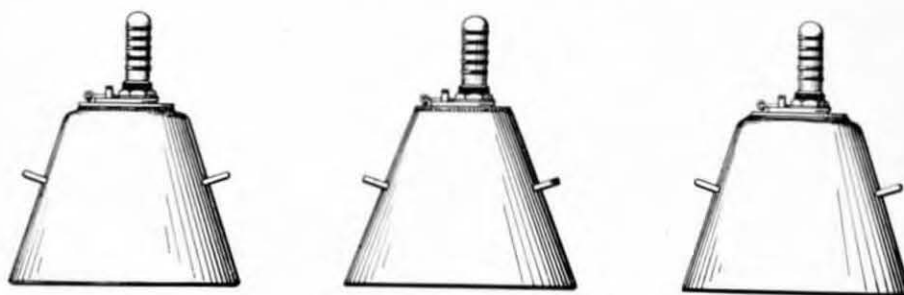
The detonator is housed in the booster during assembly, and, when laid, a rubber-covered firing cable connects the mine with an observation post on the shore. The mine is fired electrically by an observer.

Safety Precautions

The mine contains no self-disarming features. When used as a land mine, it is likely to be buried with other explosives.



MINE TYPE JG



VARIOUS SHAPE MINE CASES FOR MINE TYPE JG



Figure 17—Cross section of mine type JG. Note the various shapes of the mine cases.

MD-172

Section 8—MINE TYPE JG

A contact beach mine designated by the Japanese as "Small Type Mine, Model 2." A single electrochemical horn protrudes from the top of the mine case, and snag lines and trip wires may be attached to the horn. This mine has generally replaced the JE as a beach and land mine. It will be found 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.

A general description of the mine is as follows:

Case

Shape—Truncated cone 14"5 in diameter at base and 7" in diameter at top.

Height—Case only, 10"25; case with horn, 14"6.

Charge—22 lbs. (approx.) cast Type 98 explosive.

Weight—52.5 to 62.5 lbs.



Figure 18—Mine type JG.

External Fittings

Horn—One, electrochemical, on the cover plate, slightly off center.

Cover Plate—5"2 in diameter in the top center of the case.

Filling Hole Cover—3"25 in diameter, in the base.

Arming Plunger—0"5 in diameter, on the cover plate beside the horn. It contains two 0"2 diameter safety-pin holes.

Carrying Handles—Two, 180° apart and 4" below the top of the case.

Operation

The detonator is housed in the booster when the mine is assembled. When planted, a safety pin is manually withdrawn from the arming plunger, and the plunger moves down under spring pressure and bridges the arming switch contacts in the firing circuit. This arms the mine.

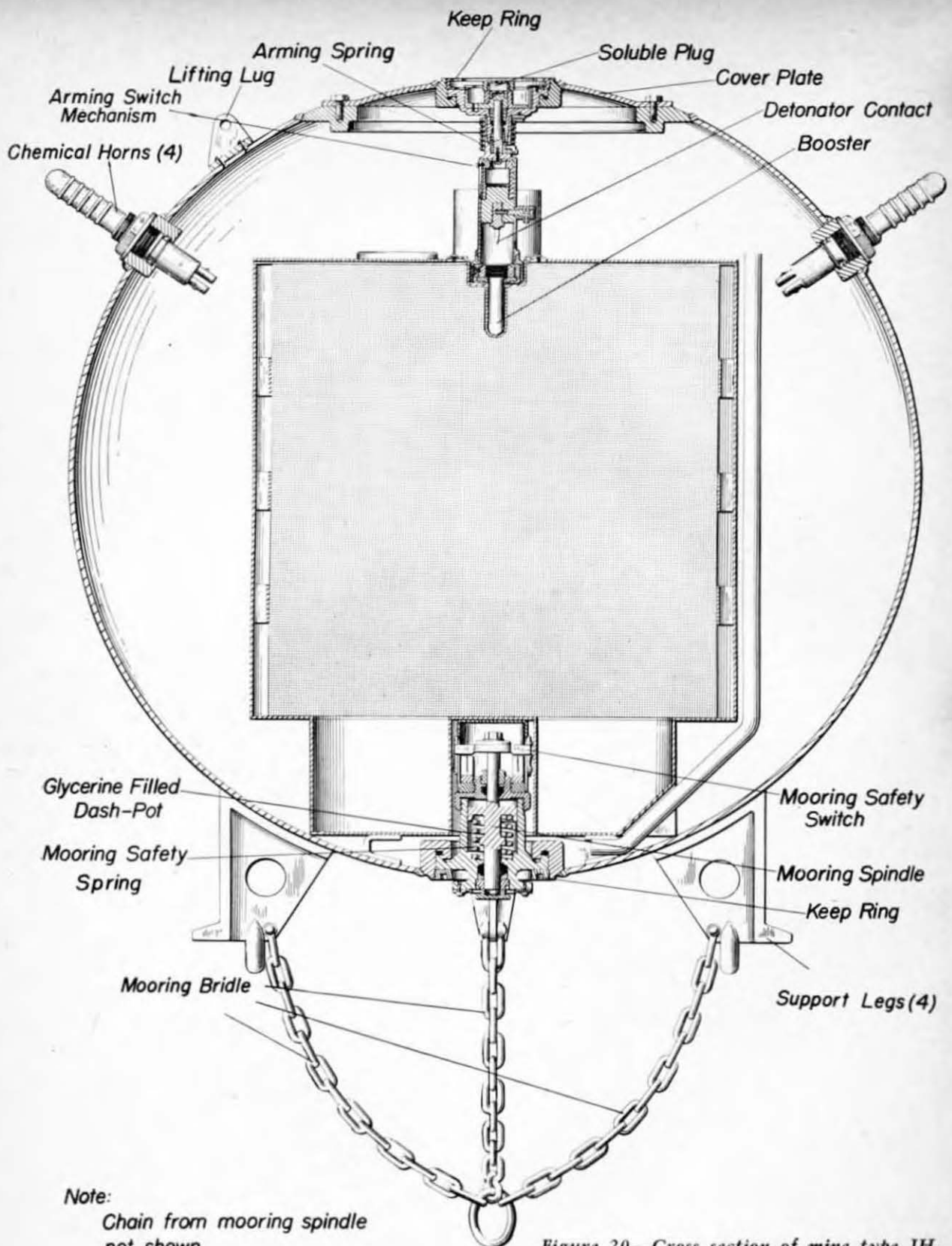
The mine fires when the horn is bent sufficiently to break its glass vial allowing electrolyte to run into a battery cup and generate sufficient current to fire the detonator.

Safety Precautions

The JG contains no self-disarming features. When used as a land mine it has been found buried with other explosives.



Figure 19—Type JG in the water.



0 1

MINE TYPE JH
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Section 9—MINE TYPE JH

A moored, contact mine laid by surface craft. Two types of this mine are known to exist and both are designated by the Japanese "Mark 6." Only the Mark 6 Model 1" has been recovered. The "Mark 6, Model 2" has been reported from intelligence sources. The depth of water in which the mine may be laid is not known, although a case depth of 82' and a mooring cable length of 3360' has been reported for the "Mark 6, Model 2." Its use has been limited, although specimens were recovered on Kwajalein and Guam.

The characteristics of the mine are as follows:

Case

Shape—Spherical, 41 $\frac{1}{4}$ in diameter.

Color—Black.

Material—Steel.

Charge—Mark 6, Model 1—478 lbs. block-fitted Shimose.

Mark 6, Model 2—440 lbs. (Type 88) explosive.

Total Weight—Mark 6, Model 1—1000 lbs.

Mark 6, Model 2— 903 lbs.

External Fittings

Horns—Four, electrochemical, 90° apart around the upper hemisphere.



Figure 21—Mine type JH.

Cover Plate—17 $\frac{1}{4}$ in diameter in the top center of the case, secured by 16 bolts.

Arming Switch Mechanism—5 $\frac{1}{2}$ in diameter, in the center of the cover plate.

Lifting Lugs—Three, around upper hemisphere, 120° apart.

Mooring Bridle—On the lower hemisphere, consisting of five 15" lengths of chain, four of which are attached to the support legs, and one to the mooring spindle.

Mooring Spindle Housing—5 $\frac{1}{6}$ in diameter, in the bottom center of the case.

Support Legs—Four, around the lower hemisphere, 90° apart.

Mooring Cable—6–10mm (0 $\frac{1}{4}$ –0 $\frac{3}{8}$) diameter.

Operation

No details of the anchor nor the depth-taking mechanism are known. Shortly after the mine is launched tension on the mooring chain closes the mooring safety switch. Dissolution of a soluble plug allows the spring-loaded arming switch to close, arming the mine.

The mine fires when one of the horns is bent sufficiently to break its glass vial, allowing electrolyte to run into the 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.



Figure 22—Type JH floating.

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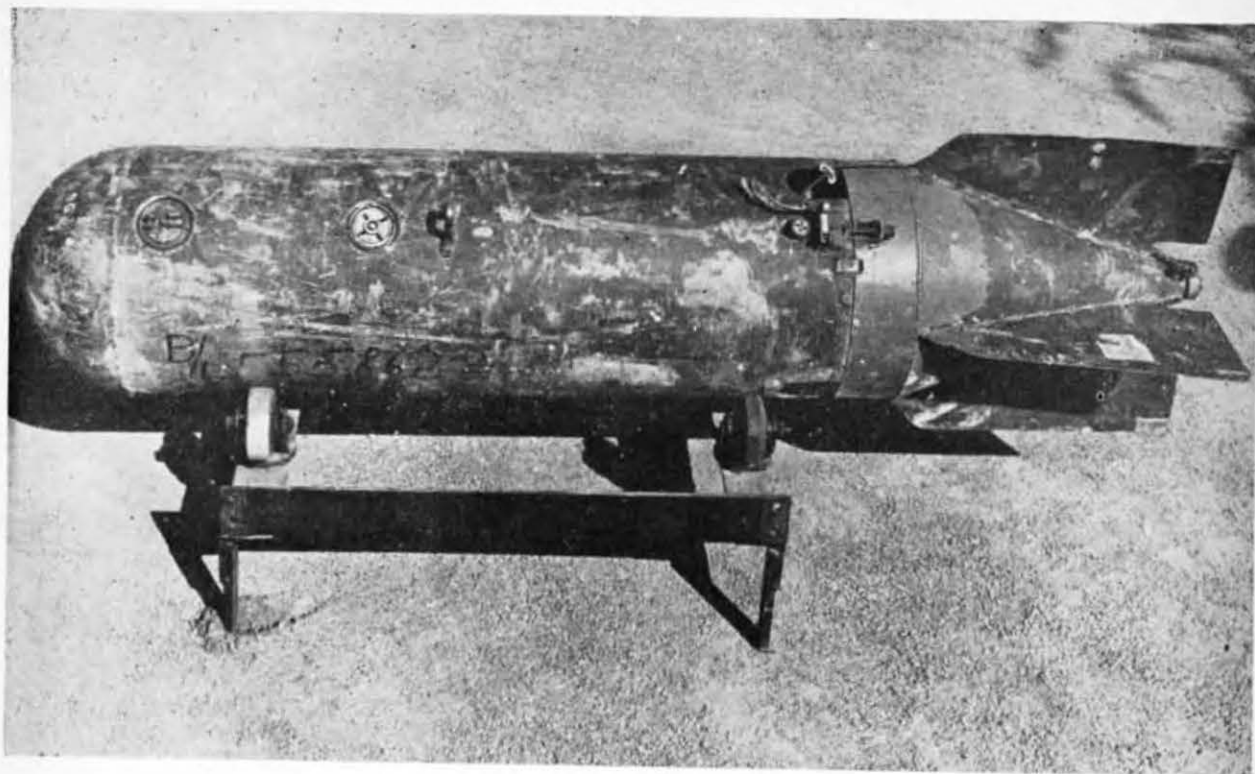


Figure 23—Mine type JI assembled.

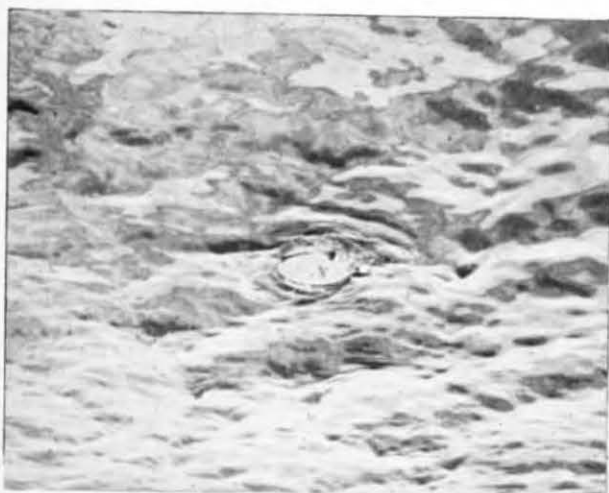


Figure 24—Type JI floating, fully armed. The buoyant tail piece supports the mine approximately 4 feet below surface.

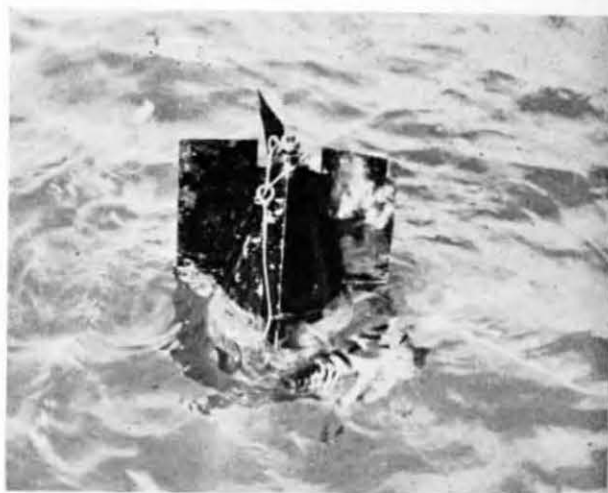


Figure 25—Type JI floating unarmed.

Section 10—MINE TYPE JI

An aircraft laid, contact, drifting mine used as an offensive weapon against surface craft and designated by the Japanese as "K-2." The mine drifts approximately 6' under the surface of the water, supported from its buoyant tail section by a short length of cable. The tail has the appearance of an oil drum floating vertically on the surface when the mine is armed. After an unknown length of time the JI scuttles itself.

The physical characteristics of the mine are as follows:

Case

Shape—Cylindrical, 14" in diameter.

Color—Black.

Material—Steel.

Length (including tail)—6'1".

Length (without tail)—4'1".

Charge—123 lbs. cast Type 98 explosive.

Total Weight—300 lbs.

External Fittings

Horns—Three, switch, equally spaced around top of mine.

Suspension Lug—One, on the top center line of the mine.

Detonator Pocket—4"25 in diameter, 180° around the case from the booster pocket.

Filling Plug—3"75 in diameter, in the nose of the mine.

Soluble Plugs—Two; one on the top center line 4" from the after end of the mine and the apex of the tail.

Tail Release Mechanism—On the top center line of the mine, 2" from the after end.

Operation

As the mine is launched from the aircraft arming lanyards withdraw safety forks from the tail release and booster release mechanisms. The booster is released under spring pressure and is permanently housed over the detonator while the mine is still in the air. On its initial plunge into the water, the hydrostatic switch operates, closing and locking the circuit from the battery to the horns. Positive buoyancy of the tail brings the mine back to the surface and it floats nose downward with the tail fins partly out of the water. Dissolution of a soluble plug releases the mine from the tail, and the case sinks to the end of the mooring cable. The weight of the case on the cable inverts the tail and it floats base upward on the surface. The strain of the case on the cable also releases the horns, which snap outward in the armed position; and closes a horn safety switch, arming the mine.

The mine fires when one of the horns is bent sufficiently to make a contact and close the circuit between the battery and detonator.

After an unknown period of time the soluble plug in the tail dissolves, flooding the float and allowing the mine assembly to sink.

Safety Precautions

Since the horns require only a force of approximately five pounds to bend them, it is possible that the mine may fire on striking the bottom. There are no disarming features if the mine should drift ashore; and movement of the JI on the beach may bend a horn and detonate the mine.



Figure 26—Two views of the type JJ mine.

Section 11—MINE TYPE JJ

This aircraft-laid, moored, contact mine bears a resemblance to the U. S. Mine Mark 10, Mod. 1. The mine case is a cylinder that floats vertically in the water when moored. It has four electrochemical horns equipped with brackets that are extended outward above the top of case by spring pressure.

The physical characteristics of the mine are as follows:

Case

Shape—Cylindrical, 24" in diameter and 52"5 long.

Material—Steel.

Total Weight—600 lbs.

Charge—240 lbs. Type 98 explosive.

External Fittings

Horns—Four, electrochemical, equally spaced around the top of the case. Each horn is equipped with a spring-loaded steel extension.

Detonator Housing—On the side of the case near the bottom.

Booster Release Mechanism—In an opening on the case 180° from the detonator housing.

Base Plate—On the bottom of the case, equipped with a mooring lever controlled by a soluble-plug mechanism; and a hydrostat assembly.

Operation

The anchor for this mine has not been recovered, therefore, its operation is not known. The mine is laid with a parachute from aircraft; some time after laying the spring extensions on the horns are released and snap outward. Hydrostatic pressure releases the booster, which is driven across the booster tube under spring pressure, housing it over the detonator. Dissolution of the soluble plug in the base plate allows mooring tension to operate the mooring lever, arming the mine.

The mine fires when one of its horns is bent sufficiently to break a glass vial allowing electrolyte to run into a battery, generating sufficient current to fire the detonator.

Safety Precautions

A safety switch is designed to disarm the mine when the mooring cable breaks or is cut, but this feature is not reliable. Therefore if found adrift, or on the beach, it should be considered dangerous.

Section 12—UNRECOVERED MINES

In addition to the foregoing mines, specimens of which have been recovered, there are the following types about which there is intelligence information only.

MINES TYPE "APRICOT" AND "GRAPEFRUIT"

These represent two types of anti-submarine, contact net mines designated by the Japanese as "Type 96" and "Type 96, Modification 1." The maximum depth of water in which the nets are laid is 700', and the depth of the mine case may vary from 8' to 300'. Drag lines from the head rope of the net to the firing mechanism fire the mines when subjected to suitable tension.

The physical characteristics of the mines are as follows:

Case

Shape—Cylindrical with rounded ends, 20"1 in diameter and 27"2 long.

Material—Steel.

Charge—Apricot—121 lbs. granular Type 88 explosive.

Grapefruit—132 lbs. granular Type 88 explosive.

Total Weight—Apricot—238 lbs.

Grapefruit—249 lbs.

Firing Mechanism

Modified type 95 depth charge pistol.

Operation

As the net is lowered into the water, a hydrostatically-operated detent on the mines restrains the drag lines from transmitting tension to the firing mechanism until a minimum depth of eight feet is reached. The "GRAPEFRUIT" has the additional safety factor of a shear pin in the firing mechanism to prevent firing on a slight tension. Thereafter, the mines will fire when a minimum tension of 300 lbs. is applied to the firing mechanisms through the drag lines.

Safety Precautions

There are no known self-disarming features.

MINE TYPE "AVOCADO"

This is a moored, contact mine laid by surface craft. The Japanese designation for this mine is not known. Unlike the majority of Japanese con-

tact mines, the AVOCADO'S firing mechanism is an impact-inertia pendulum device rather than electrochemical horns.

The characteristics of the mine are as follows:

Case

Shape—Spherical, 32"5 in diameter.

Material—Steel.

Charge—170 lbs. Type 88 explosive.

Total Weight—450 lbs.

Operation

Shortly after the mine assembly strikes the water upon laying, a metal plummet drops away from anchor, reeling out a plummet cable as it sinks. When the plummet reaches a depth pre-set on the cable drum, the drum is locked 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 the bottom, release of tension on the plummet cord allows the pawl to engage the ratchet, locking the drum. The mine is then pulled downward and will moor at a depth below the surface equal to the length of the plummet cord. No further details of the arming procedure are known. When the mine is struck or tilted sufficiently to cause an inertia pendulum to make one of three electrical contacts, the circuit through the battery and detonator is closed and the mine fires.

MINE TYPE "BANANA"

A moored, contact mine laid by surface craft. The Japanese designation is unknown. The base plate of the "BANANA" is similar to the Dutch Vickers and the British T-MK 3 mines, and may have been copied from them. The general characteristics of the mine are as follows:

Case

Shape—Two hemispheres, 33"5 in diameter, joined by a cylindrical mid-section (width unknown).

Material—Steel.

Charge—275 lbs. Type 88 explosive.

External Fittings

Horns—Four, electrochemical, equally spaced about the upper hemisphere.

Base Plate—In center of lower hemisphere, containing a straight-shank mooring spindle.

Cover Plate—In the center of the upper hemisphere.

Operation

Shortly after the mine assembly strikes the water upon laying, a metal plummet drops away from anchor, reeling out a plummet cable as it sinks. When the plummet reaches a depth pre-set on the cable drum, the drum is locked 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 the bottom, release of tension on the plummet cord allows the pawl to engage the ratchet, locking the drum. The mine is then pulled downward and will moor at a depth below the surface equal to the length of the plummet cord. Dissolution of a soluble washer permits mooring tension to withdraw the mooring spindle in the mine base plate, arming the mine.

The mine fires when one of the horns is bent sufficiently to break its vial allowing electrolyte to run into a battery cup, generating sufficient current to fire the detonator.

Safety Precautions

A 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.

MINE TYPE "PEAR"

A moored, contact mine laid by submarines as an offensive weapon and designated by the Japanese as "Type 3, Mark 6." The mine can be planted in water having a maximum depth of 1220'. The case can be moored at a maximum depth of 66'. The minimum depth of the mine case below the surface is not known. The characteristics given below are similar to the mine JA, and it is possible that the "PEAR" is an improved design of that mine.

Case

Shape—Two hemispheres, 35"5 in diameter, joined by a 10" cylindrical mid-section.

Color—Green over red.

Material—Steel.

Charge—440 lbs. Shimose.

Total Weight—900 lbs.

External Fittings

Horns—Four, electrochemical, on upper hemisphere.

Operation

Nothing is known of the anchor, arming devices or depth-taking mechanism. The mine fires when one of the horns is bent sufficiently to break its glass vial, allowing electrolyte to run into a battery generating sufficient current to fire the detonator.

MINE TYPE "PLUM"

This mine was reported in CINCPAC-CINCPAA Item #9330 as the Japanese "Type 3, Mark 1 Aerial Mine Model 1, Temporarily Designated 'K.'" No other information is known about the "PLUM." The mine JI, recently recovered in the Philippines, is an aircraft laid, drifting mine and is labeled by the Japanese as "Temporarily Designated K-2." The similarity of designation may indicate that the "K-2" is a modification of the "PLUM."

MINE TYPE "POMEGRANATE"

A moored, contact mine laid by surface craft either as an offensive or defensive weapon. The Japanese designation is not known. The "POMEGRANATE" is similar to the British Vickers and is equipped with an upper and/or lower copper antenna to increase its operating area. The characteristics of the mine are as follows:

Case

Shape—Spherical, 41" in diameter.

Material—Steel.

External Fittings

Horns—Six, electrochemical, four equally spaced on upper hemisphere, two 180° apart on lower hemisphere.

Antenna—Upper and/or lower, copper cable.

Operation

No information is available on the anchor of depth taking mechanism. The mine fires when the steel hull of a ship contacts the copper antenna, or when one of the horns is bent sufficiently to break its glass vial, allowing electrolyte to run into the battery, generating sufficient current to fire the detonator.

MINE TYPE "QUINCE"

A moored, controlled mine laid by surface craft as a harbor defense weapon and designated by the Japanese as "Type 92." This mine uses an acoustic monitoring system to indicate the presence of shipping. It is fired electrically from a control post on the beach. The maximum depth of water in which the "QUINCE" is laid is 393', and the normal depth is 98'-131'. "QUINCE" mines are laid in two rows, with mines spaced 426' apart,

and rows 524' apart. The maximum distance of a field of such mines from the control post is 15 miles. The physical characteristics of the mine are as follows:

Case

Shape—Unknown, 48"9 in height.

Charge—1100 lbs. Type 88 explosive

Total Weight—1650 lbs.

Operation

Upon laying, the mine assembly sinks to the bottom and the case remains attached to the anchor for approximately one hour. At the end of that time the case rises and assumes its correct depth. Reports indicate that these mines are laid in groups of six. Hydrophones in the mine field transmit sound of approaching ships to the control post, and at the discretion of the observer, the mines are fired electrically either singly or in groups.

Chapter 2

JAPANESE DEPTH CHARGES

Section 1—GENERAL

The U. S. Navy makes no separate designation of Japanese depth charges but uses instead, the translated Japanese names. Thus, one cannot tell, by looking at the name, whether the type has been recovered or not.

Three types of Japanese depth charges have been recovered and additional types have been reported from intelligence sources. The pistols of all charges, both recovered and reported, with the exception of "Experimental Manufacture Use 120KG Depth Charge" operate on seepage-hole principle. Water gradually seeps into a cylinder and builds up sufficient pressure to fire the depth charge.

Operation of pistols using this principle is dependent upon the rate of flow of water through an orifice rather than on hydrostatic pressure alone.

The explosives used in Japanese depth charges are the same as those used in mines, with the exception of Type 97. The general characteristics of this explosive are as follows:

Type 97—Composed of Hexanitrodiphenylamine (HND) 40% and Trinitrotoluene (TNT) 60%. This explosive is used in a cast form and has a somewhat darker color than Shimose. It has a melting point of 70°-80° C. and is slightly less powerful than TNT. The explosive is very toxic and must not be handled by the bare hands.

JAPANESE DEPTH CHARGES

TYPE	DIAMETER	LENGTH	CHARGE	DEPTH SETTING	DESCRIBED ON PAGE
88	17"8	29"7	326#	80' or 150'	32
91, Model 1, Modif. 1	17"8	29"7	220#	80' or 165'	32
93	Un- known	36"	Un- known	100'	32
95	17"75	30"5	220#	100', 200'	29
95 Modif. 1	17"75	30"5	325#	100', 200', 300' 390', 490'	29
95 Modif. 2	17"75	30"5	242#	Unknown	29
96, Model 1	Un- known	Un- known	242#	100', 200', 300'	32
2, Modif. 1	17"56	30"5	357#	100', 200', 300' 390', 490'	28
2, Modif. 2	17"56	30"5	220#	Unknown	32
Exp. Use 120KG	Un- known	Un- known	Un- known	Delay igniter used	31
YOKO	Un- known	Un- known	55#	130', 165'	33

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Section 2—DEPTH CHARGE TYPE 2

An anti-submarine weapon launched from surface craft and designated by the Japanese as "Type 2, Modification 1."

The general characteristics of the depth charge are as follows:

Case

Shape—Cylindrical, 17 $\frac{1}{2}$ in diameter and 30 $\frac{1}{2}$ long.

Color—Black.

Material—Steel.

Charge—357 lbs. Type 98 explosive.

Total Weight—491 lbs.

External Fittings

Pistol—In end of central tube, locked by a bayonet joint. Five depth settings, 30, 60, 90, 120, and 150 (100', 200', 300', 390', 490') meters are inscribed on face.

Filling Holes—Two, 180° apart, on the opposite end of the case from the pistol. A broken white

stripe, 1" wide, is painted around the end of the case containing the filling holes.

Pad Eyes—Two on each end.

Booster—In the opposite end of the central tube from the pistol.

Operation

Prior to launching, the depth-setting dial is turned to any one of five settings, opening a seepage hole in the valve plate. It is not known whether the detonator is housed in the booster manually or hydrostatically. When the charge is submerged water enters the pistol through the holes in the depth setting dial and through the hole in the valve plate. When sufficient pressure has been built up in the pistol, the firing pin is released under spring pressure and driven onto the detonator, firing the charge.

When the depth-setting dial is set on "Safe," the depth-setting valve positions the valve stem in such a manner that the pistol cannot operate.



Figure 27—Two views of the type 2 depth charge.

Section 3—DEPTH CHARGE TYPE 95

An anti-submarine weapon launched from surface craft. Three types of this depth charge have been recovered to date and are designated by the Japanese as "Type 95"; "Type 95, Modification 1"; and "Type 95, Modification 2." The only pistol recovered has been with the Type 95 charge. Data on the operation and characteristics of pistols for Modifications 1 and 2 have come from intelligence sources.

The physical characteristics of these charges are as follows:

Case

Shape—Cylindrical, 17"75 in diameter and 30"5 long.

Color—Grey.

Material—Steel.

Charge—Type 95—220 lbs. Type 88 explosive with Shimose booster.

Type 95, Modification 1—325 lbs. Type 98 explosive.

Type 95, Modification 2—242 lbs. Type 1, Temporary explosive.

Total Weight—Type 95—352 lbs.

Type 95, Modification 1—457 lbs.

Type 95, Modification 2—374 lbs.

External Fittings

End Plate—16"25 in diameter, forming one end of the case.

Pistol Cover—2"9 in diameter, screwed into central tube in the center of the end plate. This contains two holes for a pistol safety fork.

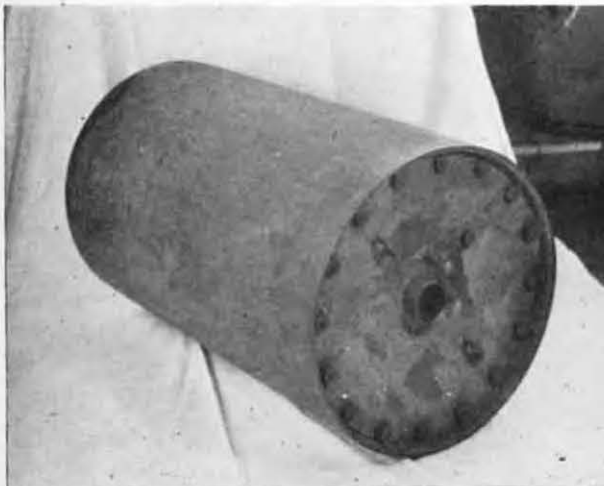


Figure 28—Two views of the Type 95 depth charge. Note the bolted end plate.

Depth Control Valve—Screwed into the opposite end of the central tube from pistol cover. Type 95 has depth settings of 30 and 60 meters (100' and 200') and 30 meters with parachute. Type 95, Modification 1, has been reported with settings of 30, 60, 90, 120 and 150 meters (100', 200', 300', 390', 490').

Pad Eyes—Two on each end of the case.

Operation

Prior to launching the charge, the depth-setting dial on the depth control valve is turned from "Safe" to the desired setting, unlocking the booster can and aligning one of three seepage holes under the depth control valve with the water inlet

hole. The safety fork is also removed from the pistol cover at this time. The charge is then launched and, as it sinks, increasing hydrostatic pressure forces the pistol and booster toward one another. The size of the seepage hole determines the flow water into the space behind the pistol and booster, and the speed with which these two parts come together. When the two meet, the detonator houses in the booster and the spring-loaded firing pin sleeve is unlocked. Further pressure releases the firing pin which then strikes the detonator and explodes the charge.

When the charge is set on "Safe" the booster is locked to the depth-control valve, the pistol is secured to the pistol cover, and none of the water-entry holes is uncovered.

Section 4—DEPTH CHARGE "EXPERIMENTAL MANUFACTURE USE 120 KG."

An offensive weapon used against surface shipping and carried aboard "suicide" motor boats. This charge, designated by the Japanese as "Experimental Manufacture Use 120 Kg. Depth Charge," was recovered by Mobile Explosives Investigation Unit Number 1 in the Philippine area. Two of these weapons are carried aboard light, high-speed, plywood-constructed motor boats. The standard depth charge pistol is replaced by a delayed-action pull igniter. The charges are either dropped close aboard or are released when the "suicide" boat crashes into the target ship. The igniter fires the depth charge shortly after it is released from the motor boat.

The physical characteristics of the charge are as follows:

Case

Shape—Cylindrical (similar to Type 95, Modification 1 which is 17" in diameter and 30" long).

Material—Steel.

Charge—Cast explosive (type and weight unknown).

Total Weight—264 lbs.

External Fittings

Igniter—In tube 1 7/8" in diameter centrally located in end of charge.

Filling Hole—One, centrally located in opposite end from igniter.

Pad Eyes—Two on each end.

Operation

Two depth charges are placed in racks, one on each side of the boat, and the pull cords from the igniters are attached to the rack. The "suicide" boat then heads for the nearest target and either manually releases its charges alongside or crashes into the target, whereby the charges are automatically released through a lever system on the boat. As the charges drop away from the boat the pull cords fire the igniters, which explode the charges after a short delay.

Safety Precautions

There are no known safety precautions on this charge, and it must be considered dangerous if found on a beach.

Section 5—UNRECOVERED DEPTH CHARGES

Several additional Japanese depth charges, believed to be in use, are described on the following pages. Since this information has been derived from intelligence sources it must be evaluated accordingly.

DEPTH CHARGE TYPE 2, MODIFICATION 2

An anti-submarine weapon launched from surface craft. Since this charge has the same type number as the "Type 2, Modification 1," it may be a modification of that charge.

General characteristics of the charge are as follows:

Case

Shape and Size—Cylindrical, 17"56 in diameter, 30"75 long.

Material—Steel.

Charge—220 lbs. Type 88 explosive.

Total Weight—352 lbs.

External Fittings

Filling Holes—Two, 180° apart, on opposite end of the case from the pistol.

Pad Eyes—Two on each end.

Operation

No further information is available regarding its use as a depth charge. However, it has been adopted for use as a land mine on Iwo Jima.

DEPTH CHARGE TYPE 88

An anti-submarine weapon launched from surface craft.

The physical characteristics of the charge are as follows:

Case

Shape—Cylindrical, 17"8 in diameter and 29"7 long.

Charge—326 lbs. block-fitted Shimose explosive.

Total Weight—523 lbs. (less accessories).

Operation

Nothing is known about the operation of this depth charge except that it sinks at the rate of 11.5 feet per second and it can be set to fire at either 25 or 45 meters (80' or 150') depth.

DEPTH CHARGE TYPE 91

An anti-submarine weapon, launched from surface craft, designated by the Japanese as "Type 91, Model 1, Modification 1."

The physical characteristics of the charge are as follows:

Case

Shape—Cylindrical, 17"8 in diameter and 29"7 long.

Charge—220 lbs. of Type 88 explosive with Shimose booster.

Total Weight—352 lbs.

Operation

Nothing is known about the operation of this charge except that it sinks at the rate of 6.6 feet per second, and it can be set to fire at either 25 or 50 meters (80' or 165') depth.

DEPTH CHARGE TYPE 93

An anti-submarine weapon launched from surface craft.

The physical characteristics are as follows:

Case

Shape—Cylindrical, 36" long.

Total Weight—441 lbs.

Operation

The only depth setting given is 30 meters (100'). A parachute is used when launched from slow craft.

DEPTH CHARGE TYPE 96

An anti-submarine weapon launched from surface craft. Only one type of this charge has been reported and this is designated by the Japanese as "Type 96, Model 1." This charge has characteristics similar to the "Type 95, Modification 2."

The physical characteristics of the charge are as follows:

Case

Shape and Size—Unknown.

Charge—242 lbs. Type 88 or Type 1, Temporary explosive.

Total Weight—374 lbs.

Operation

Nothing is known about the operation of the charge. When launched, it sinks at the rates of 6.6 feet per second or 3.3 feet per second when equipped with parachute for slow craft. The pis-

tol has four depth settings, 30, 60, and 90 meters (100', 200' and 300') and 30 meters with parachute.

DEPTH CHARGE TYPE "YOKO"

An anti-submarine weapon towed from surface craft.

The physical characteristics of the charge are as follows:

Case

Shape and Size—Unknown.

Charge—55 lbs. Type 88 explosive.

Total Weight—154 lbs.

Pistol—Modified Type 95.

Operation

Designed as a tactical anti-submarine weapon, this charge is towed at depths from 131 to 164 feet. The towing cable is approximately 600 feet long and the speed of the towing ship is 24 knots.

JAPANESE TORPEDOES

TYPE	USED ON	LENGTH	DIAMETER	CHARGE WEIGHT	TOTAL WEIGHT	SOURCE OF INFORMATION	DESCRIBED ON PAGE
44 & 44, Model 2, Modif. 1	PT, Picket Boat	18'11"	17"7	460#	1830#	Recovered	36
6th Year Model	SS CL, DD	22'5"	21"	451#	3200#	Recovered	37
8th Year Model	CL, DD	27'6"	24"	880#	5800#	Recovered (less w.head)	38
89 & 89, Modif. 2	SS	23'8"	21"	660#	3660#	Intell. Repts.	39
89, Modif. 1	SS	23'6"	21"	600#	3660#	Recovered	39
90	DD, CA, CL	27'10"	24"	880#	3520#	Intell. Repts.	47
91, Modif. 1	A/C, PT	17'3"	17"7	338#	1730#	Recovered	40
91, Modif. 2	A/C, PT	18'	17"7	420#	1800#	Recovered	41
91, Modif. 3	A/C, PT	17'4"	17"7	522#	1800#	Recovered	42
91, Modif. 3 with Modif. 6 warhead	A/C, PT	18'9"	17"7	812#	2100#	Recovered	42
91, Modif. 3 with Type 3 warhead	A/C	18'	17"7	493#	1800#	Recovered	42
92	SS	23'8"	21"	660#	3369#	Intell. Repts.	47
93, Model 1 Modif. 2	DD, CA, CL	29'6"	24"	1080#	6000- 6500#	Recovered	44
94, Modif. 1	A/C	22'	17"7	867#	3245#	Intell. Repts.	47
94, Modif. 2	A/C	17'4"	17"7	462#	1823#	Intell. Repts.	47
95	SS	23'8"	21"	880#	3520#	Intell. Repts.	48
New Kure	A/C	Un- known	17"7	660#	1870#	Intell. Repts.	48
2 (Special)	A/C, PT	18'3"2	17"7	650#	1800#	Recovered	46
97	Midget Submarines	18'5"	17"7	790#	2205#	Recovered	45

Chapter 3

JAPANESE TORPEDOES

Section 1—GENERAL

Several types of Japanese torpedoes have been recovered and, whenever possible, their characteristics have been determined by running them on the torpedo testing range at Newport, R. I. Performance has been estimated on the torpedoes which could not be ranged because of poor condition. In addition to the torpedoes recovered, several other types have been reported from intelligence sources.

Japanese torpedoes are designated by the year in which the torpedo was first run on a testing range. The "type" designation of a torpedo is not changed because of subsequent modifications as long as the main engine and diameter of the torpedo remain the same. As the Japanese use several different systems for designating the year, the following list is only approximate:

DESIGNATION OF TORPEDO	FIRST TRIAL
Type 44	1911
6th Year Model	1917
8th Year Model	1919
Type 89	1929
Type 90	1930
Type 91	1931
Type 93	1933
Type 97	1937
Type 2	1942

Explosive charges used with Japanese torpedoes, with the exception of Type 94, are the same as in mines and depth charges described on the preceding pages. The characteristics of this explosive are as follows:

Type 94—Composed of Cyclonite 40%, and Trinitroanisole 60%. This explosive is used in a cast form and is rated as slightly more powerful than TNT.

Section 2—TORPEDO TYPE 44

An aircraft torpedo powered by a four-cylinder reciprocating steam engine, and similar in design to early American and European models. Two types of this torpedo have been reported, but only one, designated by the Japanese, Type 44, Model 2, Modification 1, has been recovered. Information on the other, designated Type 44, has been derived from intelligence sources. Although believed to be obsolete, this torpedo may still be used on PT or picket boats. It leaves a visible wake.

The physical characteristics of the torpedoes are as follows:

Description

Length Overall—18'11".
Length of Warhead—4'1".
Length of Airflask—10'.
Length of Afterbody—4'10".
(Including Tail)
Diameter—17"7.
Total Weight—1830 lbs.
Charge—460 lbs. Type 97 or 98 explosive.
Tail Fins—4.

Range/Speed—4300 yards at 36 knots.

8700 yards at 26 knots.

Exploder—Type 91, Model 3, nose, impact.

Operation

After the torpedo has travelled through the water a certain distance, an impeller, on the nose of the exploder being rotated by water pressure, arms the exploder. Impact with the target shears two pins in the nose of the exploder and drives the firing pin onto the detonator, firing the charge. Three bent-levers are attached to the exploder to insure its operation in case the torpedo should strike the target at an oblique angle, rather than "head-on."

Safety Precautions

Should this torpedo be found on the beach or in shallow water, it must be considered dangerous. Movement of one of the bent-levers, or the impeller might initiate detonation. Likewise, movement of the torpedo might cause the engine to turn over a few revolutions, driving it forward on the beach. Should the bent-levers or impeller strike anything, the torpedo would probably detonate.



Figure 29—Type 44 torpedo with warhead removed.

Section 3—TORPEDO 6th YEAR MODEL

A 21" torpedo powered by a four-cylinder reciprocating steam engine, this weapon was designed to be launched from cruisers, destroyers and submarines. It leaves a visible wake and is believed to be obsolete.

The general characteristics of the torpedo are as follows:

Description

Length Overall—22'5".
Length of Warhead—3'1".
Length of Airflask—12'9".
Length of Afterbody—6'7".
(Including Tail)
Diameter—21".
Total Weight—3200 lbs.
Charge—451 lbs. Shimose.
Tail Fins—4.
Range/Speed— 7650 yards at 37 knots.
10900 yards at 32 knots.
16400 yards at 25 knots.
Depth Setting—6'6 to 52'8.
Exploder—Type 91, Model 2, nose, impact.

Operation

As the torpedo travels through the water, an impeller on the nose of the exploder rotates, arming the exploder. Impact with the target shears two pins in the exploder and drives the firing pin onto the detonator, firing the charge. Three bent-levers are attached to the nose of the exploder to insure its operation in case the torpedo should strike the target at an oblique angle, rather than "head-on."

Safety Precautions

Should this torpedo be found on the beach or in shallow water, it must be considered dangerous. Movement of one of the bent-levers or the impeller might initiate detonation. Likewise, movement of the torpedo might cause the engine to turn over a few revolutions, driving it forward on the beach. Should the bent-levers or impeller strike anything, the torpedo would probably detonate.

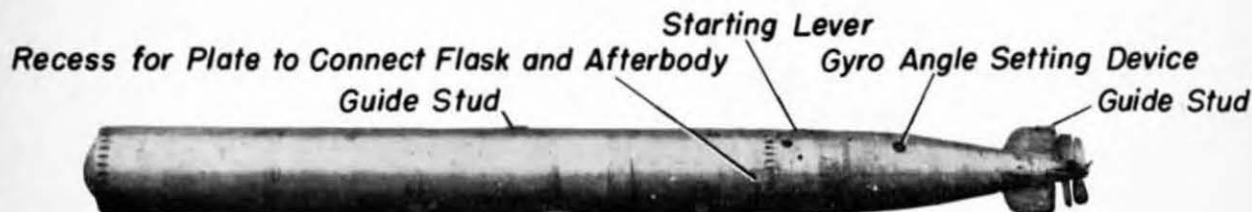


Figure 30—Type 6th year torpedo with warhead removed.

Section 4—TORPEDO 8th YEAR MODEL

A 24" torpedo powered by a four-cylinder reciprocating steam engine and fired from either cruisers or destroyers. One of the first Japanese long-range torpedoes, it leaves a visible wake and it is believed to be obsolete.

The physical characteristics of the torpedo are as follows:

Description

Length Overall—Unknown (27'6" reported from intelligence sources).

Length of Warhead—Unknown (3'9" reported from intelligence sources).

Length of Airflask—16'9".

Length of Afterbody—6'11½".

(Including Tail)

Diameter—24".

Total Weight—5800 lbs.

Charge—Unknown (880 lbs. Type 97 explosive reported from intelligence sources).

Tail Fins—4.

Range/Speed—10950 yards at 41 knots.

16400 yards at 32 knots.

21900 yards at 26 knots.

Depth Setting—6'6 to 52'8.

Exploder—Believed to be Type 91, Model 1, nose, impact.

Operation

As the torpedo travels through the water, an impeller on the nose of the exploder rotates, arming the exploder. Impact with the target shears two pins in the exploder and drives the firing pin onto the detonator, firing the charge. Three bent-levers are attached to the exploder to insure its operation in case the torpedo should strike the target at an oblique angle, rather than "head on."

Safety Precautions

Should this torpedo be found on the beach or in shallow water, it must be considered dangerous. Movement of one of the bent-levers, or the impeller might initiate detonation. Likewise, movement of the torpedo might cause the engine to turn over a few revolutions, driving it forward on the beach. Should the bent-levers or impeller strike anything, the torpedo would probably detonate.



Figure 31—The 24-inch type 8th year long range torpedo with warhead removed.

Section 5—TORPEDO TYPE 89

A 21" torpedo powered by a two-cylinder double-acting reciprocating steam engine and fired from submarines. The engine design bears a marked similarity to the British Whitehead torpedoes which were sold to Japan in 1923. Three modifications of this torpedo are believed to exist; however, only one, designated by the Japanese Type 89, Modification 1, has been recovered. The other two, Type 89, and Type 89, Modification 2, have been reported from intelligence sources. This torpedo leaves a visible wake when fired.

The physical characteristics of the torpedo are as follows:

Description

Length Overall—Type 89—23'8".

Type 89, Modification 1—23'6".

Length of Warhead—3'8".

Length of Airflask—Type 89—10'5".

Type 89, Modification 1—

13'5".

Length of Afterbody—Type 89—9'4".

(Including Tail)

Type 89, Modification 1—

6'4".

Diameter—21".

Total Weight—3660 lbs.

Charge—660 lbs. Type 94, 97 or Shimose explosive.

Tail Fins—4.

Range/Speed—6000 yards at 45 knots.

6550 yards at 43 knots.

10900 yards at 35 knots.

Depth Setting—6'6 to 52'8.

Warhead—Type 89, Modification 1—Type 89, Model 2.

Type 89, and Type 89, Modification

2—Unknown.

Exploder—Type 89 and Type 89, Modification 2—Bent-lever, nose impact.

Type 89, Modification 1—Type 90, bail, impact-inertia, fitted on top centerline of warhead.

Operation

As the Type 89, Modification 1, torpedo travels through the water, pressure depresses the bail on the exploder, freeing an inertia trigger and rotating an impeller. The rotation of the impeller arms the exploder, and impact of the torpedo with the target displaces the inertia trigger. This frees a firing pin, which is driven downward under spring pressure onto the detonator, firing the charge.

The operation of the Type 89 and Type 89, Modification 2 torpedoes is similar to the 6th Year Model. As the torpedo travels through the water, an impeller on the nose of the exploder rotates, arming the exploder. Impact with the target shears two pins in the exploder and drives the firing pin onto the detonator, firing the charge. Three bent-levers are attached to the exploder to insure operation in case the torpedo should strike the target at an oblique angle, rather than "head-on."

Safety Precautions

Should these torpedoes be found on the beach or in shallow water, they must be considered to be dangerous. Movement of the bail on the Type 89, Modification 1, on bent levers on the Type 89, and Type 89, Modification 2, may fire the charge. Movement of the torpedo itself may cause the engine to turn over a few revolutions, driving the torpedo forward, thus actuating the exploder and firing the charge.

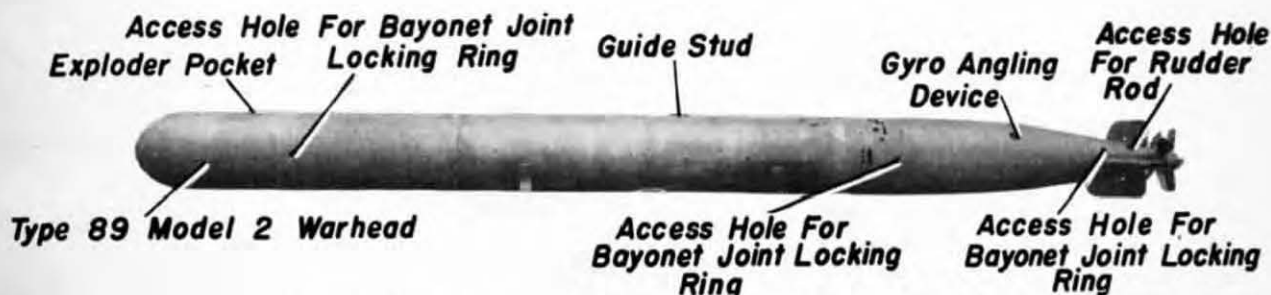


Figure 32—Submarine launched Type 89, Modification 1.

Section 6—TORPEDO TYPE 91

A 17" torpedo powered by an eight cylinder radial steam engine and designed for use by aircraft and PT boats. Owing to its length, the Type 91 must be dropped from relatively low heights; otherwise the head or tail would probably break off. Three different types of the torpedo and several types of warheads have been recovered. Because they vary widely in design and operation each type will be discussed separately on the following pages.

"TYPE 91, MODIFICATION 1"

Earliest of the Type 91 torpedoes recovered, this model can be recognized by rivets on warhead, afterbody and tail. It is a single speed torpedo and leaves a partly visible wake.

The physical characteristics of the torpedo are as follows:

Description

Length Overall—17'3".
Length of Warhead—3'1".
Length of Airflask—8'11"5.
Length of Afterbody—5'2"5.
(Including Tail)
Diameter—17".
Total Weight—1730 lbs.

Charge—338 lbs. Shimose, Type 94 or 97 explosive.

Tail Fins—4, long horizontal, short vertical.

Range/Speed—3300 yards at 42 knots.

Depth Setting—6'6 to 52'8.

Warhead—Type 91, Modification 1.

Exploder—Type 90, Model 2, bail, impact-inertia in pocket on top centerline of warhead.

Operation

As the torpedo travels through the water, pressure depresses the bail on the exploder. This unlocks an inertia trigger and frees the impeller. Rotation of the impeller arms the exploder, and impact with the target displaces the inertia trigger. This releases the firing pin which, driven downward under spring pressure, strikes the detonator, firing the charge.

Safety Precautions

This torpedo must be considered dangerous if found in shallow water or on the beach. Movement of the bail may actuate the exploder and fire the charge, and movement of the torpedo itself may cause the engine to turn over a few revolutions, driving the torpedo forward on the beach. This, too, may actuate the exploder, firing the charge.

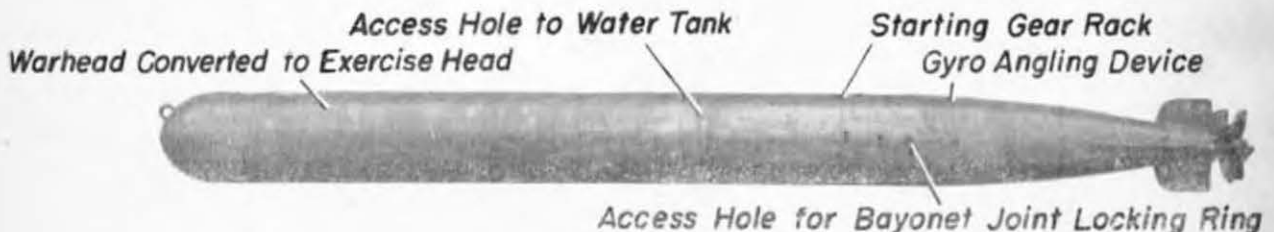


Figure 33—The aircraft and PT boat launched Type 91 torpedo.

Section 7—TYPE 91 MODIFICATION 2

This model torpedo has eight tail fins rather than four, and is equipped with anti-roll flippers on either side of the afterbody. The warhead and afterbody are of welded instead of riveted construction. It has a single speed and leaves a visible wake.

The physical characteristics of the torpedo are as follows:

Description

Length Overall—18'.
Length of Warhead—3'10".
Length of Airflask—8'11".
Length of Afterbody—5'2"
(Including Tail)
Diameter—17".
Total Weight—1840 lbs.

Charge—420 lbs. Shimose, Type 94 or 97 explosive.

Tail Fins—8.

Range/Speed—3300 yards at 42 knots.

Depth Setting—6'6 to 52'8.

Warhead—Type 91, Modification 2.

Exploder—Type 90, Model 2, bail, impact-inertia, in pocket on top centerline of warhead.

Operation

This torpedo operates in the same manner as Type 91, Modification 1, described on the preceding pages. It has been replaced in service by the Type 91, Modification 3, and Type 2.

Safety Precautions

Same as Type 91, Modification 1.

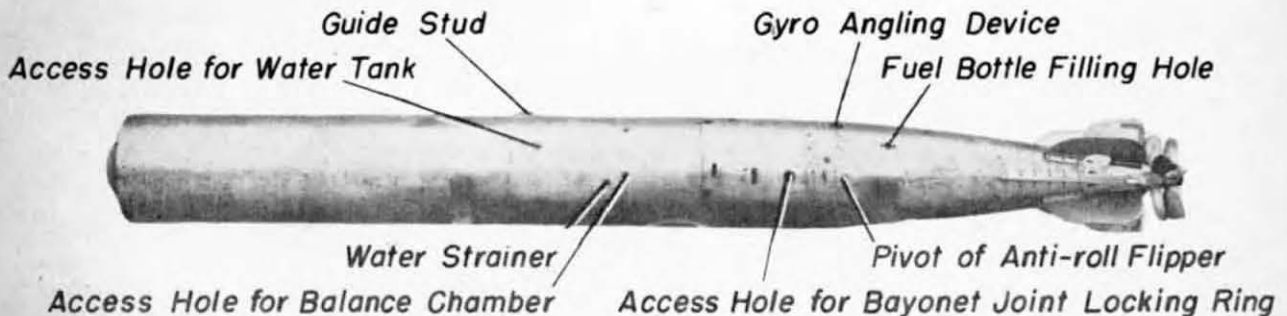


Figure 34—Type 91 Modification 2 torpedo with warhead removed. Note the 8 tail fins and the pivot point for the anti-roll flipper. This flipper has been removed from the torpedo.

Section 8—TYPE 91, MODIFICATION 3

This model torpedo has been recovered with three different types of warheads. Two of the warheads, designated by the Japanese as Type 91, Modification 3, and Type 91, Modification 6, are of normal design and differ mainly in the length and weight of charge. The third warhead, designated Type 3, is equipped with two exploders, one of a new type, and differs radically from the Modifications 3 and 6 heads. The Type 91, Modification 3, torpedo has a single speed and leaves a visible wake.

The physical characteristics of the torpedo are as follows:

Description

Length Overall—With Modification 3 Warhead—17'4".

With Modification 6 Warhead—18'9".

With Type 3 Warhead—18'.

Length of Warhead—Modification 3—4'9½".

Modification 6—6'2½".

Type 3—5'5½".

Length of Airflask—7'4".

Length of Afterbody—5'2½".
(Including Tail)

Diameter—17"7.

Total Weight—Modification 3—1800 lbs.

Modification 6—2100 lbs.

Type 3—1800 lbs. (approx.).

Charge—Modification 3—522 lbs. Type 97 explosive.

Modification 6—812 lbs. Type 97 explosive.

Type 3—493 lbs. Type 97 explosive.

Tail Fins—8.

Range/Speed—With Modification 3 Warhead—3300 yards at 42 knots.

With Modification 6 Warhead—3100 yards at 42 knots.

With Type 3 Warhead—Range unknown at 42 knots.

Depth Setting—6'6 to 59'4.

Exploder—With Modification 3 and 6 Warheads—Type 90, Model 2, bail, impact-inertia, in pocket on top centerline of warhead.

With Type 3 Warhead—One Type 90, Model 2, bail, impact-inertia, in pocket on bottom centerline of warhead; one "Hydroplane Exploder," bail, impact, in pocket on top centerline of warhead.

Operation

The Type 91, Modification 3 torpedo equipped with either Modification 3 or 6 warheads operates in the same manner as the Type 91, Modification 1 described on the preceding pages.

As the Type 91, Modification 3 torpedo equipped with the Type 3 Warhead, travels through the water, a small hydroplane attached to a towing cable is released from the warhead and streams above and slightly abaft it. The drag of the hydroplane on the towing cable arms the exploder. Impact of the hydroplane with the target automatically releases it from the towing cable. The release of tension on the towing cable actuates the exploder, firing the charge.

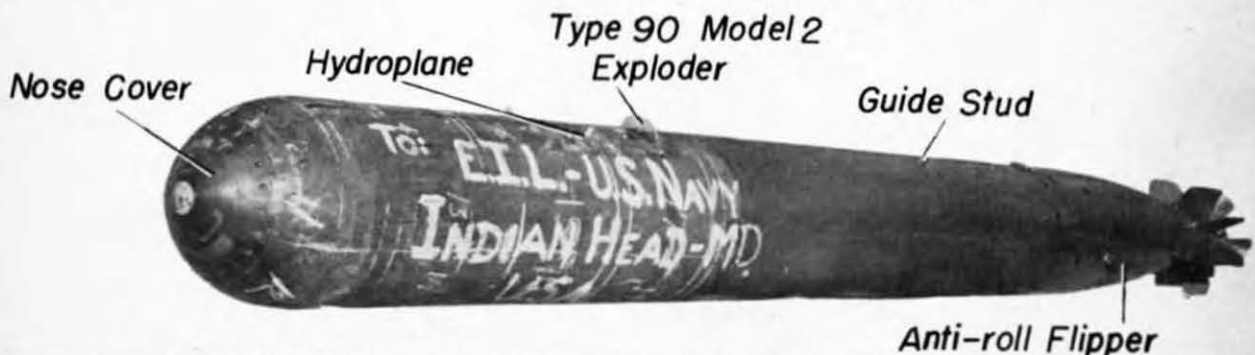


Figure 35—Type 91 Modification 3 torpedo with the hydroplane exploder. This hydroplane streaming above the torpedo allows it to detonate beneath the target.

The Type 90, Model 2 exploder arms and fires in the same manner as described for the Type 91, Modification 1 torpedo.

The hydroplane exploder allows the torpedo to be set at depths that will insure detonation under the target, rather than on the side. It should fire at the end of its run due to the release of tension on the hydroplane towing cable.

Safety Precautions

This torpedo must be considered to be dangerous if found in shallow water or on a beach. Movement of the hydroplane towing cable may explode the charge. Safety precautions described under Torpedo Type 91, Modification 1, should be observed.

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 gas bubbles, leaving only a slightly visible wake. Its use also gives this torpedo a high speed and long range. Only one type of this torpedo, designated by the Japanese as Type 93, Model 1, Modification 2, has been recovered 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 expl.

Tail Fins—4.

Operation

As the torpedo travels through the water, pressure depresses the bail on the exploder, unlocking an inertia trigger, and rotates the impeller. This arms the exploder. Impact with the target displaces the inertia trigger and frees the firing pin 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 36—This 24-inch destroyer or cruiser launched torpedo is one of the largest underwater ordnance items used by the Japanese. Its use of oxygen instead of compressed air allows it to travel with practically no visible wake.

Section 10—TORPEDO TYPE 97

A 1777 torpedo powered by a two cylinder double-acting reciprocating steam engine and designed for use by midget submarines. The use of oxygen instead of compressed air gives the Type 97 a high speed and leaves only a very slightly visible wake.

The physical characteristics of the torpedo are as follows:

Description

Length Overall—18'5".

Length of Warhead—5'11".

Length of Airflask—7'11".

Length of Afterbody—4'7".

(Including Tail)

Diameter—17".

Total Weight—2205 lbs.

Charge—790 lbs. Type 97 explosive.

Tail Fins—4, top vertical one smaller than other three.

Range/Speed—3500 yards at 46 knots.

Depth Setting—6'6 to 50'.

Warhead—Type 97.

Exploder—Type 90, bail, impact-inertia in pocket on top centerline of warhead.

Operation

As the torpedo travels through the water, pressure depresses the bail on the exploder, unlocking an inertia trigger, and rotates the impeller. This arms the torpedo, and impact with the target displaces the inertia trigger, and frees the firing pin, which, driven under spring pressure, strikes the detonator and fires the charge.

Safety Precautions

This torpedo must be considered dangerous if it is found in shallow water or on the beach. Movement of the exploder bail might fire the charge. Likewise, movement of the torpedo might allow the engine to turn over a few revolutions, driving the torpedo forward on the beach. This might actuate the exploder, firing the explosive.

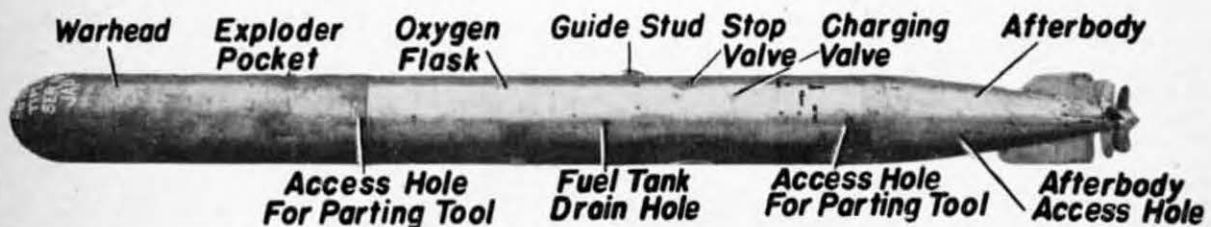


Figure 37—Type 97 torpedo used in midget submarines, powered by oxygen. It travels with only a slightly visible wake.

Section 11—TORPEDO TYPE 2 (SPECIAL)

Powered by an eight-cylinder radial steam engine, this 17'' aircraft torpedo is believed to have replaced the Type 91 torpedoes.

The physical characteristics of the torpedo are as follows:

Description

Length Overall—18'3".

Length of Warhead—6'.

Length of Airflask—7'0"5.

Length of Afterbody—5'2"5.

(Including Tail)

Diameter—17''.

Total Weight—1800 lbs.

Charge—650 lbs. Type 97 explosive.

Tail Fins—4.

Range/Speed—3000 yards at 42 knots.

(Estimated)

Depth Setting—8'3 to 59'4.

Exploder—Type 2, or Type 90, bail impact-inertia, in pocket on top centerline of warhead.

Operation

When the torpedo is launched, a safety pin is withdrawn from the Type 2 exploder, releasing the bail. It is immediately depressed under spring pressure, and when the torpedo enters the water, pressure rotates the impeller, arming the exploder. Impact of the torpedo with the target displaces the inertia trigger and releases the firing pin, which, driven downward under spring pressure, strikes the detonator, firing the charge.

If the Type 90 exploder is used, the bail is not depressed until the torpedo enters the water. The depression of the bail unlocks the inertia trigger. The exploder fires in the same manner as the Type 2.

Safety Precautions

This torpedo must be considered dangerous if found in shallow water or on the beach. The exploder must not be touched, as movement of its parts may fire the charge. Likewise, movement of the torpedo itself may cause the propellers to turn over a few revolutions, driving the torpedo upon the beach. Impact with the beach may actuate the exploder, firing the charge.

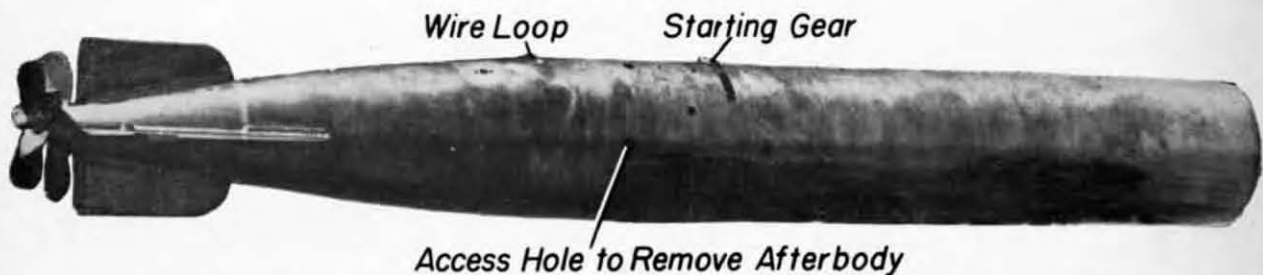


Figure 38—Torpedo type 2 (special) with warhead removed. It is powered by an 8-cylinder radial steam engine.

Section 12—UNRECOVERED TORPEDOES

Several additional types of Japanese torpedoes are believed to be in service. The data on characteristics and description of these torpedoes, taken from intelligence reports, are given on the following pages.

TORPEDO TYPE 90

A 24" torpedo powered by a two-cylinder double-acting reciprocating steam engine and designed for use by destroyers and cruisers. This torpedo has largely been replaced by the Type 93.

General characteristics of the torpedo are as follows:

Description

Length Overall—27'10".

Length of Warhead—3'10".

Length of Airflask—13'1".

Length of Afterbody—10'11".

(Including Tail)

Diameter—24".

Total Weight—3520 lbs.

Range/Speed— 8752 yards at 45 knots.

10940 yards at 42 knots.

16410 yards at 32 knots.

Charge—880 lbs. Type 94 or Shimose explosive.

Depth Setting—7' to 59'.

Exploder—Type 90, bail, impact-inertia in pocket on top centerline of warhead.

Operation

As the torpedo travels through the water, pressure depresses the bail, unlocking the inertia-trigger, and rotates the impeller. This arms the exploder, and impact with the target displaces the inertia trigger and releases the firing pin. Under spring pressure, the firing pin is driven downward onto the detonator, firing the charge.

Safety Precautions

This torpedo must be considered dangerous if found on the beach. Neither the exploder, nor the torpedo itself should be moved, as movement may initiate detonation.

TORPEDO TYPE 92

A 21" torpedo powered by an electric motor and designed for use by submarines. This torpedo is reported as trackless, firing on either impact or

magnetic actuation. It is believed to be patterned after a German electric torpedo.

The physical characteristics of the torpedo are as follows:

Description

Length Overall—23'8".

Diameter—21".

Total Weight—3369 lbs.

Charge—660 lbs. Type 97 explosive.

Range/Speed—5400 yards at 30 knots.

(When batteries are pre-warmed)

3300 yards at 28 knots.

(When batteries are not prewarmed)

Exploder—Impact or magnetic.

Operation

Nothing is known about the operation of this torpedo. It is reported as producing a distinctly whining noise at short distances.

Safety Precautions

This torpedo must be presumed dangerous if found in shallow water or on the beach.

TORPEDO TYPE 94

Two models of this 17" aircraft torpedo, designated by the Japanese as Type 94, Modification 1 and Type 94, Modification 2, have been reported.

General characteristics of the torpedoes are as follows:

Description

Length Overall—Type 94, Modification 1—22'.

Type 94, Modification 2—17'4".

Length of Warhead—Type 94, Modification 2—5'.

Diameter—17".

Total Weight—Type 94, Modification 1—3245 lbs.

Type 94, Modification 2—1823

lbs.

Charge—Type 94, Modification 1—867 lbs. Shimose or Type 97 explosive.

Type 94, Modification 2—462 lbs. explosive.

Range/Speed—Type 94, Modification 1—4923 yards at 45 knots.

Type 94, Modification 2—3300 yards at 42 knots.

Operation

Nothing is known about the operation of these torpedoes. Type 94, Modification 1, is reported to have an air speed release of 145 knots at an altitude of 85 feet.

TORPEDO TYPE 95

A 21" torpedo powered by a two-cylinder double-acting reciprocating steam engine and fired from submarines. The use of oxygen in place of compressed air leaves only a slightly visible wake.

Physical characteristics of the torpedo are as follows:

Description

Length Overall—23'8".

Diameter—21".

Total Weight—3520 lbs.

Charge—880 lbs. of Type 97 explosive.

Range/Speed—4900 yards at 38 knots.
7100 yards at 35 knots.

Operation

Nothing is known about the operation of this torpedo.

TORPEDO TYPE "NEW KURE"

Very little is known about this 17"7 aircraft torpedo. It is reported as weighing 1870 lbs. and carrying a charge of 660 lbs. of Type 97 explosive. The range is 1600 yards at 42 knots, and the air speed release is 190 knots at an altitude of 160 feet.

MISCELLANEOUS

Information has been received on two additional torpedoes from intelligence sources which it is believed worthwhile to print here. The first of these is fired from PT boats which has a gyro-control capable of steering the torpedo on a zigzag course at angles of 45°.

The second torpedo is fired from land based tubes and has a range of 7200 yards at 60 knots. There are two types of this torpedo, one 13' long and the other 11'4" long. The diameter for both is reported as 14"-15".

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