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AUSTRALIAN MILITARY FORCES

TECHNICAL INTELLIGENCE SUMMARY

No. 22

COMPILED FEBRUARY 1945

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AUSTRALIAN MILITARY FORCES
TECHNICAL INTELLIGENCE SUMMARY
NO 22
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JAPANESE EQUIPMENT

.. ..

7·7 MM MODIFIED MMG TYPE 1

1. GENERAL

This weapon incorporates most of the basic features of the Type 92 (1932) 7.7 mm M.M.G., described in AMF Tech Int Sum No. 1, but is smaller and lighter. A total saving of 59½ lbs in the weight of the gun and tripod has been achieved. The gun uses the same operating principle as the Type 92, and the rate of fire probably remains the same. However, the barrel of the Type 1 is shorter than that of the Type 92, so that the muzzle velocity is undoubtedly lower. Both types use the same ammunition, and both feed from the same 30 round clips.

2. DESCRIPTION (Fig 1)

Following are changes made in the Type 1 M.M.G. and tripod in modifying it from the Type 92 (Juki):-

(a) The modified gun has a light, quick removal barrel. This is removed by pulling the lock pin out of the barrel nut latch, which is located at the top centre of the barrel locking jacket, pulling back on the latch, and turning the barrel nut counter-clockwise until it is free from its threads. When the barrel nut is free, the barrel and gas cylinder mechanism may be removed straight to the front. By this method the heavy barrel jacket and sleeve are dispensed with and it is no longer necessary to have the various special tools required for barrel removal in the older gun.

(b) The flash hider is screwed on to the muzzle, eliminating the knurled locking collar used on the older gun.

(c) The gas regulating system uses a plug with graduated gas ports, exactly like that of the Type 99 (1939) 7.7 mm light machine gun. This does away with the long gas screw plug used on the Type 92 machine gun, and allows adjustment of the gas port to meet various conditions of the gun.

(d) The oil reservoir is much smaller than on the Type 92 machine gun, and no longer covers the entire width of the feedway. The method of oiling the ammunition remains the same.

(e) The ejection port cover is now fastened to a separate piece, hinged at the front and located to the right of the oil reservoir. Lifting up this section allows easier access to the receiver, and should aid in clearing stoppages. The feedstrip roller has been dispensed with and replaced by a simple, round-topped hinged plate.

(f) The metal sights are nearly the same as before, with only minor changes in the windage slide and the placement of the elevating lock catch. The sight is calibrated from 100 to 2200 metres, while the Type 92 machine gun sight is calibrated from 300 to 2700 metres. The regular optical sight for the Type 92 gun fits in the sight slot on the Type 1 gun, but protrudes 1 5/16 ins from the rear when so mounted. Therefore, it is assumed that a sight with a shorter base is used in this machine gun.

(g) The traversing handles, cocking slide, and trigger are unchanged, but the trigger is not used as a safety lock on the Type 1 gun. A crank shaped safety is fitted through the top of the sear housing, with its handle at the left rear of the receiver. When the handle is forward, the safety is unlocked.

(h) The tripod is very similar to that of the older machine gun. The new tripod is generally lighter in construction, and has different type spades and a different mechanism for elevating the pintle support above the tripod base. The gun elevating mechanisms are of the same type on both tripods, but the Type 1 tripod has the elevating handle on the right side instead of the left.

(i) The bolt, bolt lock, firing pin and feed mechanism are unchanged from those of the Type 92. However, the receiver of the Type 1 gun is more lightly made. The method of stripping the two guns is the same, with the exception of the barrel and associated mechanisms.

Comparative general characteristics of the two weapons are:-

	Type 1	Type 92
Calibre	7.7 mm	7.7 mm
Weight of tripod	36.3 lbs	66½ lbs
Weight of gun	33.6 lbs	63 lbs
Total weight, gun and tripod	69.9 lbs	129½ lbs
Overall length, w/flash hider	42⅝ ins	
Overall length, w/o flash hider)	38 ins	46 ins
Maximum height, w/sight ..	26 ins	
Minimum height, w/sight ..	19⅝ ins	
Number of lands	8	
Length of barrel	23 3/16 ins	28½ ins
Length of rifling	22 ins	
Total traverse or arc	45 degrees	33½ degrees

(SOURCE:- USASOS)

(g) Range corrections, in metres, from 1500 metres short to 1500 metres over are read on the bottom line (7) of the lower slide.

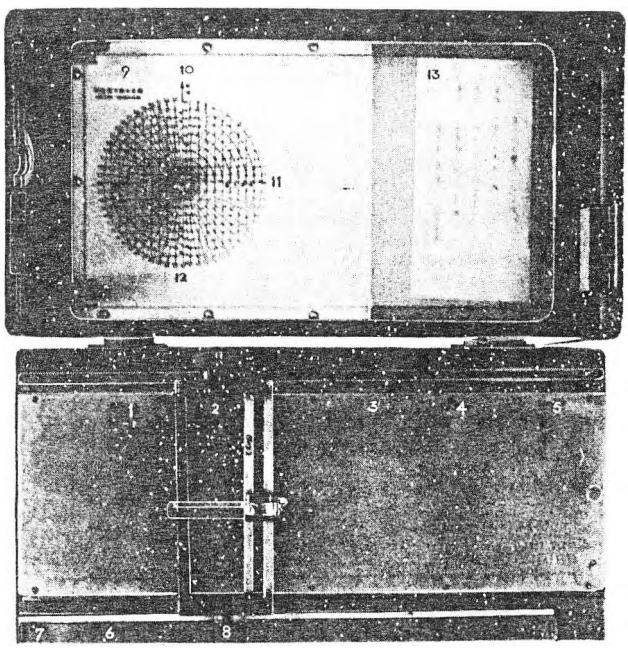
(h) A transparent runner (8) is mounted on the main slide. The main slide also has a transparent runner which is free to move in the vertical plane. In addition, the main slide is slotted to receive the firing range plate holders, which are carried in a compartment in the instrument cover. The graphs or scales which would be inserted in these plate holders were not recovered.

(i) A windage chart (9), quite similar to those included in U.S. anti-aircraft firing tables, is engraved on the large celluloid plate which is riveted to the inside of the instrument cover. On the windage chart, the arrow (10) indicates the line of fire. The horizontal and vertical axes (11 and 12) indicate, respectively, side wind component velocity, and axial wind component velocity. The windage scales are calibrated in kilometres per hour from minus 20 to plus 20 kilometres per hour. The radial lines on the chart indicate wind direction in 100 mil units. The paper (13) inserted under the transparent plate is marked with a series of notations which mean: Range Correction Board (or Plate), serial number 10932, passed 28 August 1940.

(SOURCE:- USASOS)

RANGE CORRECTION BOARD
75 MM AA GUN TYPE 88

FIG 1



1. Correction Scale.
2. Graph - Atmospheric Temperature.
3. Graph - Projectile Weight
4. Graph - Atmospheric Pressure.
5. Graph - Muzzle Velocity Adjustment.
6. Upper Line - Sliding Bottom Scale
7. Bottom Line - Sliding Bottom Scale.
8. Transparent Runner.
9. Windage Chart.
10. Arrow Indicating Line of Fire.
11. Horizontal Axis.
12. Vertical Axis.
13. Designation Slip

TYPE 90 75 MM FD GUN
PRELIMINARY REPORT

1. GENERAL

A number of these guns have been captured on Leyte and Luzon, Philippine Islands, where they were used as field and Tk A guns. All were of the high speed type, equipped with pneumatic tyres, and none of the older steel-shod, horse-drawn guns have been found. It is believed to be one of Japan's most modern weapons, and is in use only by first class artillery units. Until recently the Type 90 had not been encountered in combat, but markings on captured guns indicate they were manufactured in 1942.
Its high muzzle velocity of 2,296 ft per sec makes it suitable for anti-tank fire against heavy armour at considerable ranges. Estimated rate of fire is 10/12 rds per min and the max range 16,350 yds.

2. DESCRIPTION (Figs 1 - 3)

(a) Barrel, Breech Block, Recoil Mechanism: The gun is equipped with a horizontal sliding breech block, hydro-pneumatic recoil mechanism, split trails and muzzle brake. It fires the same size projectile as the Type 38 (Improved) 75 mm field gun, but has a larger powder charge.
This weapon also differs from most Japanese artillery pieces in the provision of such features as trunnioning of the barrel almost to the extreme rear, and the provision of an unusual system of springing. However, many standard artillery features are retained, such as the coil spring equilibrators, driven trail spades, and trough type cradle.
The gun has a long monoblock barrel, with a horizontal, sliding hand-operated breech block. The muzzle brake has a single baffle plate, with six side ports for gas escape. A continuous pull firing mechanism is used, and a trigger safety latch is provided. The gun rides in a trough type cradle, with the sleigh riding on the top of the cradle. The cradle contains the hydro-pneumatic recoil mechanism.
The gun is trunnioned one foot from the extreme breech end, and is balanced by standard Japanese coil spring equilibrators. The springs are encased in cylinders bolted to the cradle, with the long axes of the cylinder and cradle being parallel. There is one equilibrator on each side of the sleigh, and the equilibrators are connected to the carriage by $\frac{3}{4}$ in. steel rods with flexible fastenings. In spite of trunnioning the gun so far to the rear, it is apparent that a pit must be dug beneath the cradle in order to fire at high angles of elevation.

(b) Brake System: A most unusual feature is the retention of the standard slow speed artillery brake system on this high speed carriage. Seats for two crew members are provided on the front of the shield and the hand brakes are operated by one rider, using the handwheel located beneath his feet. This crude

braking system must make high speed travel quite hazardous, and the brake operator must be in a specially precarious position when attempting to operate the brake. In this respect, the gun does not seem to have been properly adapted to high speed travel.

(c) Suspension: The gun has an unusual leaf spring type of suspension, using double leaf springs with nine leaves in each spring. The gun is fastened to an upper axle, with the upper springs fastened to the ends of the upper axle, and a pintle for the trail equalizer bar in the centre of the axle. The trail equalizer is locked out of action when the trails are closed. The wheels are mounted on a second, lower axle. A small screw type jack is provided on each end of the upper axle, running between the upper axle and the lower axle. For firing, the jacks are cranked down until the weight of the carriage and gun is supported on the lower axle through the jacks, and the springs are out of action. This undoubtedly greatly increases the stability of the gun during firing. The eight ply, 30 x 5 tyres are mounted on solid disc wheels. An unusual feature is the provision of mudguards.

(d) Traverse: The traverse of this weapon has previously been erroneously reported as 43 degrees left and right. A careful check, however, shows that the total traverse of this gun is approximately 50 degrees, with a total traverse of 43 degrees indicated on the traversing scale.

(e) Sight: A standard panoramic sight is used, and the range drum is provided with three different range scales.

(f) Ammunition: Ammunition recovered includes HE, AP-HE and smoke (white phosphorus) types.

Weights and Dimensions:

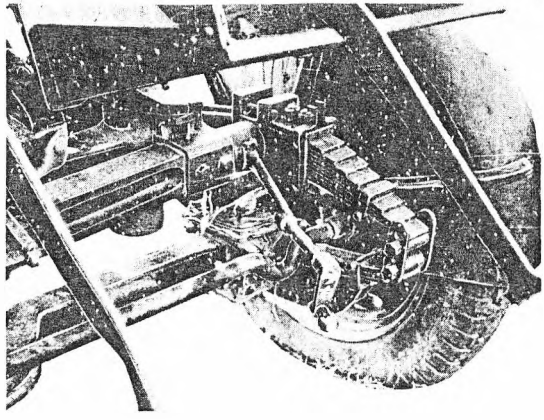
Calibre	75 mm
Overall length, gun and carriage	19 ft 6 ins
Width of axle	6 ft 5 ins
Length of barrel	8 ft 9 ins
Length of barrel and breech ring	9 ft 5 ins
Length of cradle	8 ft 1 in.
Recoil (range of graduations)	750 to 1050 mm
Length of chamber, approx	17 ins
Maximum diameter of chamber	3-7/16 ins
Diameter of barrel at breech	7 3/8 ins
Diameter of barrel at muzzle	4 3/8 ins
Thickness of breech block	5 3/4 ins
Length of breech block	8 1/2 in.
Width of breech block	5 1/2 ins
Number of lands	28
Length of rifling	7 ft 3 1/2 ins
Length of trails	9 ft 6 ins
Trail spread	9 ft
Length of equilibrator cylinders	31 1/2 ins
Diameter equilibrator cylinders	2 1/2 ins
Elevation limits, approx	0 to 45 degrees
Traverse, total	50 degrees
Depression	8 degrees
Length muzzle brake	10 ins

Diameter muzzle brake	7 ins
Clearance of gun	16 ins
Thickness of shield	1/8 in.
Width of shield	62 ins
Height of shield	33½ ins
Weight (firing position)	3,085 lbs
Length of recoil	41 ins

(SOURCE:- USASOS & CINPAC-CINCPOA BULLETIN No. 26-45)

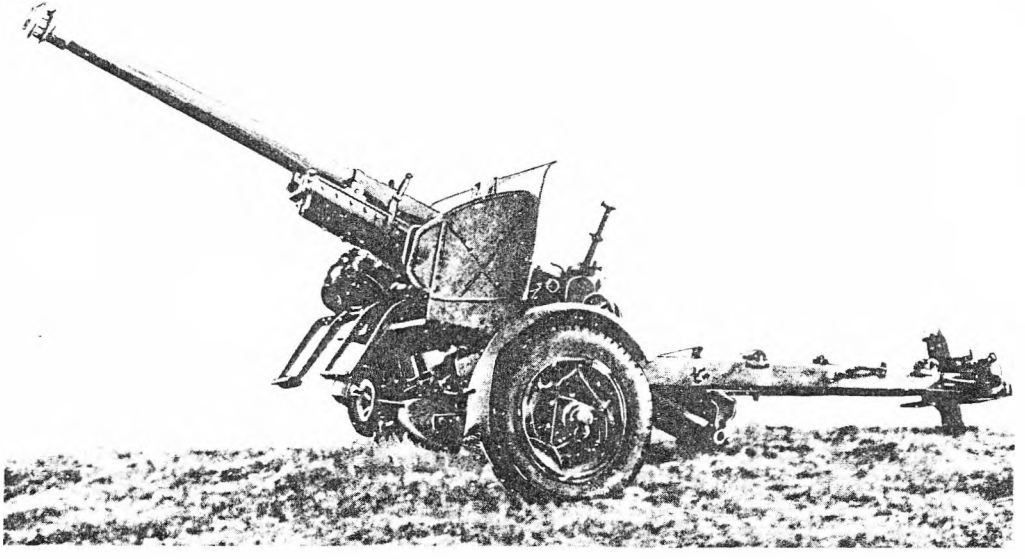
TYPE 90 75 MM FD GUN
PRELIMINARY REPORT

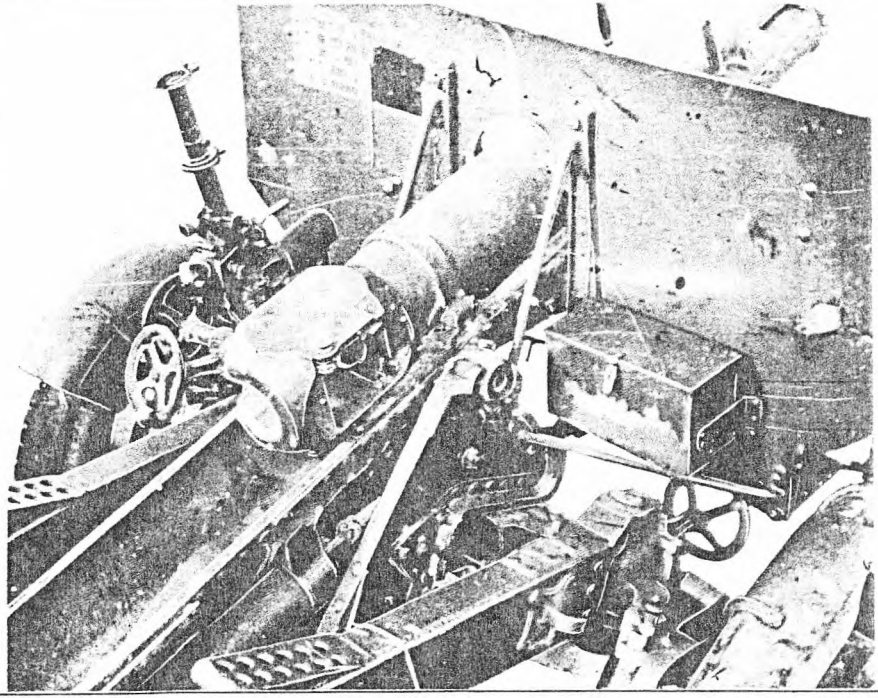
FIG 1 Suspension System



TYPE 90 75 MM FD GUN

PRELIMINARY REPORT FIG 2





TYPE 90
75 MM FD GUN

PRELIMINARY REPORT

FIG 3

Rear View Showing Breech Block, Cradle, and Recoil Mechanism

5·7 KG INCENDIARY BOMB

1. GENERAL

This bomb consists of a black, round iron container holding an incendiary mixture, a wooden plug enclosing the firing mechanism and an unpainted tin tail of the same diameter as the container. It was separated from a Japanese balloon recovered at Hayford, California, in February of this year. Three incendiary bombs still attached to the periphery of the lower ring of the weight dropping device and one lying nearby, were found. These bombs weighed 10.5 lbs, 10.75 lbs., 10.5 lbs and 11.1 lbs. respectively.

2. DESCRIPTION (Figs 1 - 3)

(a) Physical characteristics: The bomb selected for examination was 15⅝ ins high with a uniform diameter of 3¾ ins. The filling container was a welded iron pipe of ⅛ in. wall thickness, with a disc ¾ in. thick welded on at one end. Three vent plugs were near the open end, as well as six holes for screws which attached it to the wooden plug. This plug contained the firing mechanism assembly. The wooden cylinder was 2⅞ ins long with a hole ⅝ in. in diameter in the centre and two 5/16 in. holes parallel to the axis 1⅛ ins from, and on opposite sides of the centre. The latter two were vent holes and were foil-covered on the filling side.
The firing mechanism assembly was the same length as that of the wooden cylinder, while the body was of aluminium and contained a firing pin 9/16 in. in diameter, a conical spring 1½ ins long and aluminium closure caps screwed in each end of the body. One of these was a prime holder with the primer held in place by a primer retainer. Sealed at the primer flash hole were a few grains of black powder. Perpendicular to the firing mechanism, but within the wooden block, was a brass fitting which held a safety plunger, spring and arming wire. The plunger, when held in by the arming wire, prevented the firing pin from moving. Upon withdrawing the arming wire the spring threw the plunger free from the bomb and freed the firing pin.
An unpainted, cylindrical tin tail 9 ins long was attached to the wooden block by five screws, and a ⅜ in. strap with a hook was clamped to the filling container.
The gross weight of the bomb was 5698 gms, and the incendiary mixture and components weighed 3109 gms and 2589 gms respectively.

(b) Composition of Incendiary Mixture:

(1) Starter (top layer): Qualitative examination revealed that it contained $Ba(NO_3)_2$, KNO_3, aluminium (granular), magnesium, and magnetic iron oxide in large amounts. A small amount of wax was probably used as a binder, while small quantities of sulphur and carbon had

probably been added as black powder. Materials such as chlorates, perchlorates, and antimony sulphide were absent.
Probable ingredients in the mixture were:

$Ba(NO_3)_2$	23%
KNO_3	11%
Iron oxide (Fe_3O_4)..	22%
Black powder	10%
AL (granular)	11%
Mg (metallic)	20%
Wax (binder)	3%
Total	100%

Quantitative estimation revealed:

Portion soluble in chloroform	
Wax	2.6%
Sulphur	0.9%
Portion soluble in water	
Ba $(NO_3)_2$	22.5%
KNO_3	18.8%
Portion soluble in dilute NaOH	
AL (metallic granular) ..	10.7%
Portion soluble in HCl	
Mg	20.3%
Fe_3O_4 (magnetic iron oxide).	22.2%
Insoluble residue	
Carbon	1.6%
Sand and other insoluble impurities	0.6%
Total	100.2%

(ii) Main filling (bottom layer): Qualitative examination showed that it contained $Ba(NO_3)_2$, granular aluminium and magnetic iron oxide in large amounts. In addition, a small amount of oil and copper was present. The latter was evidently an impurity in the aluminium. The following toxics were found to be absent: As, Sb, Hg, Pb, Cd and Se.
Quantitative estimation gave the following results:

Portion soluble in chloroform	
Oil	0.02%
Portion soluble in water	
$Ba(NO_3)_2$	21.9%
Portion soluble in dilute NaOH	
Aluminium (granular)	23.4%
Portion soluble in HCl	
Magnetic iron oxide	54.4%
Insoluble residue	
Sand and other insoluble impurities	0.4%
Moisture (loss after 2 hr. at 150° C.)..	0.03%
Total	100.15%

(iii) Particle size estimation:

Main filling mixture	
+12	0.3%
−12 +20	3.1%
−20 +30	3.5%

-30 +50	28.6%
-50 +140	46.6%
-140	17.9%

Granular aluminum portion of main filling mixture:

+12	0.8%
-12 +20	5.5%
-20 +30	4.3%
-30 +50	45.6%
-50 +140	41.3%
-140	2.5%

Iron oxide portion of main filling mixture:

+12	0.7%
-12 +20	1.7%
-20 +30	0.7%
-30 +50	9.5%
-50 +140	67.9%
-140	19.5%

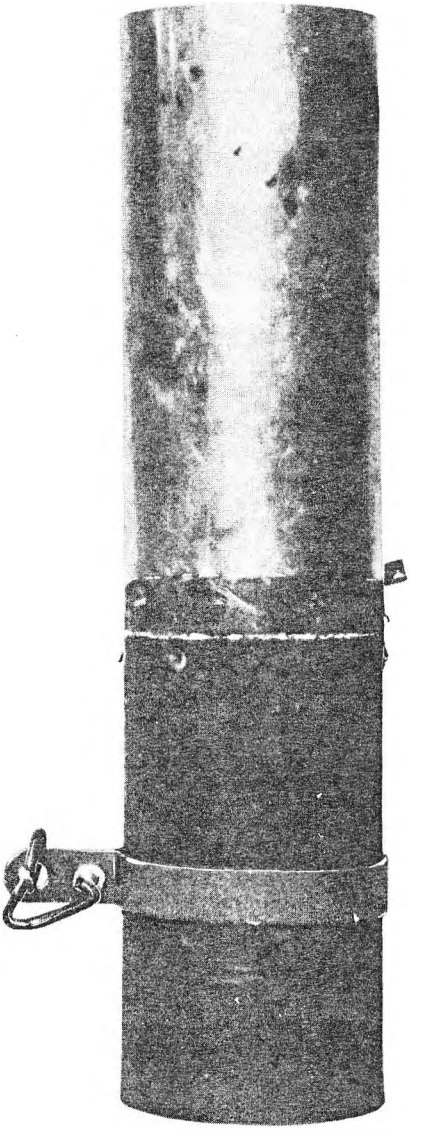
3. REMARKS

As the bomb was attached to a balloon and analysis indicated an incendiary mixture, it is concluded that this type of bomb was used to achieve an incendiary effect. The general basic design is similar to that of the British J-20 bomb, while its functioning and incendiary filling are similar to that of M 54 incendiary bombs.

(SOURCE:- EDGEWOOD ARSENAL, M.D.)

5·7 KG INCENDIARY BOMB

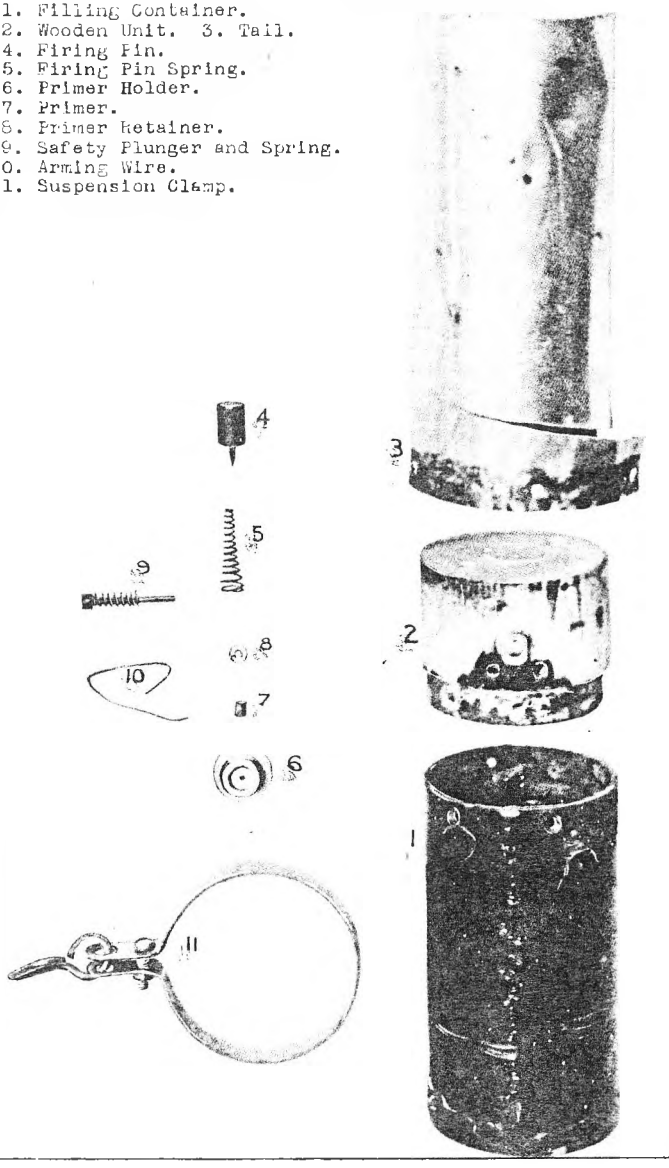
FIG 1 External View



5·7 KG INCENDIARY BOMB

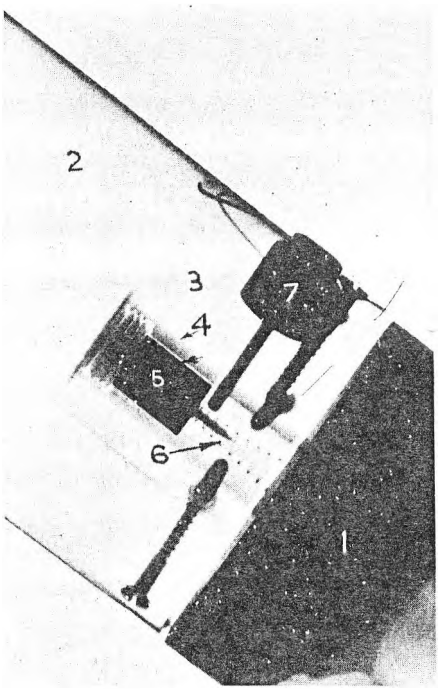
FIG 2 Component Parts

1. Filling Container.
2. Wooden Unit. 3. Tail.
4. Firing Pin.
5. Firing Pin Spring.
6. Primer Holder.
7. Primer.
8. Primer Retainer.
9. Safety Plunger and Spring.
10. Arming Wire.
11. Suspension Clamp.



5.7 KG INCENDIARY BOMB

FIG 3 X-Ray Photo Showing Assembly of Firing Mechanism



1. Filling Container. 2. Tail.
3. Wood Cylinder. 4. Firing Mechanism Body.
5. Firing Pin. 6. Firing Pin Spring.
7. Safety Plunger.

LUNGE MINE

1. GENERAL

The effectiveness of Allied tanks in operations against the Japanese has led the latter to devise an extraordinary series of hand-carried anti-tank demolitions. Perhaps the oddest of these is the so-called "Lunge Mine" encountered on Leyte Island. This weapon - an armour-piercing charge on the end of a pole - derives its name from the way in which it must be thrust against the side of a tank in order to detonate.

2. DESCRIPTION (Figs 1 - 2)

The mine is a sheet-steel cone, 11 ins long and 8 ins in diameter at the base, and contains a shaped charge of loosely cast, dirty cream-coloured explosive powder (crude T.N.T.). As in all hollow charges, the cavity in the bottom of the cone tends to guide the force of the explosion out from the bottom of the cone and against the armour-plate of the target.
A metal sleeve extends from the top, or apex, of the cone and houses the simple firing device - a pointed striker on the end of the broomstick-like handle which fits into the sleeve. A standard grenade detonator, or a primer cap, safety fuse, and non-electric blasting cap is set into the top of the cone, where the striker will strike the cap if the handle is jammed down in the sleeve. During transport, however, the handle is held immobile in the sleeve by a simple safety pin inserted through the sleeve and handle. A further safety feature is a thin holding pin, or shear wire, similarly installed through the sleeve and handle. The liner of the cone is of aluminium or steel. Three legs are welded (120 degrees apart) to the base of the cone to provide stand-off.
General Data:-

Weight of mine body	5.4 kgs
Weight of powder	3.2 kgs
Weight of handle	1.5 kgs
Length of handle	76 ins
Internal height of shaped charge cone	4.5 ins
Bottom diameter of cone	3.7 ins
Apex angle	40 degrees
Length of legs (stand-off)	6 ins
Delay (reported)	5-10 secs

3. OPERATION

The Japanese suicide soldier has been taught to wield this weapon as he would a rifle and bayonet. The prescribed method of operation is for the soldier to remove the safety pin as he approaches the tank, and to grasp the centre of the handle with his left hand, and the buttend with his right. Then, holding the stick level, with the mine to the front, he lunges forward as in a bayonet attack, thrusting the three legs on the mine base against the side of the tank. The

shock of contact breaks the shear wire and drives the striker into the primer cap (initiating delay) or into the detonator, thus exploding the mine.

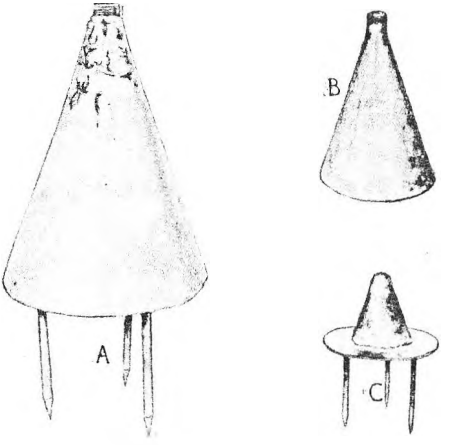
4. REMARKS

It is reported that the mine is capable of penetrating 6 ins of armour plating with sufficient force to kill or injure occupants and damage internal equipment of a tank, provided the mine contacts the plate squarely. If contact is made at an angle of 60 degrees, the mine is reputed to penetrate 4 ins of armour.

(SOURCE:- MEIU No. 4 & WAR DEPT, WASHINGTON)

LUNGE MINE

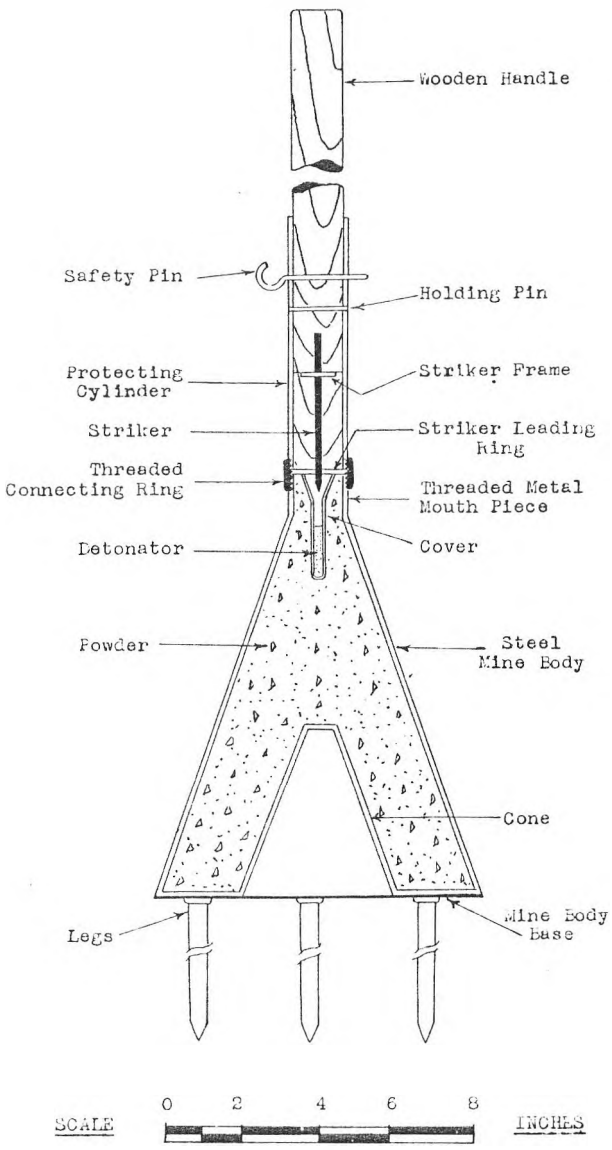
FIG 1



(A) Assembled Mine. (B) Mine Body.
(C) Inner Cone.

LUNGE MINE

FIG 2



NAVY 70 KG INCENDIARY BOMB

1. GENERAL

This bomb is very similar to the Japanese 60 Kg oil incendiary bomb, the only apparent external difference being the single row of screws which secure the tail to the main body instead of a double row. The oil incendiary filling is replaced with a pellet and igniter powder filling. The Japanese designation is "Type No. 1, Mk 6, Model 3, Modification 1".

2. DESCRIPTION (Figs 1 - 2)

(a) Body: This comprises a cast steel nose welded to a steel tubular body which is grey in colour with a 3½ ins wide red nose band and red tail struts. The tail cone is constructed of ⅛ in. steel with a longitudinal welded seam, and has welded to it a tail collar 1½ ins wide and ⅜ in. thick which is tapered to receive a single row of 16 screws. These secure the tail to the main body.
Four fins spot welded to the tail cone and braced by four sheet steel braces welded to the fins, constitute the tail construction.
The nose of the bomb contains a wooden block 1¾ ins thick, to which is nailed a tin gaine liner. This liner consists of a tin cylinder, 1⅝ ins in diameter and 3⅝ ins long, with a circular tin plate soldered at the top of the cylinder. Three nails secure this plate and cylinder to the wooden block. The liner serves to prevent the fine ignition powder from sifting out when no fuse or shipping plug is present.
The nose of the bomb is threaded to receive a fuse of 1¾ ins outer diameter, with 10 threads per inch. The fusing is the "Type 97 Mk 2 bomb nose arming mechanism," (A-3(a), and the gaine to be used is the "Type 92 bomb fuse Modification 2."

(b) Bomb Case Data:

Overall length	42⅝ ins
Length of body	21⅝ ins
Diameter of body	9⅞ ins
Thickness of wall	⅛ in.
Material of wall	Steel
Type of suspension	Horizontal (Navy Type)
Construction of suspension lug:	Normal navy suspension lug attached by four rivets.
Length of tail	21¼ ins
Width of tail	13¼ ins
Width of tail fins	6 ins
Dimensions of struts	1/16 in. sheet steel 1½ in. wide. 9½ in. long
Material of tail fins	1/16 in. sheet steel
Weight of filling	111 lbs
Total weight of bomb	160 lbs
Loading factor	69.4%

(c) Incendiary Filler Data:

Weight of ignition powder	30 lbs
Weight of the pellets	81 lbs
Total number of pellets	182
Length of pellets	2-2/16 ins
Diameter of pellets	1-9/16 ins

Composition of the ignitor powder:
75% Barium Nitrate
24.5% Aluminium
0.2% Moisture
0.3% Oil

Composition of the pellets: 35% Barium Nitrate
28% Ferric Oxide
18% Aluminium
The remainder is a synthetic rubber of polysulphide type closely resembling "thiokol".

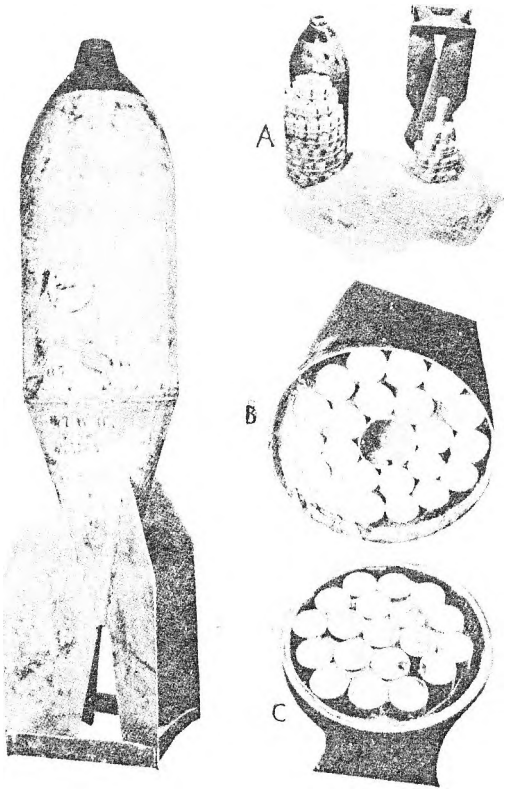
The pellets are bound together with string in the form of rings. Several rings inside one another form an increment. All space in the bomb not occupied by the pellets was filled with the ignition powder.
The pellet arrangement in the bomb body was as follows:

1st increment - three rings, 19 pellets total.
2nd increment - two rings and a spacer, 18 pellets total.
3rd increment - two rings, 7 pellets total.
4th increment - one ring, 5 pellets total.
5th & 6th increments - one pellet each.

(SOURCE:- MEIU No. 4)

NAVY 70 KG INCENDIARY BOMB

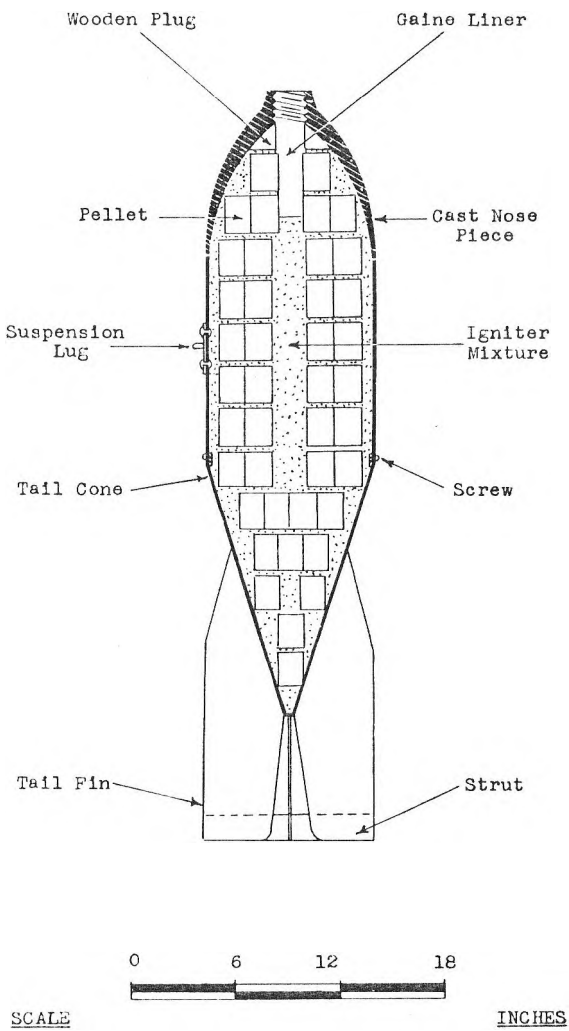
FIG 1



(A) Ignition Powder, Pellets, and Disassembled Case.
(B) Pellet Arrangement, Side View.
(C) Pellet Arrangement, Top View.

NAVY 70 KG INCENDIARY BOMB

FIG 2



NAVY 81 MM MORTAR BOMB

1. GENERAL

Manufactured for navy use, this projectile is new in construction, explosive filling and fusing. The tail structure has been altered from the standard army design and a new type main charge is used. The round is fused with a combination impact and time fuse which may be set for impact firing only, or as an aerial burst fuse with a variable delay ranging from 5 to 20 secs in 5-second intervals.

2. DESCRIPTION (Figs 1-3)

The bomb is comparable in size, shape and material of construction to the Japanese army 81 mm projectile except for a few alterations in tail and propellant tube construction, explosive filling and fuse pocket which, contrary to all other mortars so far captured, has right-hand threads instead of the regular left-hand threads.

(a) Bomb: The main body is a cast steel, tear-drop shaped container threaded internally at the forward end to receive the fuse adapter. The projectile has a well machined bourrelet just aft of the fuse pocket at the point of maximum diameter. The remainder of the body is rough and shows no evidence of machining. The base of the bomb is threaded internally right-hand to receive the propellant tube and tail assembly.
The propellant tube and tail assembly have been altered from the conventional army type. Twelve fins are spot-welded to the propellant tube. Just forward of the fins are six rows of flash holes with three flash holes 3/16 in. in diameter in each row. The after end of the propellant tube is threaded to receive the primer which is screwed into place after the cardboard cylinder containing the propellant charge has been placed in the tube.
The projectile is black overall with a $\frac{1}{2}$ in. green band on the nose and a 7/8 in. red band directly below.
General Data:-

Overall length (less fuse)	$11\frac{1}{2}$ ins.
Diameter at bourrelet	81 mm
Thickness of case	5/16 ins.
Width of bourrelet	$1\frac{1}{4}$ ins.
Diameter of fuse pocket	7/8 in.
Threads per inch in fuse pocket R/H..	16
Length of propellant tube	4 ins.
Diameter of propellant tube (outside)	$1\frac{1}{4}$ ins.
Diameter of propellant tube (inside)	7/8 in.
Diameter of tail	$3\frac{1}{8}$ ins.
Width of fins	1 in.
Length of fins	$1\frac{1}{2}$ ins.
Length of propellant case	$2\frac{5}{8}$ ins.
Weight of propellant	$\frac{1}{2}$ oz.
Weight of filling	$1\frac{1}{4}$ lbs.
Weight of projectile (less fuse) ..	$6\frac{3}{4}$ lbs.

(b) Explosive: The main charge was found by analysis to be a mixture of Picric Acid 57% and alpha-nitro-naphthalene 43%. The explosive is yellow in colour and has a total weight of 1.1 lbs. It is pressed into the case and has a somewhat waxy or oily appearance.
The propellant charge is contained in a cardboard cylinder and consists of a ½ oz. charge of double base powder initiated by a primer which is screwed into the base of the motor. It is assumed that extra increments for propulsion must be used but none were recovered with the round reported.
The time train detonator is a mixture of potassium chlorate and antimony trisulphide. The time train lead-in is a 50-50 mixture of barium peroxide and metallic silicon. The time train is a yellow powder mixture of lead chromate, barium peroxide, barium carbonate, silicon and powdered glass. Total weight of time train mixture is 3.5 grams.
The gaine which screws into the base of the fuse consists of a potassium chlorate, antimony trisulphide cap, a lead azide pellet and a tetryl booster.

(c) Fuse: This is of two piece construction and may be found with either a brass or a black steel body. The upper fuse body is threaded internally to receive the lower fuse body. An impact striker protrudes above the upper fuse body and is held in the safe position by a safety ring. The lower end of the striker is housed in the upper fuse body and is secured by a shoulder around its lower diameter, which engages the shoulder of the upper fuse body.
The impact striker is centrally bored to receive a set-back striker, set-back striker spring, time train detonator, and black powder delay. A horizontal flash channel is bored through the lower end of the striker just above the impact firing pin.
The lower fuse body is bored to two diameters. A safety collar consisting of a cylinder of nitrocellulose fits into the upper and larger bore. The smaller bore allows the impact firing pin to impinge on the impact firing detonator, which is screwed into the base of the lower fuse body. The extended portion of the lower fuse body, which houses the safety collar, has four small holes which carry the flash from the burning safety collar out to the time train ring.
The time setting ring is made of brass. The train consists of a yellow powder except at the section where the flash enters. At this section the train consists of a grey powder lead-in. The annular groove for the train is interrupted by a wooden block which allows the train to burn in only one direction and also serves as a booster lead-in stop when the external setting is set for impact firing. A spring clip on the outside of the brass ring engages an indentation in the fuse body to give the desired time setting.
The base of the fuse body is threaded internally with left-hand threads to receive the detonator holder, and externally with right-hand threads, which screw into the fuse pocket in the mortar projectile.
General Data:-

Weight of fuse (Gaine)	7¾ oz.
Overall length	3½ ins.
Length of upper fuse body	3/4 in.
Length of lower fuse body	15/16 in.
Width of brass time ring	1/4 in.

Length of impact striker	2 ins.
Diameter of impact striker (less collar)	3/8 in.
Length of set-back striker..	11/16 in.
Diameter of set-back striker	1/4 in.
Length of gaine	11/16 in.
Diameter of gaine	5/16 in.
Diameter of threaded fuse base ..	7/8 in.
No. of threads per inch right-hand..	16

Translation of the instruction tag reads:
"Warning, inspect outside of fuse and see that everything is in order. Tear off warning tag, release safety ring and attach fuse to mortar."

3. OPERATION

The safety ring is first removed from the impact striker and the fuse screwed into the mortar projectile. The time train ring is set for the desired time. When fired from the mortar, set-back causes the set-back firing pin to hit the time train detonator. The flash from the detonator ignites the powder delay which burns for approximately 2 seconds and then flashes out the flash holes in the lower portion of the impact striker, igniting the safety collar. The burning away of the safety collar ignites the time train and arms the fuse for impact firing. After the flame has ignited the time train, it burns for the pre-set time and then flashes down to the detonator holder. If the fuse should make impact with the target before the set time has elapsed, the impact striker will be forced down into the impact detonator, which in turn will initiate the booster. If it is desired that the fuse function only on impact, turning the brass timing ring to the position indicated by the two Japanese characters on the fuse body will bring the portion of the annular groove with the wooden plug directly over the booster lead-in. The time train will burn out harmlessly without causing the fuse to function. The fuse will then function on impact only.

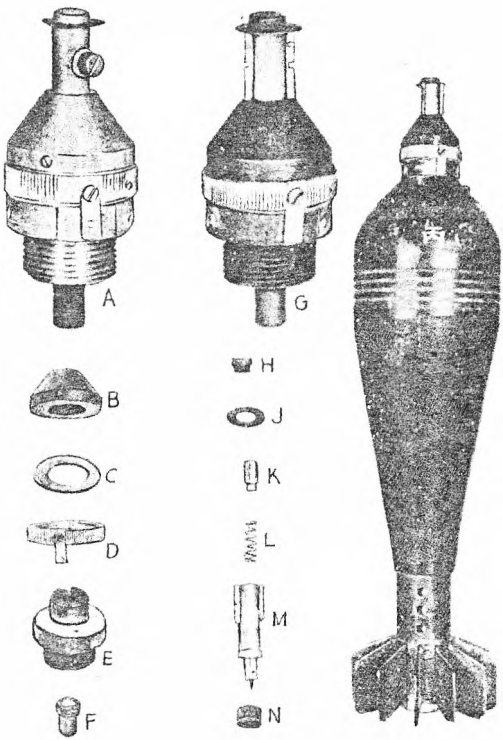
4. REMARKS

It should be borne in mind that the fuse used in this bomb is highly sensitive to shock. The set-back striker is held away from the time train detonator only by a very weak spring. Dropping the fuse would in all probability ignite the time train.
This is the first Japanese mortar projectile fuse recovered which has right-hand threads on the base, all previous rounds have had left-hand threads.
It should be remembered that once the round is fired and the nitrocellulose disc has burned, there is nothing to prevent the impact striker from being forced into the detonator. Care should be used in handling unexploded rounds.
In one of the fuses examined a grub screw was threaded into the impact striker and engaged an annular groove in the set-back striker to prevent accidental firing of the time train. It is not known at present whether or not this is a modification of the other fuse.

(SOURCE:- MEIU No.4)

NAVY 81 MM MORTAR BOMB

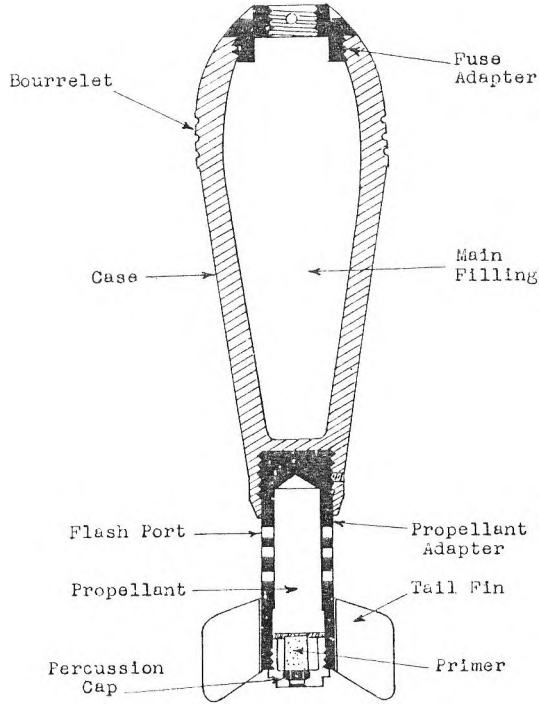
FIG 1



(A) Brass Fuse. (B) Upper Fuse Body. (C) Washer.
(D) Time Ring. (E) Lower Fuse Body. (F) Gaine.
(G) Steel Fuse. (H) Screw Plug. (J) Metal Washer.
(K) Setback Striker. (L) Safety Spring.
(M) Impact Striker. (N) Safety Disc.

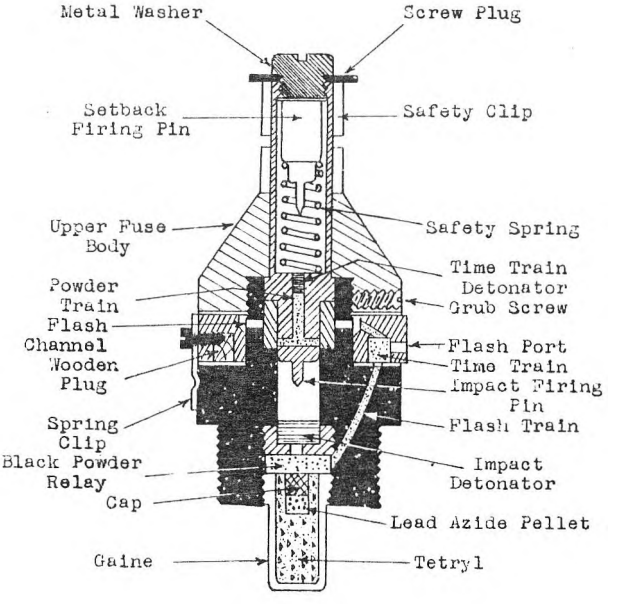
NAVY 81 MM MORTAR BOMB

FIG 2



NAVY 81 MM MORTAR BOMB

FIG 3 Fuse Details



SCALE INCHES

88 MM AA AMMUNITION

1. GENERAL

This ammunition was recovered on Saipan. It is designated 9 cm. by the Japanese but actually measures 88 mm. at the bourrelet. The round resembles the 75 mm. Type 88 anti-aircraft ammunition, described in AMF Tech Int Sums Nos. 5, 9, 10 and 14, but on a larger scale except for the rotating bands. Because of shipping restrictions at Saipan, ammunition had to be stripped of explosives. Hence, this round was received entirely inert.

2. DESCRIPTION (Figs 1 - 4)

(a) Projectile: This is painted black overall except for the rotating bands. There is a red band at the nose indicating an explosive filling present, and a yellow band halfway between the bourrelet and rotating bands, indicating a cast or hard-pressed filling. Aft of the two rotating bands are two circumferential grooves for case crimping. Aft of the lower groove the projectile is boat-tailed to its base. The open end of the projectile is internally threaded to take the booster cup and time fuse. The booster cup is externally threaded to fit the fuse pocket, and internally threaded to take the auxiliary detonating fuse. A grub screw secures the time fuse in the projectile.
Painted in white just above the rotating bands are Japanese characters which indicate the projectile was loaded in January, 1944, at Tokio. Between the yellow band and bourrelet in white paint is a minus sign (-) indicating a weight error of -.5% to -1.5% below specified weight.

General Data:

Weight of projectile, booster cup and auxiliary detonator	16 lbs 5¼ oz
Length of projectile without fuse	11 11/16 ins
Inside width of rotating band	⅜ in.
Outside width of rotating band	5/16 in.
Width of bourrelet	¾ in.
Distance between rotating bands	¼ in.
Distance between rotating bands and base	2½ ins
Distance between rotating bands and bourrelet	2¾ ins
Base diameter	2⅞ ins
Diameter at bourrelet	3 7/16 ins
Diameter just aft of bourrelet	3⅜ ins
Diameter of rotating bands	3⅝ ins
Outside diameter at fuse pocket	2⅝ ins
Outside max. diameter of aft rotating band	3 9/16 ins
Shell body thickness	½ in.
Depth of cavity	10 13/16 ins
Length of booster cup	4⅛ ins

Length of lower portion of booster cup .... 3 1/16 ins
Length of threaded portion of booster cup ½ in.
Diameter of lower portion of booster cup .. 1 3/16 ins
Thickness of booster cup .. .. 1/16 in.
Threads in fuse pocket (R/H) .. .. 19 per in.
Internal threads of booster cup (R/H) .... 21 per in.

(b) Case: This is made of drawn brass and is machined for about 2⅝ ins above the rim. It is a full-rimmed case with a slight taper and very little bottle neck. It is crimped to the projectile by two complete crimping grooves. The screw-in primer has three spanner holes and is flush with the base of the case. There is a black powder charge above the primer cap.
In purple on the side of the case is painted 192A. The meaning of the "A" is not known but the figures indicate the case was loaded in February, 1944. Just below these figures is the Tokyo Army Ordnance Branch Depot's code mark. On the base of the case is stamped November, 1943, the date of manufacture. The place of manufacture is the Army Arsenal. The meaning of an F stamped on the base is not known. On the primer base are characters meaning it was manufactured December 1943, at a Tokyo Army Arsenal.

General Data:-

Length of case .. .. 22⅝ ins
Thickness .. .. 1/16 to 1/8 ins
Diameter at rim .. .. 4 ins
Diameter below rotating band .. ... 3½ ins
Diameter of rim .. .. 4⅜ ins
Length of primer .. .. ⅝ ins
Diameter of primer at base .. ... 1 5/16 ins
Thread diameter of primer .. ... 1 3/4 ins
Threads of primer .. .. 20 per ins

(c) Fuse: This is a 50-second combination mechanical time and impact projectile fuse designated Type 100 by the Japanese, and is similar to the Japanese Navy Type 91 time projectile fuse. It is significant to note the Japanese Army has essentially adopted a Navy projectile fuse mechanism. The auxiliary detonating fuse is the same as is used in the Japanese Army Type 88, 75 mm anti-aircraft projectile. The fuse consists of the following parts:

1. Windshield: This merely adds to the fuse form. It is made of aluminium alloy and is threaded internally at its base to screw on to the shoulder of the time setting ring.

11. Time Setting Ring: The ring is made of alum-alloy and is the piece which is turned to set the time. Its upper shoulder is externally threaded to receive the windshield and is pierced by two holes. The large hole is in line with a hole in the clock body when the fuse is set on safe, and is so arranged to permit the entry of a key to wind the clock. The smaller hole receives a setting lever which is a part of the clock mechanism. In the top of this ring is a set-back plunger. The plunger's lower end keeps it in the ring while a relatively strong spring keeps the plunger extended. On the inside of the ring is riveted a brass lug which

serves as a safety stop against a protruding lug on the fuse body. This permits the ring to be turned clockwise only, when set on safe, and never past the 50-second marking.

iii. Assembly Ring: This is made of aluminium and is internally threaded on its lower portion to fit the fuse body. It is further secured by two grub screws 180° removed. This ring secures the time setting ring. The notches in its upper part are spanner slots.

iv. Clock Mechanism: This is a well built piece, of steel construction. Besides the mainspring and timing gears, it contains a spring-loaded firing pin, centrifugal safety block, a set-back pin, a firing pin release arm, a setting disc, a stop arm, and a setting lever. The brass centrifugal safety block is pivoted off centre and spring-loaded to remain under a shoulder of the firing pin until the projectile is rotating 1000 R P M. The firing pin release lever holds the firing pin in a cocked position by resting under a shoulder of the firing pin. The lever is held stationary by a set-back pin on one end and a setting disc on the other. A shoulder on the set-back pin holds an escapement release arm in the teeth of the escape wheel until set-back occurs. The setting lever, stop arms, and setting disc rotate loosely as one piece on the central spindle of the clockwork until the projectile is fired. The setting disc has a slot in it into which the firing pin lever can fall when the slot has rotated opposite it. A lug on the underside of the stop arm catches on the disc end of the firing pin lever, firing disc, and the clock from operation if the projectile is fired.

v. Fuse Body: This piece is made of aluminium alloy and houses the impact firing assembly, time primer assembly, and base plug. The time firing assembly is merely a primer cap under which is a black powder flash channel leading to the small black powder magazine in the base plug. The impact firing assembly consists of a stationary firing pin separated from a movable primer carrier by a spring. Two spring-loaded detents are engaged in the slot of the primer carrier until the projectile is rotating in flight. The fuse body is threaded externally at the base to fit the opening of the shell. It is threaded externally to take the assembly ring and the fuse cover. It is threaded internally to take the impact firing assembly plug and also the base plug.

vi. Fuse Cover: This piece is made of brass and is threaded internally at its base to fit over the fuse in storage.

General data:

Weight of complete fuse	18½ ozs
Length of fuse overall	4⅞ ins
Length of fuse visible when in projectile	4 5/16 ins
Maximum diameter of fuse	2⅜ ins
Diameter of threaded section ..	2 1/16 ins
Threads of base (R/H)	19 per in.

Stamped on the fuse can lid label, fuse cover, and windshield in purple paint are markings which reveal that it is a Type 100 mechanical time fuse made in April 1943, at the Tokyo Army Arsenal.
On the time setting ring is a Japanese character stamped in red, halfway between the 0 and 50 second markings. The arrow above this mark indicates the direction in which the ring must be turned to advance the time setting.

3. OPERATION

(a) Time: Results of setbacks: i. The set-back plunger overcomes its spring and, in doing so, bends down the thin setting lever and disengages it from the setting ring. At the same time, the plunger drives downward a clutch bar which secures the setting disc, setting lever and stop arms, to the central clock spindle. (b) A set-back pin frees the escape wheel, allowing the clock to run and turn the setting disc counter-clockwise. The pin also allows the firing pin release arm spring to engage the firing pin release arm and force the arm to ride against the setting disc until the slot in the disc allows the firing pin release arm to move out from under the shoulder of the firing pin. By this time, centrifugal force has forced the brass safety disc from under another shoulder of the firing pin and the pin is thus able to impinge upon the primer. The flash from the black powder channel ignites the magazine and fires the auxiliary detonator.

(b) Impact: Centrifugal force moves the detents from the slot in the primer carrier and the primer carrier is then free to overcome the spring and hit the fixed firing pin upon impact. A small black powder charge flashes to the base magazine, which in turn fires the auxiliary detonating fuse.

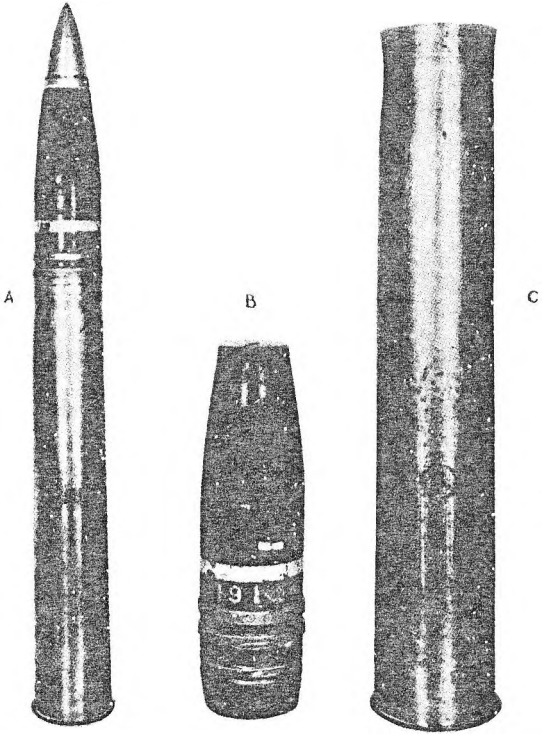
4. SAFETY FEATURES

A lug on the time setting ring engages a lug on the fuse body so the ring cannot be rotated clockwise when set on safe. This keeps the slot in the setting disc from being presented to the firing pin release arm, and causing very short or instantaneous fuse settings.
A stop arm comes against the setting disc end of the firing pin release arm when the fuse is set on safe. Since the clock's centre spindle turns counter-clockwise, this feature prevents the setting disc turning and the clock work from running should the projectile be fired. A set-back pin holds the firing pin release arm under the shoulder of the firing pin. It also frees the impact primer holder of the detents engaged in its slot.

(SOURCE:- MEIU - No.4)

88 MM AA AMMUNITION

FIG I



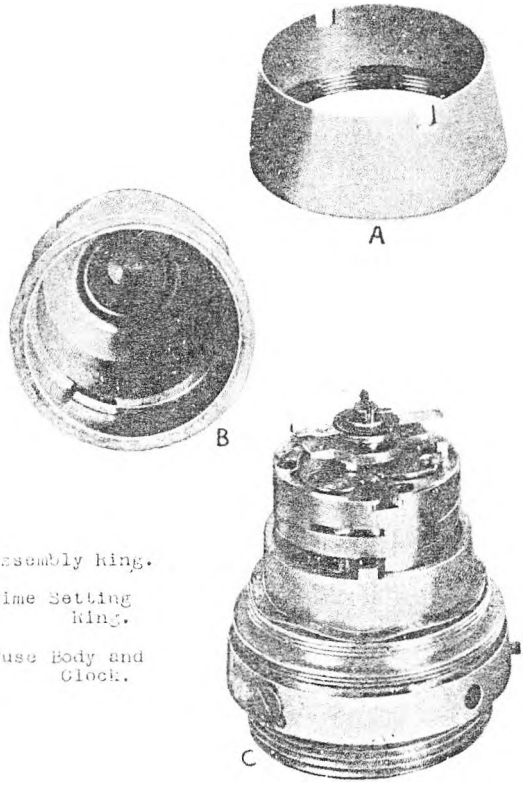
A. Complete round.

B. Shell.

C. Case.

88 MM AA AMMUNITION

FIG 2



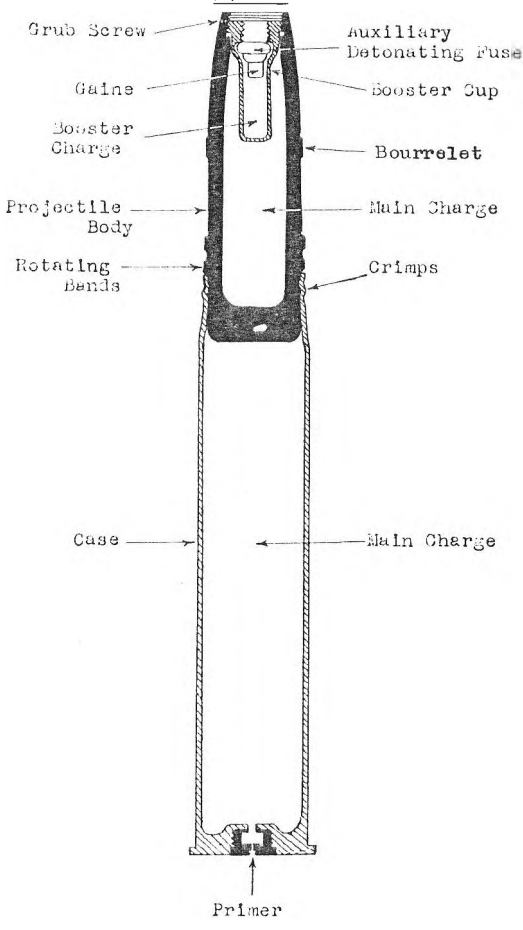
(A) Assembly Ring.

(B) Time Setting Ring.

(C) Fuse Body and Clock.

88 MM AA AMMUNITION

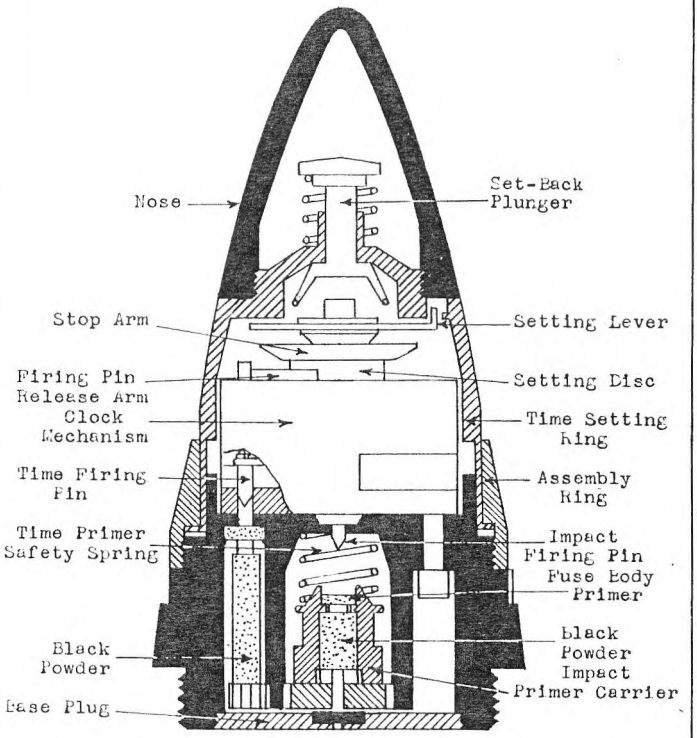
FIG 3



88 MM AA AMMUNITION

FIG 4

Type 100 Combination Fuse



150 MM HE SHELLS

1. GENERAL

The ammunition discussed in this report are the 150 mm streamline HE and the Type 92 Short Nose HE projectiles. The designation of the former could not be ascertained from examination, but it is believed to be a Type 92. A number of rounds of the short nose shell were recovered in the Lingayen Gulf area, Philippines. It is for use with the Type 38,15 cm howitzer and is of interest because of its unusually short case.

2. DESCRIPTION (Figs 1 - 3)

(a) Streamline Shell: This is made of steel and painted in the usual army manner, being black overall with a yellow band below the copper bourrelet and a white band above the rotating band. An adapter, which screws (R/H) into the nose of the projectile, is internally threaded (L/H) in the forward end to take a Type 88 instantaneous or short delay fuse. A grub screw in the shell body secures the adapter. The latter is internally threaded (L/H) at its base to take the booster cup, which is secured by a grub screw in the adapter. Aft of the double cannelured rotating band the shell is boat-tailed.
The shell is loaded with cast T.N.T., while the booster cup contains a pellet of RDX (cyclonite) in a thin, white cardboard container which is recessed at the upper end to take the fuse gaine.
Stamped into the shell body just above the white band are a number of Japanese characters showing that the shell was manufactured in January 1935, at the Osaka Army Arsenal. Near the forward end of the shell is stamped 370.

Additional data is as follows:-

Weight (empty)	57 lbs
Weight of explosive	11 lbs
Overall length	22 7/8 ins
Distance from base to rotating band	3 1/4 ins
Width of rotating band	9/16 in.
Distance from rotating band to bourrelet	7 1/4 ins
Width of bourrelet	3/4 in.
Distance from bourrelet to fuse pocket	10 7/8 ins
Diameter at base	5 1/4 ins
Diameter at rotating band	6 ins
Diameter of body	5 3/4 ins
Diameter of bourrelet	(148 mm) 5-27/32 ins
Length of booster cup	2-13/16 ins
Diameter of booster cup	7/8 in.
Length of adapter overall	2 ins
Threads of fuse pocket -	
Per inch (L/H)	13 U.S. Std
Outside diameter	15/16 in.
Length of threaded portion	1/2 in.

External threads of adapter -
Per inch (R/H) .. .. .. 12 U.S. Std.
Outside diameter .. .. 1-13/16 ins
Length of threaded portion ½ in.

(b) Short Nose Shell: This is painted black overall, with the usual yellow band around the body and a red-tipped nose. The nose is internally threaded to take a Type 88 instantaneous or short delay howitzer fuse. The rotating band, which has two cannelures, is the kind usually found on 150 mm projectiles. The booster is a pellet of RDX (cyclonite).
The date of manufacture, May 1940, is stamped into the projectile, while the following additional data is stencilled in white: Date of filling, March 1942; place of filling, Osaka; type of explosive, angayaku (RDX and ammonium nitrate); designation of shell, Type 92.
The brass propellant case has straight sides and is rimmed. In storage the mouth is closed by paper or cardboard sealed with waterproof tape. All cases have the common, small primer.
The cases recovered have either had Japanese markings or have been marked "Berndorf 1905." Translation of the Japanese markings gave the date and place of manufacture as November 1942, Osaka. Markings on the large powder bag read: "August 1942, Osaka, Type 38, Howitzer, large." Markings on the smaller powder bag are identical except that the character for "small" replaces the character for "large".
The propellant charge is flake, graphited, smokeless powder. It is contained in one large and one small silk bag. A small black powder bag is sewn on the base of both increments.

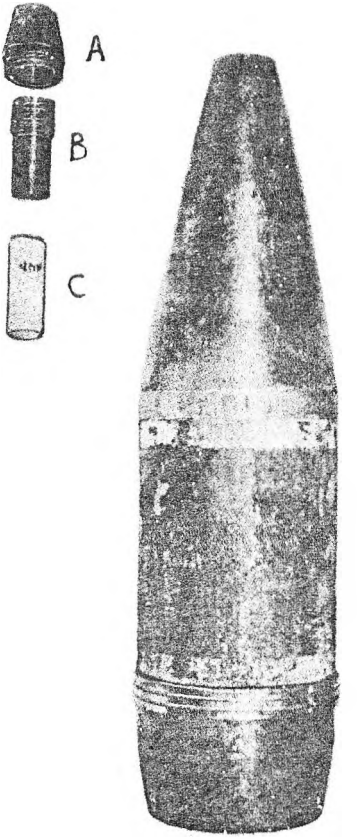
General data is as follows:

Total weight of projectile	78 lbs 5 ozs
Overall length	22½ ins
Overall length of propellant case	4.1 ins
Base diameter of propellant case..	6.7 ins
Mouth diameter of propellant case	6.1 ins
Thickness of case at mouth	1/32 in.
Weight of case (empty)	5 lbs 3 ozs

(SOURCE:- MEIU No. 4)

150 MM HE SHELLS

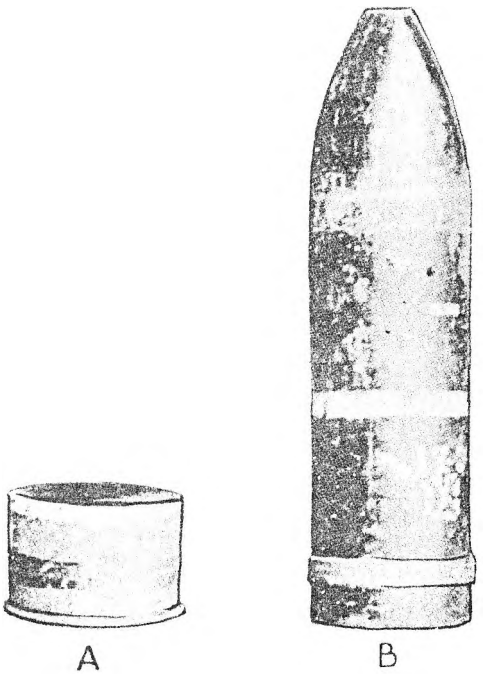
FIG 1 Streamlined Projectile



(A) Fuse Adapter. (B) Booster Cup. (C) Booster Pellet.

150 MM H.E SHELLS

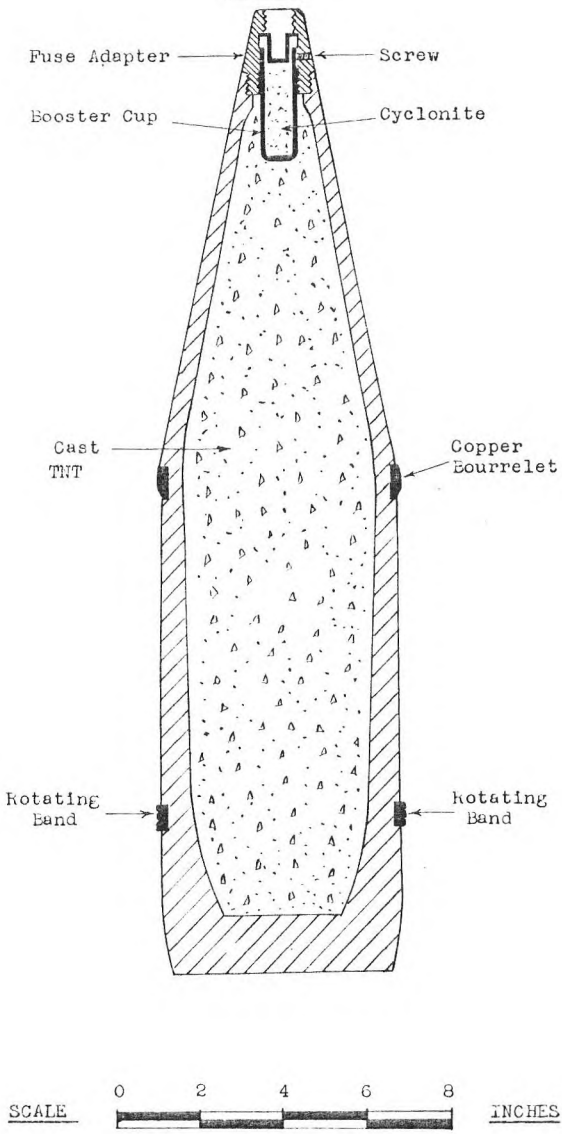
FIG 2 Short Nose Projectile and Case.



(A) Case (B) Projectile

150 MM HE SHELLS

FIG 3



FIRING TESTS
TYPE 97 15 CM MORTAR

1. GENERAL

Firing tests conducted with the Type 97 (1937) 15 cm mortar gave a minimum range of 380 yds and a maximum of 4650 yds. Enough firing was carried out to supply data for tentative firing tables. In almost all instances only one round was fired at each range; therefore the ranges given may be in error by the full value of the dispersion. The mortar was found to be stable in firing.

2. FIRING TESTS

The actual firings were conducted by a Chemical Mortar Battalion, and ranges were taken by a Sound and Flash Ranging Platoon of a Field Artillery Observation Battalion. The firing was conducted over water. Four observation points, 500 yds apart, were set up along the beach. One was located at the mortar position, two were on the right of the mortar position, and the fourth was located on the left of the mortar position. Elevations were obtained by means of the mortar sight. These were checked with a U.S. Gunners Quadrant, Ml. There was a slight discrepancy between the sight and the quadrant, and, consequently, allowance was made for the sight as the quadrant was known to be in perfect adjustment.

Out of 35 rounds fired over water, only one fuse failed to function on impact. The fuses used were the Type 100 combination instantaneous-delay mortar fuse. Of the igniting cartridges used only one primer failed to function. However, considerable difficulty was experienced in inserting the igniting cartridges in the stem of the rounds. This was due to the fact that moisture had caused the cardboard cartridge cases to swell.

The fragmentation of the projectiles appeared to be excellent. Splashes from shell fragmentation could be seen ranging out to a radius of approximately 100 feet around the projectile before the large cone of water was thrown up by the force of the explosion. An estimated 50 to 100 of these fragment splashes could be seen on almost every round that was near enough to shore to make them discernible with the naked eye. It appears that the fuse functioned instantaneously as the small splashes could be seen an instant before the cone of water was thrown up by the combined blast and fragmentation effect of the projectile.

During the first half dozen rounds fired, it was noted that the base plate shifted to the rear, but it then settled firmly into the ground and no further movement was noted. The propelling charge is almost entirely smokeless. However, a muzzle flash varying from 2 to 3 ins to approximately 3 feet long could be seen, the length of the flash depending on the number of increments used.

3. TENTATIVE FIRING TABLES

The following tentative firing tables were obtained by firing only one round at each charge and angle of elevation:

ZONE 0
(Igniting cartridge only)

RANGE (Yards)	ELEVATION (Mils)
* 440	1200
460	1100
575	1000
620	900
690	800

(* A second round fired at 1200 mils gave a range of 380 yards. This is well within the rectangle of dispersion that would be expected).

ZONE 1
(Igniting cartridge and one increment)

RANGE (Yards)	ELEVATION (Mils)
840	1200
940	1100
1080	1000
1060	900
1040	800

ZONE 2
(Igniting cartridge and two increments)

RANGE (Yards)	ELEVATION (Mils)
1205	1200
1430	1100
1675	1000
1720	900
1760	800

ZONE 3
(Igniting cartridge and three increments)

RANGE (Yards)	ELEVATION (Mils)
1680	1200
1920	1100
2200	1000
2240	900
2280	800

ZONE 4
(Igniting cartridge and four increments)

RANGE (Yards)	ELEVATION (Mils)
2110	1200
2360	1100
2710	1000
2940	900
2980	800

ZONE 5
(Igniting cartridge and five increments)

RANGE (Yards)	ELEVATION (Mils)
2620	1200
2950	1100
3290	1000
3490	900
3680	800

ZONE 6
(Igniting cartridge and six increments)

RANGE (Yards)	ELEVATION (Mils)
3060	1200
3400	1100
4040	1000
4250	900
4650	800
4160	700

(SOURCE:- USASOS)

NAVY TYPE N° 80 LAND BOMB & N° 80 LAND BOMB MODEL 1

1. GENERAL

Examination of specimens of these two bombs, recovered at LEYTE, PHILIPPINE ISLANDS, and on PALAU, reveals that they are the same in all respects except that the explosive filling and auxiliary booster are Shimrose (picric acid) in the No 80 Land Bomb and Type 98 (Trinitroanisol 70%, HND 30%) in the Model 1.

2. DESCRIPTION (Figs 1 - 2)

The bomb is an enlarged version of the No 6 and No 25 Land Bombs, and is of three piece construction. The nose is fastened to the barrel by a continuous weld and three rows of rivets; the tail cone is fastened to a coupling ring by two rows of rivets and the coupling ring is attached to the bomb body by two rows of screws. Four 1/8 in steel fins are welded to the tail cone by eight spot welds and are supported by box-type struts. Two guide studs, 180 degrees apart, form the attachment for some type of suspension or trunion band.

Other characteristics are:

Overall length	III - 11/32 ins
Length of body (nose to junction at base)	69 - 7/16 ins
Length of tail fins	35 3/4 ins
Diameter of body	17-11/16 ins
Width of tail diagonally	24-19/32 ins
Wall thickness	½ in
Bomb weights:	
Tail section (empty)	79.1 Kg
Body (empty)	330 Kg
Total weight of bomb case	409.1 Kg (900 lbs)
Weight of filling	389.5 Kg (857 lbs)
Total weight of bomb	798.6 Kg (1757 lbs)

The filling consists of 15, pre-formed paper-wrapped blocks. The covering of each is marked as follows:

Nose blocks	A1--A4
Body blocks	B1--B8 (reading aft)
Tail blocks	C1--C3 (reading forward)

The following information on the explosive filling was printed on the labels found on blocks A4, B8 and C3:

Bursting charge for No 80 Land Use Bomb (Model 1)

	Bursting Charge		Booster	
	(No Model)	(Model 1)	(No Model)	(Model 1)
1. Type of powder	Picric Acid	Type 98	Picric Acid	Type 98
2. Lot number	407	70	20	68
3. Date of manufacture	Jan '40	Mar '40	Jan '40	Feb '40
4. Date cast or pressed	Jun '40	Jun '40	May '40	Jun '40
5. Weight of explosive	(not given)		(not given)	

Naval Powder Factory

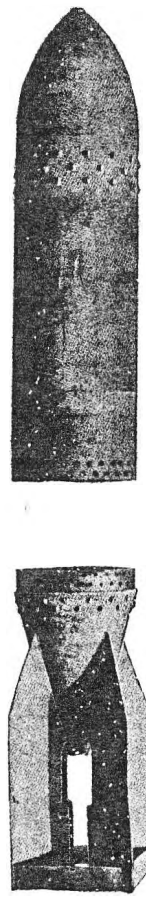
The bomb is grey overall with a green nose, green tail fin tips and tail struts. There is also a blue band 12 ins aft of the guide studs, and two red stripes, 180 degrees apart, run along the longitudinal axis of the bomb 90 degrees from the guide struts. On the nose band and one tail strut are the Japanese characters for "Land Use". At the after end of the barrel and the forward end of the cone are stencilled the manufacturer's symbol and matching serial numbers. This follows in all respects the Japanese Navy's old marking code for land bombs.

Fuses used in the nose are probably A-1(c) or A-3(d), and in the tail B-3(b). All are of the impact type.

(Source : MEIU)

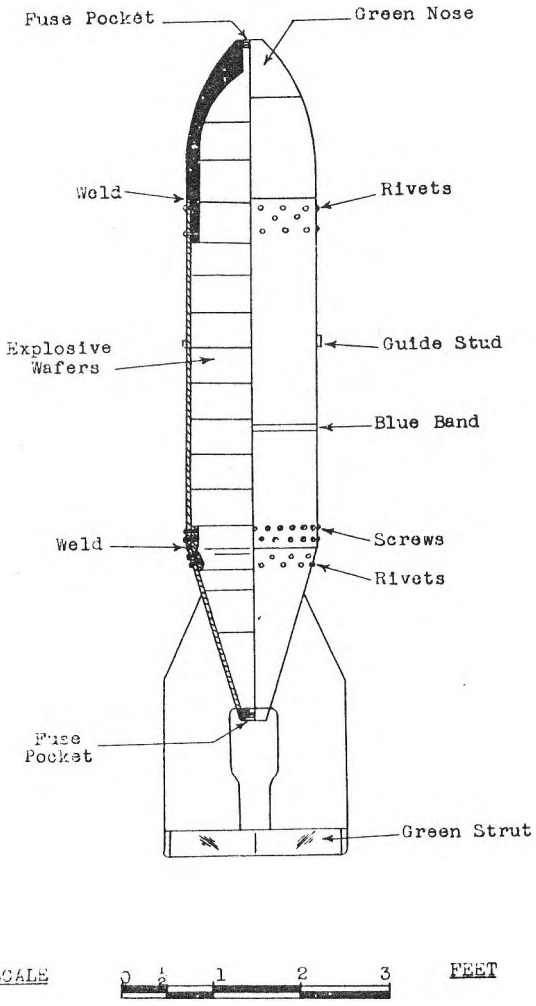
NAVY TYPE N° 80 LAND BOMB & N° 80 LAND BOMB MODEL 1

FIG 1 No 80 Land Bomb Model 1, Disassembled Prior to Unloading



NAVY TYPE N° 80 LAND BOMB & N° 80 LAND BOMB MODEL 1

FIG 2



TRANSCEIVER MODEL 66 TYPE A

1. GENERAL

This equipment is a Walkie-Talkie type and consists of a transmitter and receiver. It is not known how it is carried but it is presumed that it is strapped to a soldier's back since there are four square hinged rings on the corners of one side. Equipment examined was incomplete as a major portion of the hook-up wires were broken or missing.

2. DESCRIPTION (Figs 1-6)

The set measures 8½ ins by 4 ins by 6 ins and weighs 8 lbs without any accessory parts or power supply. The controls are distributed on the top and the two sides. The top contains the receiver and transmitter switches, the plate milliammeter and the aerial milliammeter. The left side is the transmitter panel and mounts the aerial key and microphone jacks, the auxiliary key, aerial tuning dial, oscillator tuning dial and a small hinged compartment containing the crystal socket. The right hand side is the receiver panel which mounts the on-off switch, filament rheostat, main tuning control, regeneration control, phone jacks, ground connection, external power supply and filament voltage test. The other panels are all removable giving easy access to all major parts.
Each component is stamped with a number from 1 to 47 inclusive. The frequency range of the RF tank circuit was found to be approx. 2.4 mc to 9.1 mc.
The three valves used are duotriode UZ 109C types which are very similar to the American 19 valves.
The receiver uses two valves, one as a regenerative detector and audio amplifier and one as a push-pull amplifier. Regeneration is controlled by a variable resistance (No.28) in the "B" lead of the regenerative half of the first valve. The audio amplifying half of this valve is coupled to the push-pull amplifier by a matching transformer with a turns ratio of 1:3.
The transmitter can be used for either phone or CW. On phone, two valves are used. One is a crystal controlled oscillator and the other is a push-pull modulator. The microphone is coupled to the grids of the modulator by a transformer with a turns ratio of 1:50. Plate modulation is used, the aerial is tuned by a variometer and a key is mounted directly on the transmitter panel. A key jack on the same panel provides for remote keying. As the hook-up wires to both the panel key and the key jack are missing and since there are three multi-element switches in the set, it is impossible to determine the original keying circuit.
There are two aerial jacks, one of which goes directly to the aerial coil and one through a 99 mm fd condenser to the aerial coil. It is not known what type of aerial is used. The filament voltage is controlled by a rheostat.
A filament test voltage jack is provided. Nothing is

known of the source of power except that it must supply 135 volts DC for the plates and 1.5 volts DC for the filaments. A small compartment within the set apparently houses a 9 volt battery and a 4.5 volt battery to supply the grid biases.

TRANSCEIVER MODEL 66 - TYPE A
(See Figs 4,5,6)
PARTS LIST

No.	Component	Function	Value
1	Aerial Jacks		
2	Switch	Send-Receive Switch	
3	Milliammeter	Aerial Current Meter	0-150 ma
4	Variometer	Aerial Tuner	
5	Coil	Transmitting Aerial Coil	
6	Coil	Oscillator Coil	
7	Condenser	Blocking Condenser	
8	Condenser	Blocking Condenser	
9	Variable Condenser	Oscillator Tuning Condenser	
10	Crystal Holder		
11	Resistor	Grid Leak	20 K ohms, 1W.
12	Resistor	Grid Leak	Missing
13	Duo Triode	Transmitting Oscillator	
14	Condenser	RF Bypass Condenser	
15	Switch		
16	Microphone Jack		
17	Key		
18	Transformer	Output Transformer	Ratio 2:1
19	Duo Triode	Push-pull Amplifier; push-pull Modulator	
20	Resistor		500 K ohms, $\frac{1}{2}$W.
21	Resistor		500 K ohms, $\frac{1}{2}$W.
22	Transformer	Microphone and Plate to push-pull grids Transformer	Ratio 1:3:50
23	Transformer	Audio Transformer	Ratio 1:3:5
24	Coil	RF Choke	
25	Duo Triode	Regenerative Detector and Audio Amplifier	
26	Condenser	Bypass Condenser	
27	Switch		
28	Potentiometer	Regeneration Control	
29	Resistor		Missing
30	Milliammeter	Plate Current Meter	0-50 ma
31	Switch	Power On-Off Switch	
32	Coil	Part of RF Circuit	
33	Condenser	RF Bypass Condenser	495 mmfd, 1000 v.d.c.
34	Resistor	Grid Bias Resistor	20,000 ohms, 1W.
35	Condenser	Coupling Condenser	
36	Variable Condenser	Tuning Condenser	
37	Coil	Feedback Coil	
38	Coil	Receiver Aerial Coil	
39	Jack	Counterpoise Jack	
40	Jack	Filament Voltage Test Jack	
41	Potentiometer	Filament Rheostat	
42	Battery Terminal	Grid Bias Terminal Block	
43	Resistor		50 ohms
44	Condenser		99 mmfd, 1000V
45	Resistor		
46	Phone Jack		
47	Key Jack		

SOURCE:-Camp Coles Sig.Lab. Ft Monmouth, N.J.

TRANSCEIVER MODEL 66 TYPE A

FIG 1 Front View

(A) Receive-Transmit switch.

(B) Phone switch.

(C) Microphone switch.

(D) Milli-amp meter.

(E) Plate Milli-amp meter.

(F) Main tuning control.

(G) Regeneration control.

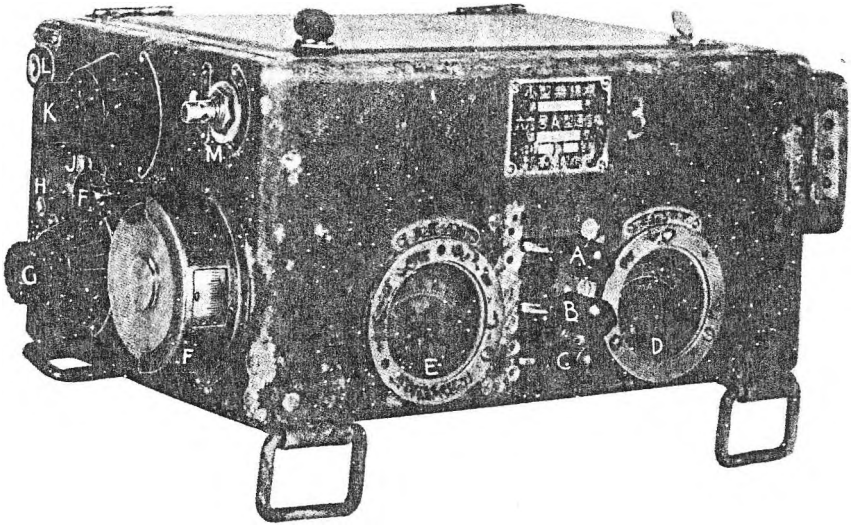
(H) External power supply jacks.

(J) Filament test voltage jack.

(K) Filament rheostat.

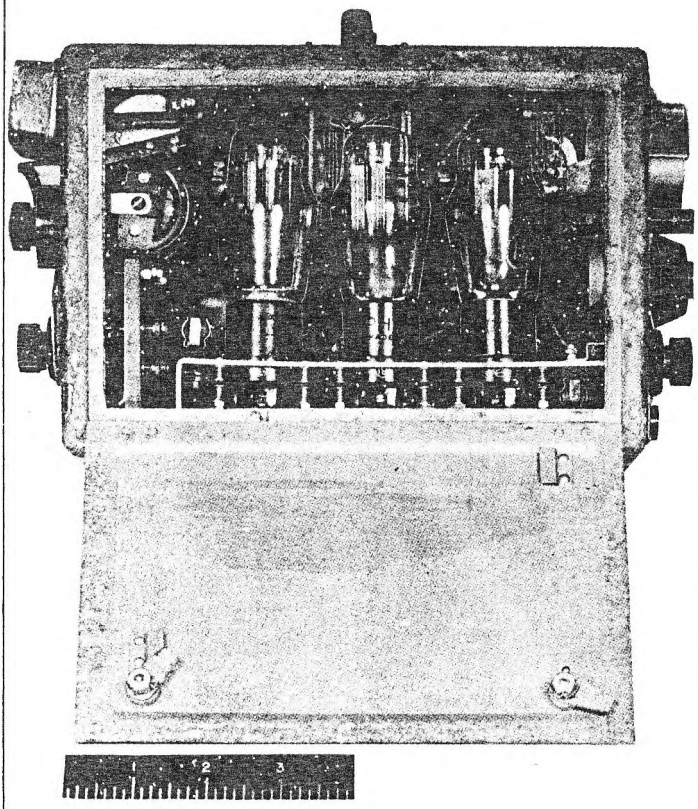
(L) Ground jack.

(M) Off-On switch.



TRANSCEIVER MODEL 66 TYPE A

FIG 2 Interior View



TRANSCEIVER MODEL 66 TYPE A

FIG 3 Bottom View

(A) Crystal holder.

(B) Key

(C) Microphone jack.

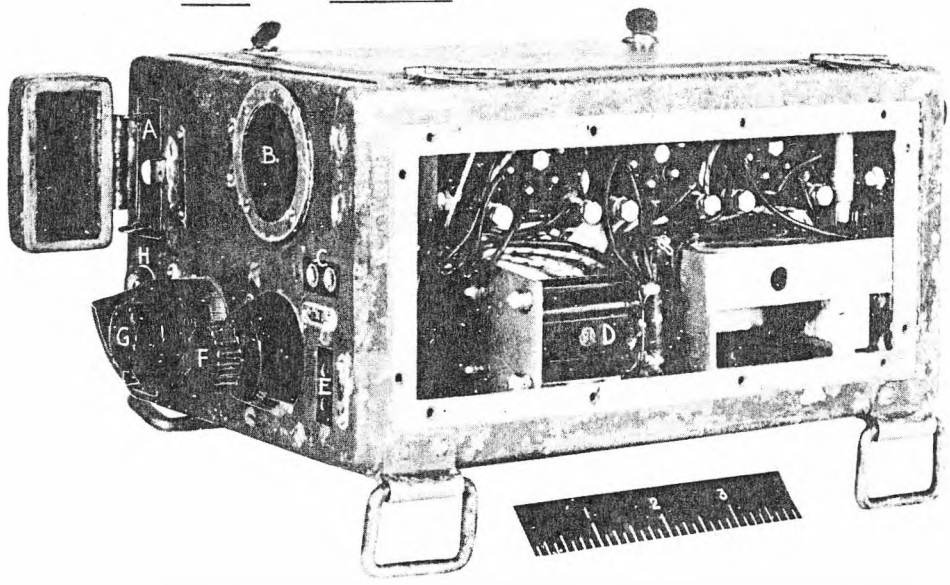
(D) Output transformer.

(E) Key jack.

(F) Variometer control.

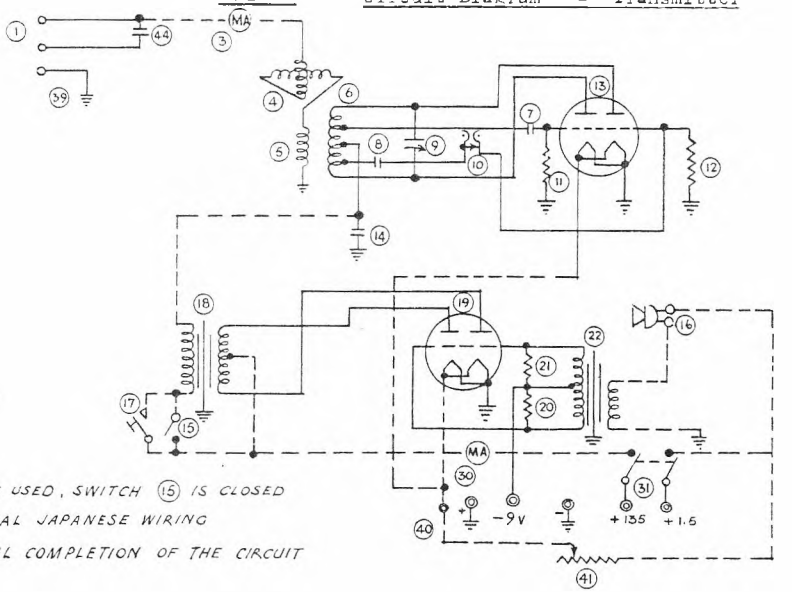
(G) Oscillator tuning.

(H) Aerial jack.



TRANSCEIVER MODEL 66 TYPE A

FIG 4 Circuit Diagram - Transmitter



NOTE :-

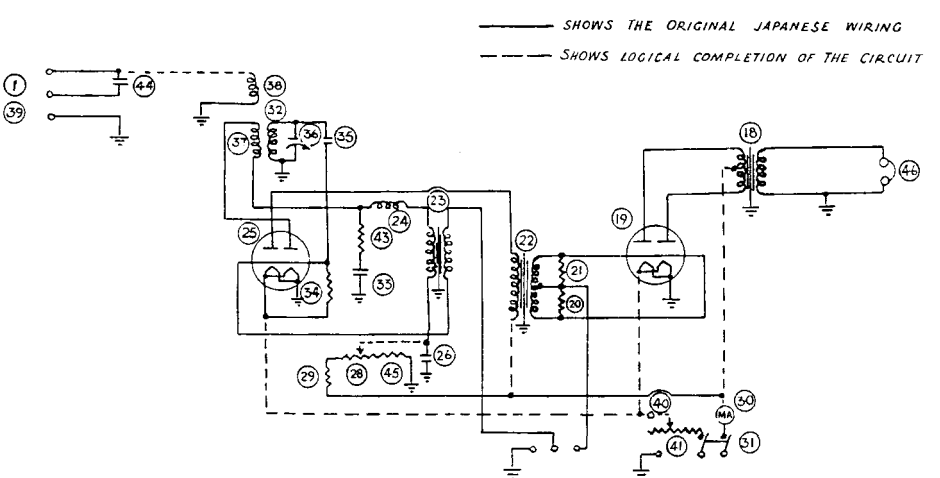
WHEN VOICE IS USED, SWITCH (15) IS CLOSED

—— SHOWS ORIGINAL JAPANESE WIRING

--- SHOWS LOGICAL COMPLETION OF THE CIRCUIT

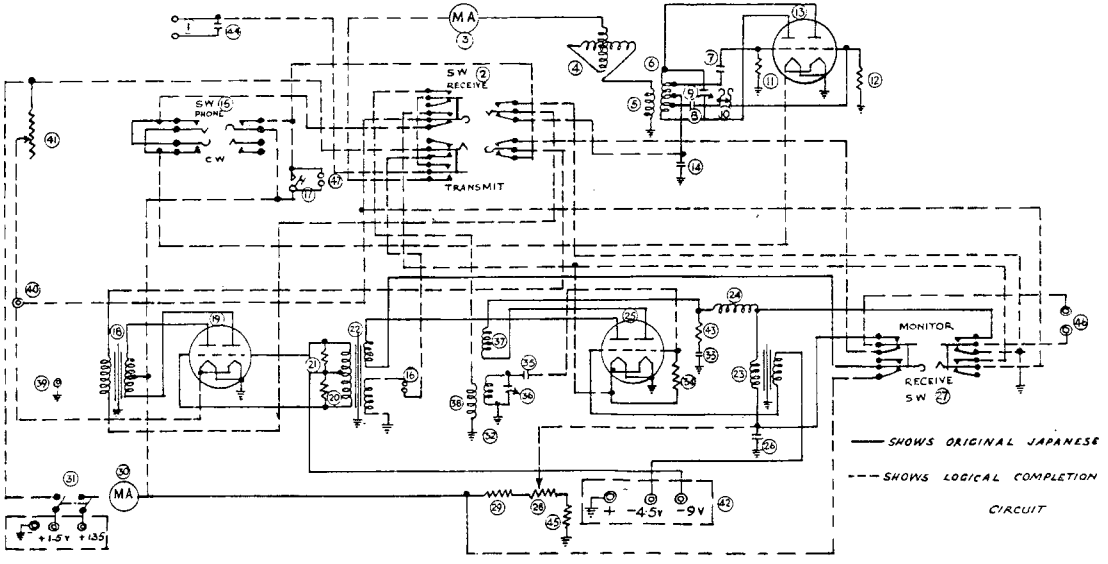
TRANSCEIVER MODEL 66 TYPE A

FIG 5 Circuit Diagram - Receiver



TRANSCEIVER MODEL 66 TYPE A

FIG 6 Circuit Diagram



EIGHT LINE TELEPHONE SWITCHBOARD TYPE 93

1. GENERAL

This instrument is an 8 line local battery switchboard designed for use with ground-return lines. It was manufactured in November 1941 by Oki Electric Coy. The most outstanding feature is the fact that in place of the cord circuit commonly used in U.S. Army switchboards, a group of key switches are used to perform the same functions as the cords.
The switchboard provides facilities sufficient for three simultaneous conversations, that is, three "cord" circuits

2. DESCRIPTION (Figs 1-7)

The construction of this switchboard is sturdy. It is smaller and lighter than the U.S. Army Switchboard BD-71, to which it is comparable in application. One of its disadvantages is the necessity of a separate telephone for the operator. The drops are held in place during transit by a metal plate with spring hinges. The switchboard is enclosed in a painted aluminium case with brass hinges and brass reinforcements. The line terminals are mounted in a strip of phenolic plastic. The drops and keys are mounted in sections of black phenolic plastic, and the key knobs are made of red and white plastic. The internal wiring is neatly cabled, and all connections are well soldered. The wire used is No. 21 A.W.G. black enamelled copper with two layers of cotton covering, the outer layer waxed and colour-coded. Each line circuit includes a fuse at the terminal. A sliding door is provided in the top rear of the case for access to the drop adjustments. A tool compartment is provided in the front cover under the circuit diagram plate (see figure 4). The Model 93 Switchboard could be used without any changes by our troops. When used with metallic-return lines, one leg of each line would be connected to the common "ground" terminal of the board.

3. OPERATION

Each line circuit contains a drop and two three-position key switches. The drop operates when the calling party rings in. To answer the call, the operator throws the lower (red) key corresponding to that line down. This connects the operator's telephone (an ordinary field telephone such as the Type 2 or Type 92 may be used) to the line. As soon as the operator determines what number is to be called, he returns the red key to its normal (centre) position. He then selects the red key corresponding to the called party, throws that key down, and turns the hand generator of his telephone to ring out. To complete the connection, the operator must then move one of the two keys of both lines to the same "operate" position. For this there are three possibilities open to the operator, as follows: The

upper (white) keys of both lines may be thrown upward; the white keys of both lines may be thrown downward; or the red keys of both lines may be thrown upward. Each of these possible connections constitutes one of the "cord" circuits.
If the operator should elect to throw the white keys of both lines upward, the connection would be completed through the No. 1 "cord" circuit, which includes the No.1 supervisory drop. The other two methods of completing the connection would include the No.2 or No.3 supervisory drop, as the case might be. In any such connection, the line drops of both lines are cut off the circuit, and are replaced by the supervisory drop of the "cord" circuit selected. Across the coil of each supervisory drop is connected a capacitor which passes voice frequencies, but blocks the ringing frequency. When the conversation is completed, either party may ring off, causing the supervisory drop to operate. The operator then throws one of the monitoring keys (at the right-hand side of the switchboard panel) to the position corresponding to the "cord" circuit in use. This connects the operator's telephone to the cord circuit and to both lines. Thus the operator can determine if both parties are finished, and can proceed to make any further connections desired, or to break the connections by returning the keys of both lines to their centre positions.
The operator's telephone is connected to the switchboard through the terminals marked "operator's telephone" at the top of the switchboard. The line drops are equipped with night-alarm contacts which are connected to the tip and ring of each of the two lower jacks. The two upper jacks are believed to be intended for connecting a second switchboard, which would operate as a "trunk" permanently connected to the No. 3 "cord" circuit of the first switchboard. Each line consists of two replaceable units, each fastened to the front panel by two screws. The drop forms one unit; connections between it and the remainder of the circuit being made through plug-in contacts. Connections common to all keys are made by screw connections to bus-bars. Inter-unit connections are made through screw-type terminal strips. The use of replaceable units would simplify and speed repairs.

4. INSPECTION AND ADJUSTMENT

Translation of the instruction plate fastened to the inside of the switchboard cabinet gives the following information:

(a) Inspection: The inspection will be executed with the telephone operator's set in the following order. Detect the defective parts by examining each part successively.

i. Line drop (indicator)

Put the knob of the connection key in the centre position (normal position), connect one end of the telephone cord to the "common ground" and the other end to any of the "main" terminals, and turn the generator crank slowly. If the drop plate drops, it is satisfactory. Short circuit all the "main" terminals together and connect one end of the telephone cord to it, the other end of the cord to the "common ground", and

turn the crank of the generator very slowly. By means of the order of drop plate movement, the sensitivity of the drops can be compared.

ii. Ring-off drop and connection key

Connect both plugs of the phone cord to any two "main" terminals (for example 1 and 2), move the knobs 1 and 2 of the first row upward (downward), and turn the crank of the generator slowly. If the drop plate 1 (2) drops, it is satisfactory. Inspect the drop 3 in a similar way on the second row (upward only).

Move downward (CALL-ANSWER) all the knobs on the second row, connect the telephone cord to the "telephone operator's set" terminals. Slowly turning the crank of the generator, short circuit the "main" terminals to the "ground" terminal with a screwdriver, and watch for the spark. In a similar manner, inspect the rest of the main terminals.

iii. Listening key

Move the knob of the listening key to either position, move all the knobs of connection keys of the same row to the same position, and proceed in the same manner as above.

(b) Adjustment:

i. Line drop

If the drop plate does not hook properly to its armature or if it does not drop with the vibration due to call signal, open the door on the upper rear side of the box and adjust the elasticity of the armature by moving the screw located on the back of the drop with a screwdriver. If it still is unsatisfactory, raise the distributing panel and adjust the upper adjusting screw for proper hooking degree. After adjustment tighten all the lock nuts on the adjusting screws.

ii. Ring-off drop

Adjustment of the ring-off drop will follow the same procedure as that of line drop, except that the set will have to come out of the box first.

SOURCE: USASOS.

- CORRECTION -

Type 97 AA Calculating Machine

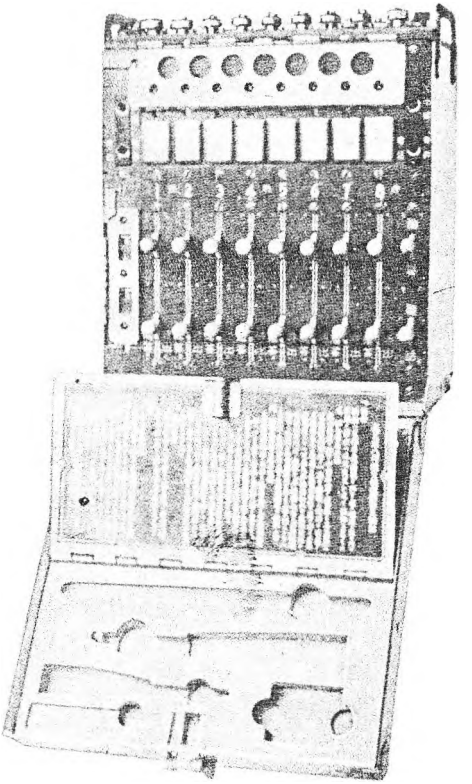
This instrument was reported in Tech Int Sum No.19 - Nov. 44 - as being an OZ Model. This is an error as further examination has shown it to be a Type 97 AA Calculating Machine for use with the Type 88, 7cm Field AA Gun.

EIGHT LINE TELEPHONE SWITCHBOARD
TYPE 93

FIG 1 Front View Closed

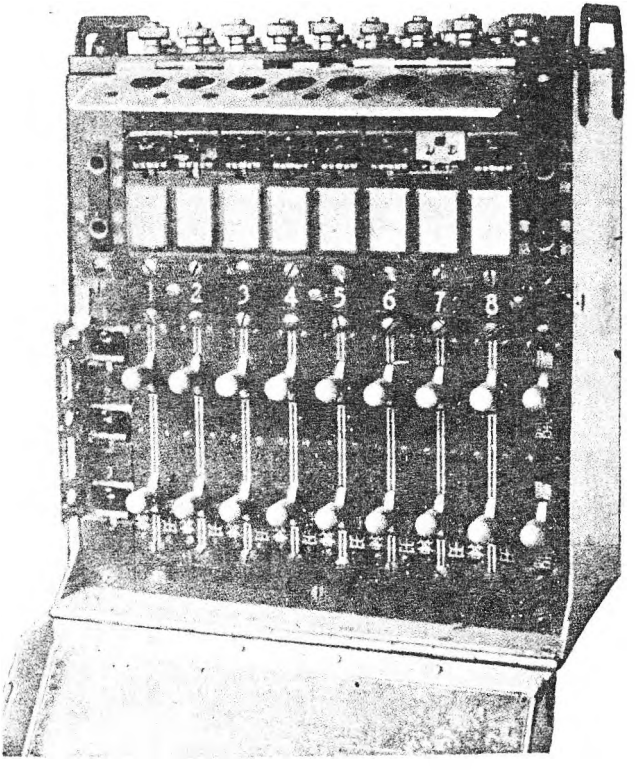
EIGHT LINE TELEPHONE SWITCHBOARD TYPE 93

FIG 2 Front View showing tool compartment



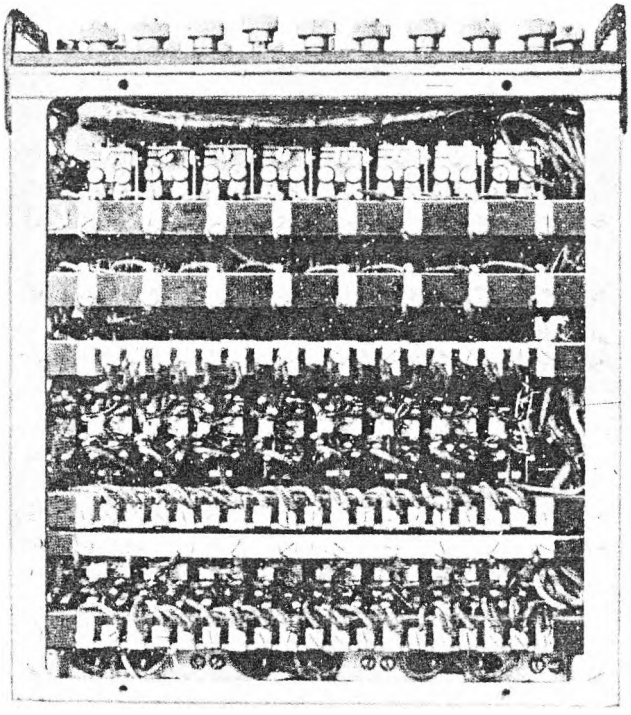
EIGHT LINE TELEPHONE SWITCHBOARD TYPE 93

FIG 3 Front Panel



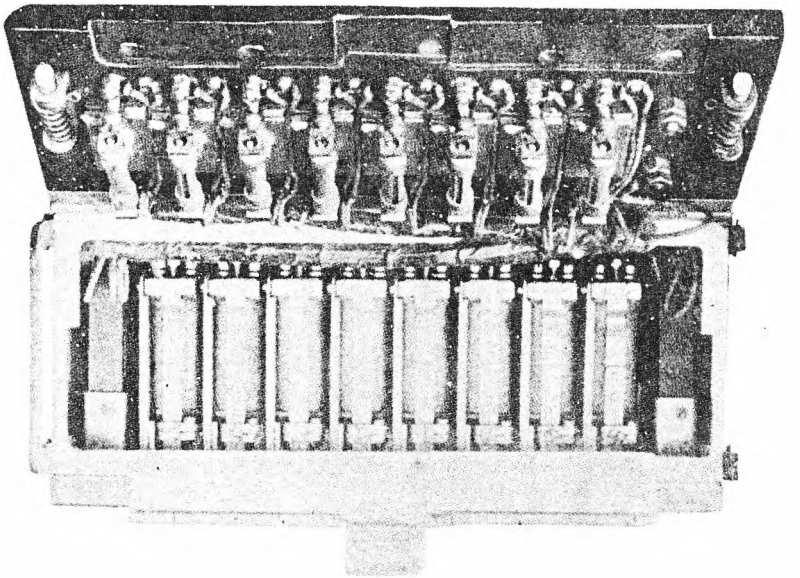
EIGHT LINE TELEPHONE SWITCHBOARD TYPE 93

FIG 4 Rear View with cover plate removed



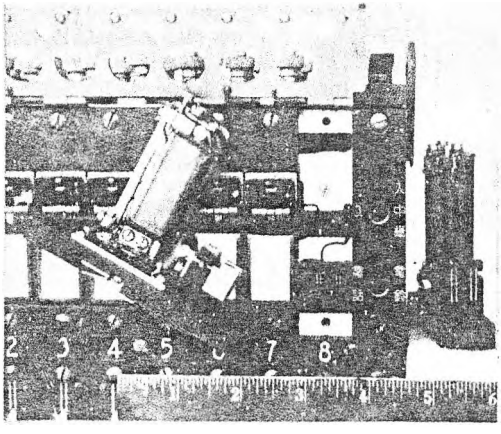
EIGHT LINE TELEPHONE SWITGHBOARD
TYPE 93

FIG 5 Top View, Open



EIGHT LINE TELEPHONE SWITCHBOARD
TYPE 93

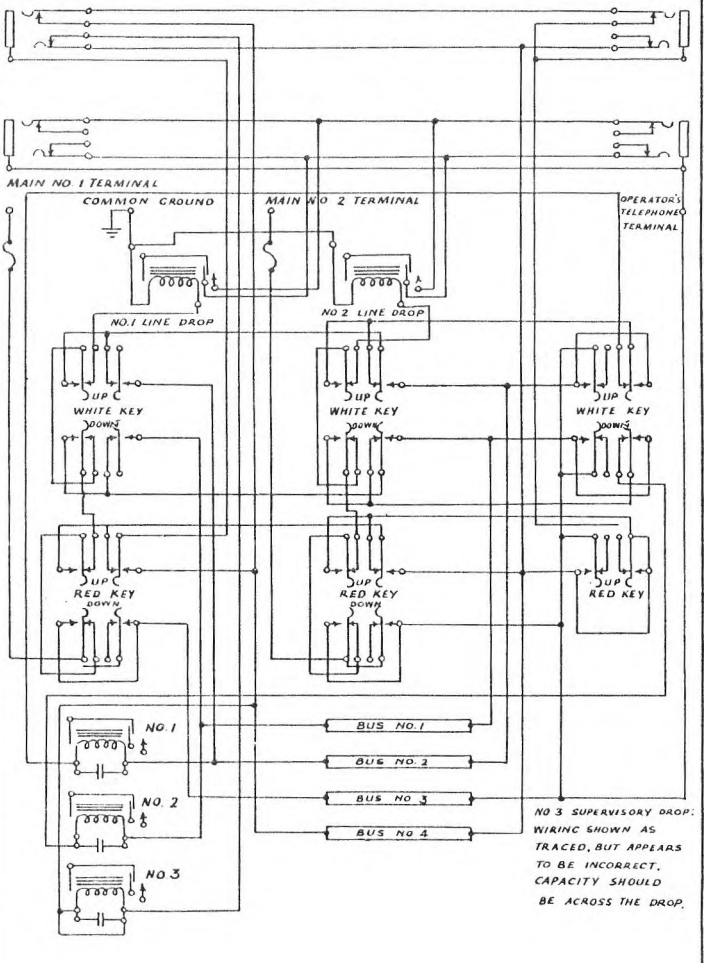
FIG 6 Close up of drop



EIGHT LINE TELEPHONE SWITCHBOARD TYPE 93

FIG 7

Circuit Diagram



INDIVIDUAL PROTECTIVE POUCH

1. GENERAL

This is an olive-green rubberized container holding a viscous liquid which analysed 69% ethylene glycol, 30% water, 0.40% Irish Moss and 0.06% ash, and is believed to be used in the field as a soothing agent against body irritation. From the information available, however, it is not known specifically how, and against what it is used. Presumably it is an item for individual issue.

2. DESCRIPTION (Figs 1-2)

The pouch measures 2½ ins wide and 5¼ ins long. A seal is established along its longitudinal axis and at the bottom by overlapping and cementing the sides. The top is closed by an overlapping flap, 1 in. long, which is used in opening the pouch. The inscription was translated as "Protective Ointment B, Product of Showa."

Additional characteristics are as follows:-

Weight of pouch and contents	159.5 gms
Weight of pouch (empty)	7.0 gms.
Weight of contents	152.5 gms

(a) Chemical Analysis: The contents of the pouch was a light yellow, translucent, mucilaginous substance with a specific gravity of 1.107 at 25/25 degrees C. and a pH of 7.
Tests for nitrogen, sulphur and the halogens were negative. Ignition at 650 degrees C. yielded 0.06% residue which gave a test for sodium. The liquid was distilled at reduced pressure using a six plate fractionating column. Two distinct fractions were obtained: Fraction I, a colourless, odourless liquid B.P. 31.5 degrees C. at 34 mm (99.7 degrees C. at 760 mm); Fraction II, a colourless, semi-viscous liquid B.P. 75-76 degrees C at 4 mm (197-199 degrees C at 760 mm).
Identification of distillation products:

Fraction I

Boiling point	99.7°C. at 760 mm
Specific gravity	1.001 at 25/25°C.

This fraction was identified as water.

Fraction II

This fraction was identified as ethylene glycol by the following chemical and physical characteristics:

Boiling point	197°-199°C.at 760 mm	198°-200°C.at 760 mm
Refractive Index ..	N_D^{25} 1.429	N_D^{20} 1.427
Di-benzoate derivative	m.p. 70.9°-71.1°C. ..	m.p.70.3°-71°C.

The ultimate composition (quantitatively) was as follows:

Ethylene glycol	69.02%
Irish Moss	0.40%
Ash	0.06%
Water (by difference)	30.52%
	100.00%

(b) Toxicological Analysis: Representative films were placed on four depilated rabbits and an effort was made to dry the film for one-half hour. Vapour cups containing H and L were inverted on the film for 5 and 15 mins. A control was made on unprotected skin for 5 mins. There was no protection afforded by the liquid on all the rabbits, either for 5 or 15 mins, when compared to the control. As a control, liquid H was applied to two rabbits by means of a No. 6 rod. After 2 and 4 mins, respectively, decontamination of a 10 mg. drop of H liquid was attempted by application of the liquid contained in the Japanese rubber pouch. The liquid was rubbed into the area and wiped off three separate times. No decontamination resulted as severe necrotic areas were noted.
Ethylene glycol is used as a substitute base for ointments or creams wherein the substance is capable of soothing an inflamed or abraded membrane, or protecting it from irritation. The anti-vesicant effects were shown to have been negligible.

REMARKS

Glycerine is superior for most purposes to ethylene glycol as a medicant. The presence of ethylene glycol in the pouch may be due to the need of glycerine for the production of high explosives, therefore the substitution of this product as a base component of this "protective ointment."
It does not contain any antivesicant properties and is not recommended for use by our troops for burns or irritations.

(SOURCE:- TECHNICAL COMMAND, EDGEWOOD ARSENAL, MD)

INDIVIDUAL PROTECTIVE POUCH

FIG 1 Showing Front Side and Inscription

FIG 2 Rear View and Inscription

ANTI-GAS HORSE LEGGINGS

1. GENERAL

Five pairs of these leggings were found in the Philiopines in late 1944. They are made of olive green, rubberized fabric and are designed to protect the horse's leg, from the hoof to the hock-joint, against blister gases. The leggings described in this report are of the "large" size and weigh 1 lb. 9 ozs per pair.

2. DESCRIPTION (Figs 1 - 2)

The leggings comprise: (a) Body, (b) Straps and Buckles, and (c) Heel.

(a) Body: This consists of two sides and two widening patches made of thin rubberized fabric, which are sewn to the heel. A seam runs down the middle of the legging where the two sides are sewn together. This is double-stitched and a thin strip (11/16 in. wide) of rubberized fabric is cemented over the stitching to render the seam impermeable. This strip runs the whole length of the seam on the inside, then folds over the top and runs down 2½ ins on the outside seam.
A single legging weighs 13 ozs and is approximately 16 ins long, 13 ins wide at the top and 20½ ins wide at the bottom.

(b) Straps and Buckles: Three upper straps situated 1¾ ins, 3-5/8 ins and 5-3/8 ins respectively below the top are sewn and cemented to the legging body at the seam. These straps are made of three layers of rubber and two of hemp arranged alternately, and are ½ in. wide, 6 ins long and 1/16 in. thick.
Three upper buckle chapes 1½ ins long, consisting of a double layer of the same material as the straps, are sewn to the body of the legging so that the buckles just reach the edge of the side. The upper-hoof strap, which is 16 ins long, ⅝ in. wide and 3/32 in. thick, is sewn to the legging 3 ins from the bottom on the same side as the upper buckle. The buckle for this strap is on the strap itself.
The lower-hoof strap, which is 12 ins long, 5/8 in. wide, and 3/32 in. thick, is sewn to one edge of the heel while the chape (6 ins long, 5/8 in. wide, 3/32 in. thick) holding the buckle for this strap, is sewn to the other edge of the heel. Both the lower and upper hoof straps consist of four layers of rubber and three of hemp arranged alternately. All the straps are perforated and adjustable, and all are slightly tapered near the tip to permit easier threading through the buckle.
One-inch square patches are cemented over the inside of the legging, covering the stitching where the three upper buckle chapes and the upper hook strap are sewn.
There is a difference between the right and left legging. The location of the fastenings and the direction

of the straps are opposite. In adjusting the legging the buckled side overlaps the other side. In the right legging the upper straps go around the leg counter-clockwise and the hoof straps clockwise. The directions are reversed on the left legging.

(c) Heel: This is moulded to conform to the double-knobbed shape of the horse's heel. It is 5/32 in. thick and consists of three layers of a heavy type rubber and two layers of hemp arranged alternately. The maximum width is 4¾ ins, and it is approximately 2½ ins high.
To increase the width of the legging at the hoof, two triangular patches are inserted. These patches (base 3½ ins, height 4½ ins) are sewn to the legging and are situated about 4¼ ins from either side.
On the inside of the legging about 3 ins from the buckled edge and about ½ in. down from the top is a rectangular canvas patch (2 ins x 3 ins) rubber cemented on the legging, containing stamped Japanese characters which indicate the size, leg and manufacturer. Each of the four pieces (the two sides and the two widening patches) of the legging is stamped with the same serial number, presumably as an aid in assembling the leggings.

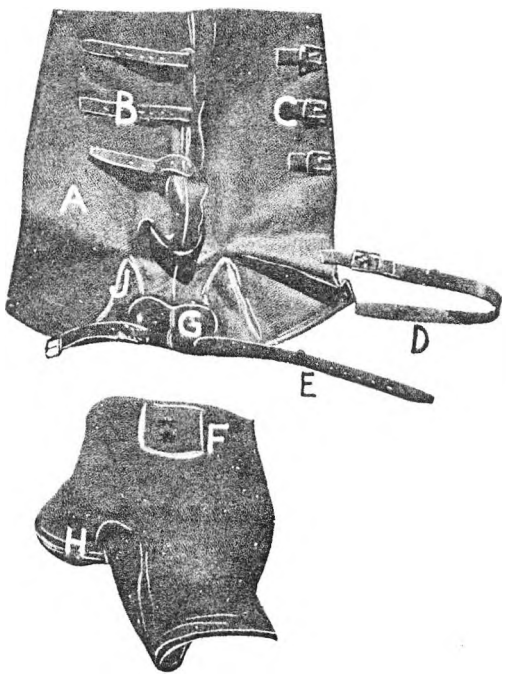
3. REMARKS

No tests were made to determine the H-resistance of the leggings, nor was a comparison made with similar U.S. equipment. Judging from the translation of the markings it is reasonable to assume that the Japanese also have a small size legging.

(SOURCE: 98th CHEMICAL COMPOSITE COY - APO 565)

ANTI-GAS HORSE LEGGINGS

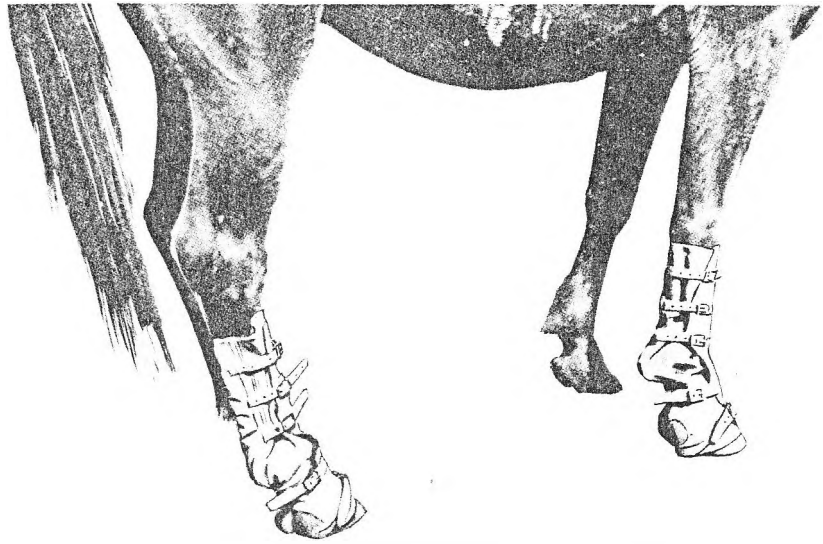
FIG 1



(A) Body. (B) Upper Straps. (C) Upper Buckle Chapes. (D) Upper Hoof Straps. (E) Lower Hoof Straps. (F) One Inch Square Patches. (G) Heel. (H) Rubberized Fabric. (J) Triangular Patches.

ANTI-GAS HORSE LEGGINGS

FIG 2 View Showing Method of Fastening



PACK SADDLES

1. GENERAL

These saddles are designed to pack all infantry weapons. The Model 15 pack saddle appears to be the common type although four distinct types have been identified, these latter saddles possibly being older models superseded by Model 15. No markings were found which would indicate year of manufacture, manufacturer or the model.
The main feature of this equipment is the unique method of adjusting the width of the saddles to fit animals of different size and conformation.
The saddles described herein were recovered in the Burma Area.

2. DESCRIPTION (Figs 1-11)

The saddles are of rigid steel frame construction with detachable pads. The later models provide for attachment of artillery arches, ammunition hangers and a great variety of specialized attachments for the one general purpose saddle.
In this report, Models 5, 11 and 15 are discussed in detail. A brief description of the so-called Model 38 is also given but this is incomplete as no sample of this pack saddle has been received to date:-

(a) Model 5 (1916 Taisho Era Design): The nomenclature for this saddle is given as "Light Heavy 5 Year Model Pack Horse Equipment". It is the simplest, crudest and lightest of the four types and embodies the basic design of all the saddles in having arches that are adjustable by means of a screw arrangement at the top hinge. This adjustment permits a variation of 14 ins from a minimum width of 11 ins between lower inside edges of the full pads to a maximum of 25 ins. While a certain variation in adjustment is possible between front and rear, a strain is imposed upon the bottom bar fastening to the arch.
The arches are of 1 in. thick wood faced with iron channels. They are 1½ ins deep at the foot rests and 4 ins over the saddle tree, at which point the wood is completely faced with iron sheet all the way to the hinge and adjusting screw.
The front hinge is 22 ins vertically from the plane of the foot rests with the rear hinge ½ in. higher. The arches rise 7½ ins vertically from the foot rests and then curve 20 ins more to the hinge. The removable iron load-hooks 2 ins by 3/5 in. are 15½ ins from the foot rests at the rear and 17 ins at the front. Hinged D rings are provided on the front arches 8½ ins above the foot rests. The arches are 15½ ins apart.
The pads are removable type, 21 ins long at the tree and 17½ ins deep. They are filled with 4-½ lbs of rice chaff to a thickness of 3 to 4 ins under the tree down to about 2 ins at the swell of that barrel. While provision is made for a handhole in the leather back of the pad, there is only one and most of the chaff is

permanently sewn in place. It is therefore not easy to adjust the filling to reduce sores or bunches on the animal. The leather backs of the pads have folded aluminium "T's" copper riveted to the leather at each lower corner, which fit into steel slots on the inside of the foot rests. Leather cups on the upper forward corners of the leather backs of the pads fit over the front of the tree, and similar leather cups then buckle over the rear end of the tree, thus fastening the pads in place. Removal and replacement are quick and simple. There are heavy 1½ ins breast buckles about the centre of the forward edge of each pad slanting down at an angle of about 45°. The pads are faced on the blanket side with a light cotton duck. For some reason a much heavier duck is used as lining against the leather. The tear strength and snag resistance of the duck do not appear to be adequate for many pads were torn or patched and repaired.

The saddle tree is of shaped wood, uncovered but painted. Each is 21 ins by 4 ins with ¾ in. maximum thickness. A slot in each tree with its centre 2/3 of the distance from the rear arch to the front arch permits the 3 ins heavy web girth to pass through and be fastened. The girth passes between the pad and the tree and bottom bar. It is fastened in place and adjusted as to length by the simple means of inserting a wooden toggle too large to pass through the slot. The double thickness webbing is cross-stitched only at 2½ ins intervals permitting insertion of the toggle on the off side at any point to adjust the length of the girth. The girth is fastened beneath the belly by a single 1½ ins leather strap passing through a roller D ring on the end of the opposite girth and then back to a tongue and roller bar buckle. This gives a 2 to 1 pulley advantage in tightening the girth from the near side.

There was no breeching or breast strap with this saddle. An impregnated fabric strap 1⅝ ins wide and 17½ ins long with tapered tips and buckle holes was attached to the breeching D ring on the adjusting screw of the rear arch. On the saddle trees there are three light 1 in. D rings and one 2 ins medium D ring. There is one 2 ins medium D ring on each pressed steel bottom bar. The dark OD paint is mostly gone but there has been very little rusting even on an extremely wet tropical coast.

The weight of the stripped saddle without blankets or padding is 38 lbs.

(b) Model 11 - (1922 Taisho Era Design): The nomenclature of this saddle is not definite. It is clearly a design intermediate between Models 5 and 15. Since the Japanese "Reference Manual on Handling of Weapons" shows it most frequently with the two Model 11 Infantry guns, that nomenclature has been tentatively adopted until the exact name is available.

The basic design of Model 5 has been kept, but it has been greatly improved. The arches have been completely redesigned in pressed steel to permit carrying artillery weapons. For that purpose the hinge joining the arches has been moved from a peak above the adjusting screw to a position below. This permits a flat top of about 6 ins on the arches. The change also places the principal strain on the hinge rather than on the screw threads so that, together with more accessible position, easier adjustment is possible. The hinge is now a removable

bolt permitting easy change of a damaged side.
The arches rise vertically 15 ins from the foot rests to the load-hooks. Up that far they are simple 1 in. by 1 in. channel iron stiffened with wood filling. Just above the removable load-hooks the rear arch inclines inwards at a 33° angle for 10½ ins on a straight line. The front arch curves for the first 2 ins above the load-hook and is then straight for 7½ ins, a total of 1 in. less than the top rear arch. The total height above the foot rest plane is 1 in. greater than on Model 5. The upper pressed steel channels are 1.18 ins inside dimensions with .39 in. by 1.57 ins slots for artillery arch bolts 9.84 ins apart, and curved on a radius of 4.92 ins so as not to interfere with adjustment of the saddle. The arches are 16½ ins apart, 1½ ins more than on Model 5. The front arch D rings have been omitted. The pads are essentially identical to those of Model 5. They are 1 in. wider at the tree and 1 in. shallower, being 22 ins by 16½. The "T" connections are of iron instead of aluminium. In addition to the front breast strap buckles which are on the pads of all 4 types of saddles, the pads on this saddle are the only ones of the 4 to have breeching buckles at the lower rear corners. It would seem to be too great a strain on the pads for good design.
The tree is 1 in. longer and ½ in. wider than on Model 5. Strangely, it was covered with a very light coarse weave cloth. The gap between the trees is well covered with a sheet of medium weight leather. The girth arrangement is in the same position but has been changed to 18 strands of laid cordage 4 ins wide. At 3 ins intervals the cords are cross laced with string permitting the wooden toggle to be inserted between the strands for adjustment of length of the girth. One end is bound in heavy leather. At the other end 9 strands of cordage are fastened to each of two 1½ ins leather straps 20 ins long. These go to roller bar D rings on a heavy leather strip coming from the near tree to a point just below the lower edge of the near pad. After passing through those rollers they go back to tongue and roller bar buckles at the beginning of the girth straps, thus giving the same 2 to 1 pulley advantage in tightening the girth from the near side, as was provided in the previous model.
The breeching is quite complete on this model with padded croup piece laced to the crupper, and the main breeching of 2½ ins heavy double layer leather being attached to the relatively weak lower corners of the pads. One attachment has torn loose.
There are four light 1 in. D rings and one medium weight 2 ins ring on each saddle tree. The pressed steel bottom bar has two medium weight 2 ins D rings and one heavy 3 ins. On the heavy D at the forward end of each bottom bar there are attached with a removable plate link and cotter key a two-link chain with a 2½ ins ring, a hinged 2 ins roller D ring, and a 3 ins heavy iron toggle.
A heavy duty 1 in leather strap 3 ins from the rear arch passes through a notch in the top edges of both trees and through 2 ins D rings on the bottom bar. The weight of the stripped saddle without blanket or trappings is 45 lbs.

(c) Model 15 -(1926 Taisho Era Design): This model is identified with Type 94 37 mm Gun ammunition, Type 94 Mountain Gun and Type 92 Infantry Gun. There is very

little change from Model 11 but there has been substantial improvement in design details to reduce weight and improve flexibility of use.
Nomenclature is clearly established by Figure 26 from the 1938 Japanese "Photographic Manual of Ammunition Boxes" in "Reference Data on Handling of Weapons." The right hand column reads from top to bottom "Model 94 37 mm Gun ammunition". The left hand column reads from top to bottom "15 Year Model Pack Horse Equipment". Other photos show the saddle carrying ammunition boxes for the Model 94 Mountain Gun and Model 92 Infantry Gun. The most noticeable change is to cut out some massive sheet metal in the upper arches. The arches remain essentially the same with identical artillery bracket slots so as to permit interchangeability with Model 11. In addition five removable bolts with castellated nuts and cotter pins have been added to each lower arch leg, and one bolt 2 ins above the removable load-hook on the front upper arch and 3¼ ins above the hook on the lower arch. These bolts permit a great variety of light-weight attachments for ammunition, machine guns, etc to be attached. There are permanently attached heavy breast D rings on the front arches 3 ins below the top of the pads. The breeching buckles have been omitted from the lower rear corners of the pads. Instead, breeching D rings are attached at the lower bolts on the rear arches when needed. The dark brownish OD paint is in good condition.
The pads are the same design and size as on Model 5 but with rusted iron T connectors instead of aluminium. Since the breeching D rings have been omitted the breech assembly is only a simple crupper attached to the hinged D ring at the arch hinge. The girth is identical with that of Model 11. The D rings on the saddle tree and bottom bar are also the same except that the forward D rings have been omitted. They are easily added when needed. The leather cover for the space between the trees has been left off. The weight of the stripped saddle without the blanket or trappings is 45 lbs.

(d) Model 38 (1905 Meiji Era Design): This saddle is described in a Japanese reference manual as being used with the heavy machine gun. Japanese equipment tables also list a "Model 38 Machine Gun Pack-Horse Equipment". From the design it would appear to be a more recent pack saddle than Model 5 which however was standardized in 1916, eleven years later.
The adjustment of the arches is similar to that of the Model 11 but is more complicated, more difficult to adjust, and cannot be taken apart for replacing damaged sides. There is no provision for attachment of top artillery arches. On the other hand, holes are provided along the straight lower arch leg to permit use of a variety of special supports and hangers. These are similar to the removable bolts of the most recent Model 15. The arches of this saddle are of full pressed steel channels stiffened with wood filling. The balance of the saddle is essentially the same as the other three models. The ammunition box hangers are presumably an early type. Those used with the Model 15, have been considerably lightened by elimination of excess metal.

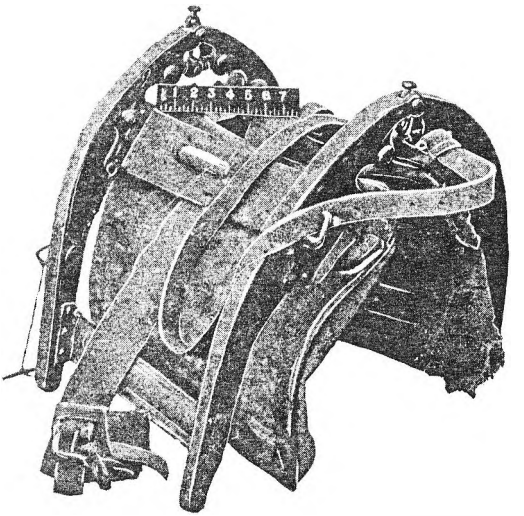
3. CONCLUSIONS

These saddles are excellently designed and well made. They are not considered superior to US saddles for artillery loads but may be superior for general purpose side loads.

(SOURCE:- QMG - W.D. WASHINGTON)

PACK SADDLES

FIG 1 Model 5, Front View



PACK SADDLES

FIG 2 Model 5, Rear View

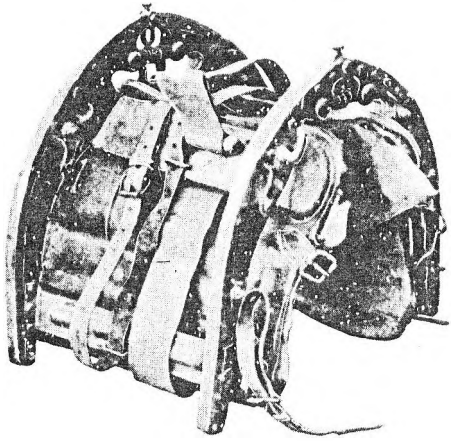
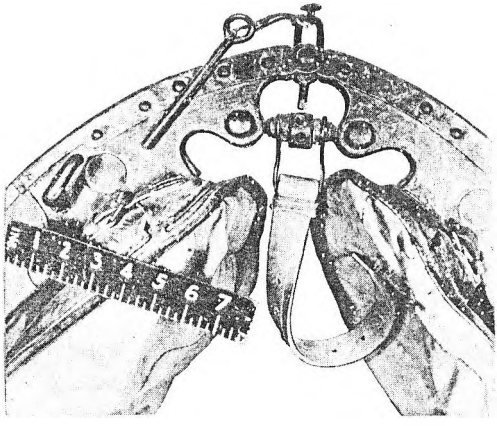


FIG 3 Model 5, Adjusting Device



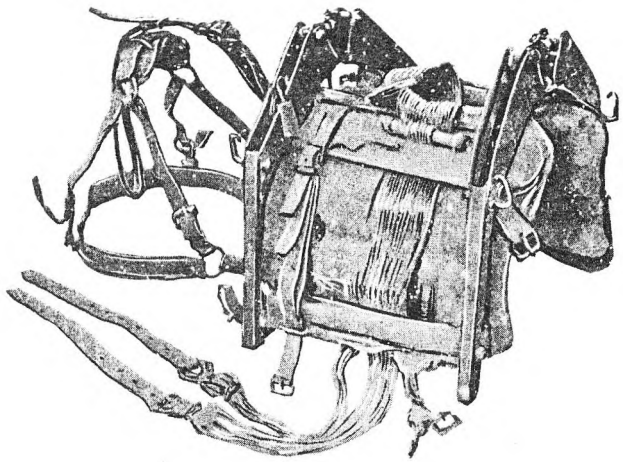
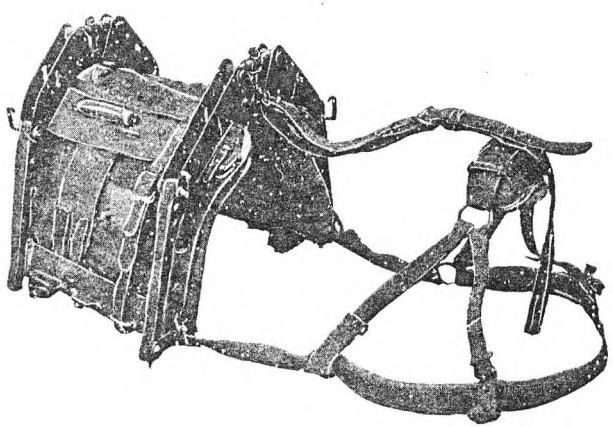


FIG 5 Model 11, Rear View with Full Breeching



PACK SADDLES

FIG 6 Model 11, Adjusting Device

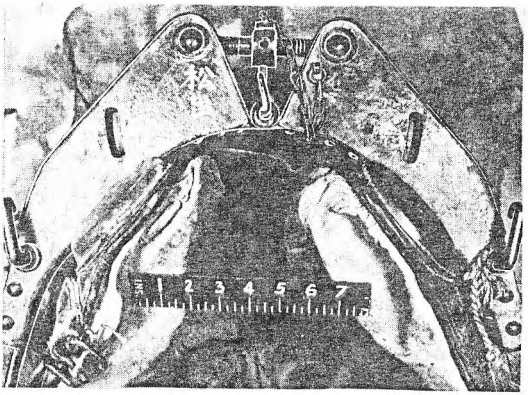
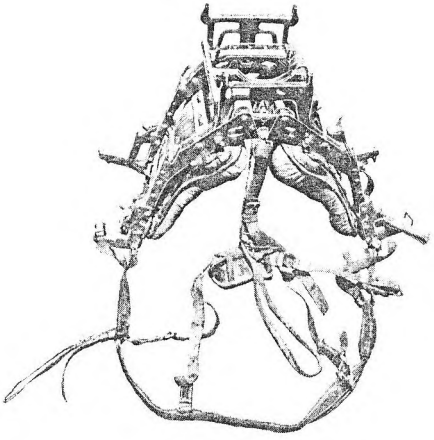


FIG 7 Model 15, Rear View, with Breeching



PACK SADDLES

FIG 8 Model 15, Rear View

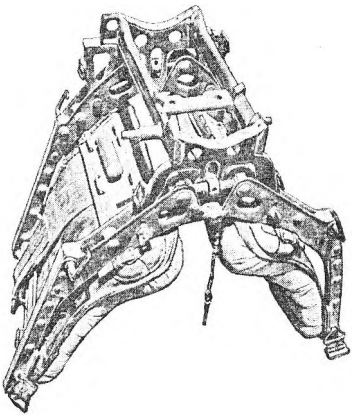


FIG 9 Model 15 with Artillery Arch, and Adjusting Device

PACK SADDLES

FIG 10 Model 38, Rear View

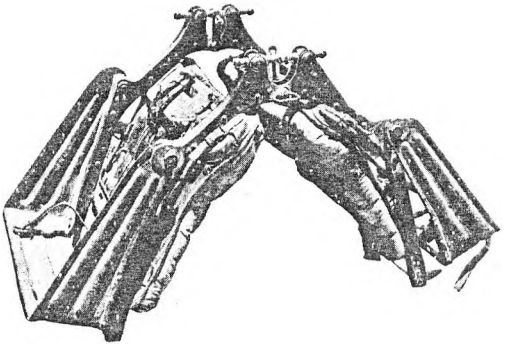
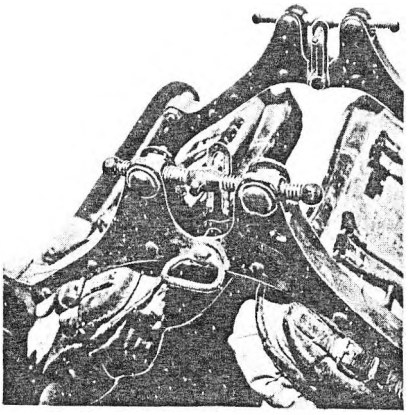


FIG 11 Model 38, Showing Adjusting Device



TYPE 100
LAND MINE DETECTOR

1. GENERAL

This device is designed to locate metal objects by visual indication only as no provisions exist for aural indication attachments.
After the recovery of this equipment in the Northern Burma area the wiring had been changed and when received for examination it was wired for an American VT-33 receiving type valve. The sensitivity was very low.

2. DESCRIPTION (Figs 1-5)

The equipment consists basically of an oscillator unit and a loop assembly. The carrying box measures 29-1/8 ins by 17-1/2 ins by 9-3/4 ins and the total weight when packed is 53 lbs.
The nameplate on the oscillator unit is translated "Type 100 Land Mine Detector Oscillator - Mfd, Dec 1940 - Manufacture No. 368 - Nippon Denki Kabushiki Kaisha Tokyo".

(a) Oscillator Unit: This electrical component can be divided into three parts; namely, the audio oscillator, coupling system and power supply. The unit measures 8-7/8 ins by 7-1/2 ins by 4 ins and with carrying case weighs 8 lbs.

i. Audio oscillator: The tuned grid inductive feed back type employs Japanese type UY 133 valve, a resonant circuit consisting of the secondary of T_1 and a fixed condenser in parallel. This is used in the grid circuit to maintain a strong signal. Measurement of the oscillator frequency was not possible, but the tone, when amplified through the audio section of an R C A chanalyst and heard in a headset, was in the upper audio range estimated at approximately 15000 c.p.s.

ii. Coupling System: The coupling between the plate and grid circuits of the oscillator is inductive and is completed through a bridge network. The primary and secondary of the transformer (No.6) form the two coupled arms of this bridge. The oscillatory current indicator is in series with the secondary of this transformer. The control (R_1) is in series with the primary and provides for centring the indicator by controlling the degree of feedback. This control is required to compensate for ageing batteries, changing circuit constants and replacement of valves. The other two arms of the bridge consist of a centre tapped winding on transformer (T_2). The primary of the grid circuit transformer (T_1) is connected to the centre tap of this winding. Thus the inherent sensitivity of a bridge is employed to increase the response of the loop. The search loop is inductively coupled to the plate circuit of the oscillator through a separate winding on transformer (T_2). Voltages induced in the loop as

it is passed over metallic objects affect the amplitude of oscillations causing deflections of the indicator.
Note: The loop must be in motion to produce an indication.

iii. Power Supply: The following are the power requirements:

Plate supply voltage - 45 volts (1-B-No.5)
Filament " " - 1.5 " (2-No.4 flat type cells in parallel)

All the batteries are contained within the oscillator box.

(b) Loop: It is approximately 15 ins in diameter and has a prone and a standing type of handle 11 ins and 44 ins long respectively. The relative cable is 59 ins long for the prone type and 34 ins long for the standing type. The prone loop weighs 2-1/2 lbs and the standing type 5 lbs. The loop is composed of two windings inductively coupled. One winding of four turns is connected to transformer (T_2) in the oscillator circuit thus coupling it to the plate of the oscillator. The second winding is a closed resonant circuit consisting of fifty-two turns of a .05 mfd capacitor. The resonant frequency of this circuit was measured at 13500 c.p.s which corresponds to the oscillator frequency. Both windings are of No. 23 SWG solid copper wire, enamelled and silk insulated and are separated by a heavy varnished fabric. The successive layers of the complete loop from the outside are: Fabric tape, rubber overall sheath, varnished fabric, fabric tape (holds loop and fibre channel support together), fabric tape, tinfoil shielding and varnished fabric covering winding. The tinfoil shielding and that on the cabling act as conductor for the four turn winding in the loop. No evidence of moisture was apparent in any of the successive wrappings.

3. OPERATION

The detector operates on the principle of an unbalanced mutual inductance bridge providing a maximum of sensitivity with the minimum of parts.
To adjust the detector for operation, plug the cable of either loop into the four prong plug. Turn the oscillator on by pulling out the switch alongside the plug. Adjust the knob control (R_1) inside the case for centering the indicator. Grasp the handle of the search loop below the indicator with one hand and above the indicator with the other hand and hold the loop horizontally about 4 ins above the ground. Move the loop slowly and at a constant speed from side to side, maintaining constant height above the ground and following the contours as far as possible.
When the needle jumps, sweep the loop from side to side and stop at the point of greatest deflection. At this point move the loop forward and backward again stopping at the point of greatest deflection. The loop is then centred directly over the metallic object. The detection of small metallic objects will cause the indicator to deflect first in one direction and then in the other. The detection procedure in this case is similar to the above with the exception that the

object will be directly below the loop as the indicator changes its direction of deflection.
The prone loop is provided for use at times when adequate cover is not available. The operating procedure is identical to the foregoing. The translation of the name plates appearing on each type of loop were as follows, with the relative type of loop substituted accordingly - "Type 100 Land Mine Detector - Searching Coil for standing position - Mfd 1940 - Manufacture No. 368 - Nippon Denki Kabushiki Kaisha, Tokyo".

4. REMARKS

This unit is not nearly as effective as American types although it would be adequate for mine detection in an emergency. The fact that only visual indication is possible and the low detection sensitivity of the set are both serious disadvantages. It is also difficult to detect the exact location of a buried metallic object, due to the fact that the loop must be in motion for detection.

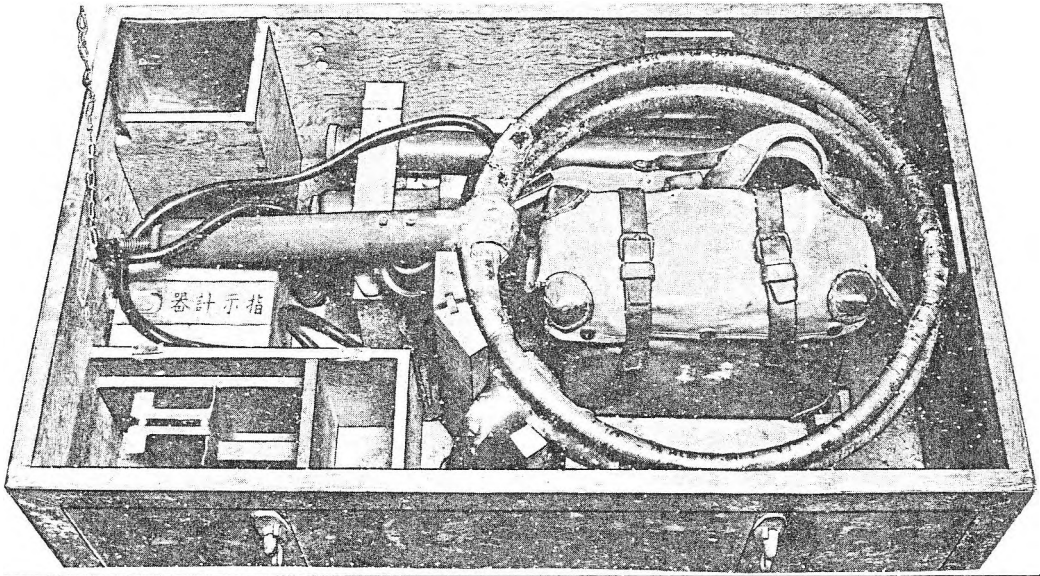
SOURCE: EEIS - INDIA

TYPE 100 LAND MINE DETECTOR

FIG 1 Detector with Prone Loop

TYPE 100 LAND MINE DETECTOR

FIG 2 Complete Detector in Carrying Case

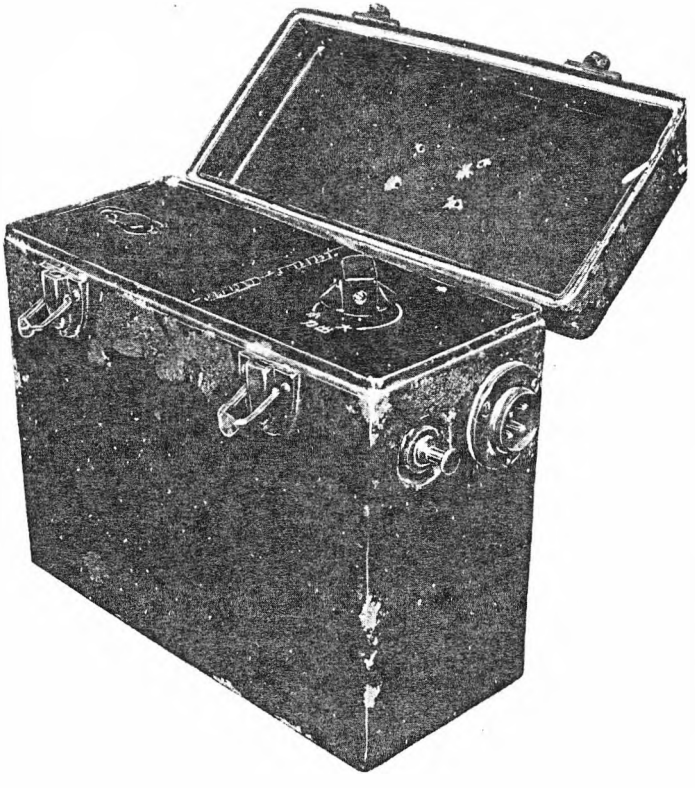


TYPE 100
LAND MINE DETECTOR

FIG 3 Detector in Use with Standing Loop

TYPE 100
LAND MINE DETECTOR

FIG 4 Oscillator Case Showing Control Knob, Switch, and Cable Connector Plug



TYPE 100
LAND MINE DETECTOR

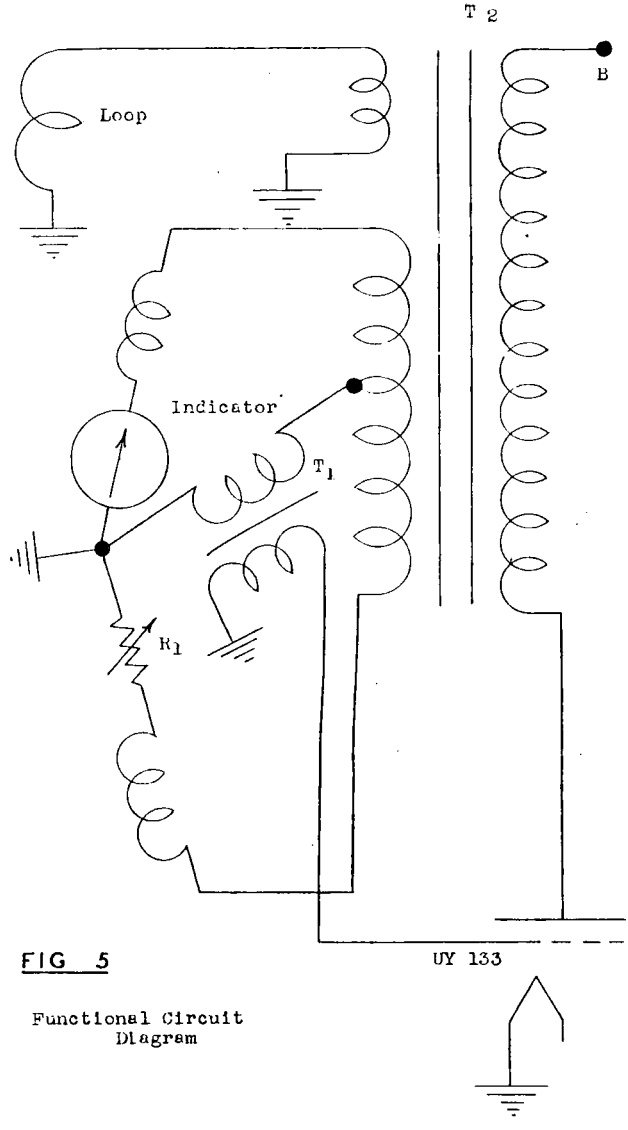


FIG 5

Functional Circuit Diagram

PARALLAX COMPUTER

1. GENERAL

This instrument is designed to graphically solve gun-target range and deflection with data obtained from an observation post. Angles are measured visually with the aid of a small telescope fastened to the top of the computor.

2. DESCRIPTION (Fig 1)

The computor consists of two main components - a telescope and a telescope adapter assembly.

(a) Telescope: This is provided with elevating and angle of site mechanism. The objective assembly, which is offset from the eyepiece, can be rotated through vertical angles by direct manual pressure independently of the eyepiece assembly. Both assemblies are moved in unison by the elevating mechanism.

Two angle of site scales are provided. One is located to the immediate left of the objective assembly and is graduated in increments of 100 mils for 6400 mils. A vernier index allows settings of one mil to be made. The second scale is part of the angle of site assembly and is graduated in units of 100 mils from 200 to 1400 mils, with 1000 mils representing the normal. This latter scale is supplemented with a micrometer of conventional design. A table listing the mil value for each degree from 1 - 10 degrees is engraved on the cover of the elevation housing.
A penta prism is used to reflect the light from the right side of the telescope to the left side and into the erecting system, which is an amici prism.
The reticle design consists of a vertical and horizontal line with a horizontal mil scale graduated in mils from 0 to 50 right and left.
Additional general characteristics are:

Power	6 diameters
Field of view	6.3 degrees
Diameter of exit pupil ..	.11 in.
Limits of focusing movement	Plus 7 to minus 8 diopters.

(b) Telescope adapter: The gun-target arm is fitted over the circular plate so it may be rotated separately or locked to the plate so both move in unison. There are three range scales on the gun-target arm, each divided into increments of 50 metres. The centre scale is numbered from 15 to 70, while the two outer scales, graduated from 0 to 55, are marked "corrected". The significance of this mark is not known.
The distance between gun and observer is introduced by offsetting the centre of the telescope adapter from the centre of the plate. A lead screw is provided to accomplish this, and a distance scale divided into

hectometers from 0 to 1500 metres, denotes the amount of offset. A micrometer allows settings of one metre to be made.
The upper portion of the telescope adapter is fitted with an azimuth mechanism of worm and worm wheel design. This mechanism is provided with a conventional scale and micrometer, the scale being marked "observer's azimuth". An arm cast as an integral part of the telescope adapter is fitted with a sliding index which has a magnifying lens for reading the gun-target range scale. The arm on the telescope adapter has two range scales, one engraved on each side. The one on the right is marked "observer-target distance"; the left one "observer-target distance corrected".

3. OPERATION

To use the instrument it is only necessary to set the various angle indices at their measured values and slide the index of the observer-target arm along until it is in agreement with the proper graduation. The value on the gun-target arm, in agreement with the index, is the gun-target range.

4. REMARKS

This computer is of simple construction and design, and it appears accurate enough for all practical purposes. The scales and vernier indices, however, are so located that accurate settings become difficult and fatiguing.

(SOURCE:- ABERDEEN PROVING GROUND,MD.)

PARALLAX COMPUTER

FIG 1