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AUSTRALIAN MILITARY FORCES

TECHNICAL INTELLIGENCE SUMMARY

No. 21
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Light Beam Telephone, page 38, Fig 5)
page 41, Fig 11) Invert photographs.
Light Anti-Gas Trousers,)
page 55, Fig 1)

Light Beam Telephone, page 46 - Delete Fig 21.

page 46 - After Fig 22, "Lamp Unit", delete "Photo-electric Cell Assembly"; substitute "Bulb Socket Assembly."

AA Director, Model 2, page 86, Figs 5 & 6 - Transpose photographs.

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JAPANESE EQUIPMENT

TYPE 2 (1942)
7.7 MM PARATROOP RIFLE

1. GENERAL

Japanese paratroops who participated in the airborne attack on Leyte, Philippine Islands, in December 1944, were found to be carrying several new types of weapons. One of the items, a type 2(1942) 7.7 mm rifle is apparently intended exclusively for paratroop use. This weapon is basically the standard 7.7 mm type 99 rifle, described in AMF Tech Int Sum No. 11, modified to break into sections. It was manufactured at the Nagoya Arsenal.

2. DESCRIPTION (Figs 1 - 2)

The dimensions, action, and accessories of this rifle are identical to those of the 7.7 mm type 99 rifle. The main differences between the rifles are the rapid take-down feature of the type 2 and the omission of the wire monopod which is usually fitted to the type 99 rifle. The barrel and front end of the type 2 rifle are detachable at the receiver ring. The web rifle sling is fitted with a large harness snap where it is attached to the rear swivel, thus allowing the sling to be rapidly removed when the rifle is broken down.
The barrel of this weapon is made with a straight, unthreaded shank, fitted with a single large lug on its under surface. This shank is a push-fit into a socket formed in the front of the receiver. A tapered locking key passes through the receiver from right to left and engages in front of the barrel lug. This locking key may be withdrawn far enough to the right to allow removal of the barrel, but cannot be taken completely out of the action. When the barrel is in place, the key is locked by screwing a threaded nut, located on the right side of the key, into the receiver wall. Heavy blue metal ferrules are fitted to both the butt group and the forward section of the weapon at the point of contact. The two parts are joined by a short dowel, when assembled, to ensure complete rigidity. The bolt may be either open or closed when taking down the rifle. To take down, the sling is unsnapped from the rear swivel, the ring on the locking key is turned in a counter-clockwise direction until the nut is free from the threads, the locking key is pulled to the right as far as it can go, and the front end group is pulled straight forward out of the receiver. When taken down the barrel section is 25½ ins long and the stock section 20¼ ins. Total weight is 8.9 lbs loaded.

3. CONCLUSION

The take-down system is simple and sturdy, and should give excellent service.

(SOURCE:- USASOS)

TYPE 2 (1942) PARATROOP RIFLE

FIG 1 Rifle and Bayonet

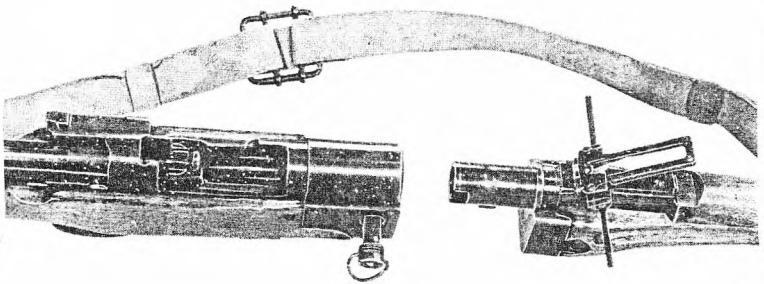


FIG 2 Takedown Features

TYPE 100 (1940)
PARATROOP 8MM S M G

1. GENERAL

This weapon was recovered from the body of a Japanese paratrooper on Leyte, Philippine Islands. The gun is clearly marked as a type 100 weapon, and was made at Nagoya Arsenal. It appears to use basically the same operating mechanism as the 7.63 mm Solothurn SMG, described in AMF Tech Int Sum No. 1, but has several differences in construction.

2. DESCRIPTION (Figs 1 - 3)

In appearance the gun resembles the Solothurn SMG, but is simpler in design and construction. Extensive use is made of welding and stampings.
It has a long, cylindrical receiver, a perforated barrel jacket and a wooden, rifle type shoulder stock. The gun is fitted with a compensator and will take the standard rifle bayonet. The sights consist of a crude, non-adjustable rear peep sight and a barley-corn front sight, with provision for lateral adjustment. The gun uses 8 mm pistol ammunition, 30 rounds being loaded in a curved clip which enters the receiver from the left side. It fires from an open bolt and uses the direct blowback principle of operation. With clip and spring the gun weighs 8.8 lbs, and is 36 ins long. When taken down, the front section is 24 ins long and the rear section 26½ ins long. The barrel measures 10 ins.

3. STRIPPING

First remove the magazine by depressing the magazine catch located at the rear of the magazine well, and held there by a small pin. A small coil spring serves to keep the magazine catch pressed against the magazine.
To remove the receiver and barrel assembly from the stock assembly, first make certain the bolt is forward. By using the receiver lock spring, draw the receiver lock outward and rotate 90 degrees, thus unlocking the receiver and barrel assembly from the stock assembly. Lift the rear of the receiver assembly to disengage it from the receiver lock. Pull forward on the receiver and barrel assembly allowing the forward lock to disengage from the locking pin assembly at the forward end of the stock assembly.
To remove the bolt, driving spring, and back plate from the receiver, first rotate the back plate locking pin 180 degrees. Draw it out to the right, at the same time maintaining a slight pressure on the back plate to allow for the tension exerted by the driving spring. Draw the back plate, driving spring guide, and buffer spring to the rear and out of the receiver. The recoil spring is 15¼ ins. in length with 5½ turns to the inch. The buffer spring is 13/16 in. in

length with 3½ turns to the inch. Draw the bolt to the rear as far as it will go with the bolt stud. Remove the latter from the bolt by drawing it outward. The bolt stud is 1 11/16 ins. in length. When inserted in the bolt in the weapon the bolt stud protrudes 15/16 in. Raise the muzzle and allow the bolt to slide out of the receiver.
To remove the trigger and trigger guard assemblies from the stock, first remove the receiver lock ring. The receiver lock and spring can next be drawn out to the right. Undo the screw located at the front of the trigger guard and rear of the trigger assembly and remove these parts from the stock. The only safety device on the weapon is the manual safety catch located on the trigger guard assembly. When pushed forward this blocks the movement of the sear.

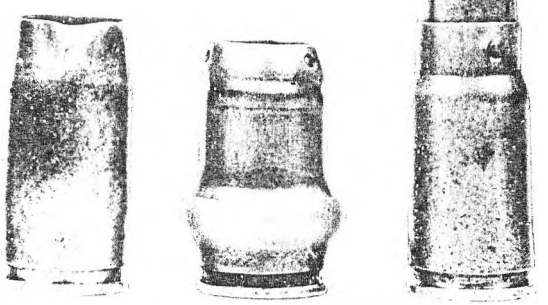
4. REMARKS

There is much rough welding on the weapon, and an unusual feature is the replaceable firing pin. This screws into the face of the bolt. The weapon has a very high cyclic rate of fire (estimated at between 800-1000 rounds per min.), which is considered undesirable in this type of gun. The muzzle velocity is approximately 1050 ft per sec. The weapon was fired with the standard Japanese pistol ammunition - 8 mm cupro-nickel ball projectile, but failed to extract 75 per cent of the rounds. With failure to extract, the cartridge cases were damaged on the end as shown in the illustration, and a small percentage had an extreme bulge.

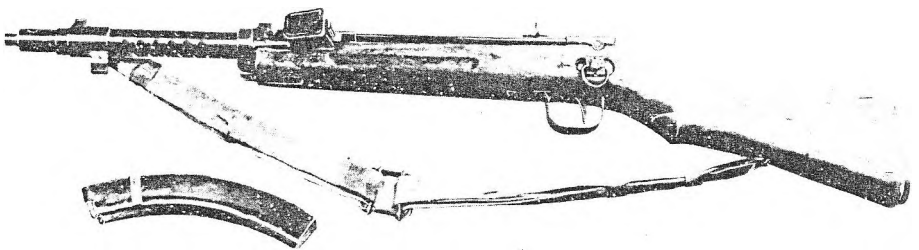
(SOURCES:- USASOS and ABERDEEN PROVING GROUND MARYLAND)

TYPE 100 (1940) 8 MM SMG

FIG 1 Cases Damaged by Faulty Extraction.

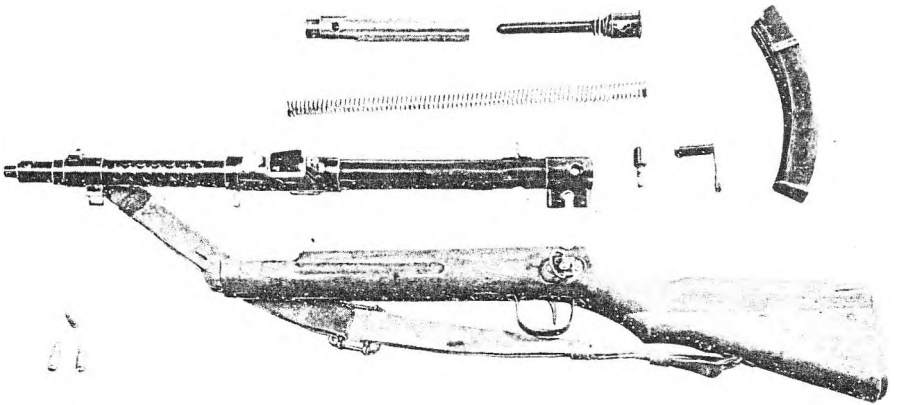


TYPE 100 (1940) PARATROOP 8 MM S M G FIG 2



TYPE 100 (1940) 8MM SMG

FIG 3 Disassembly



TYPE 100 MORTAR FUSE

1. GENERAL

This fuse is designed for use in the Type 100, 82 mm Mortar Bomb and gives instantaneous or delayed action.

2. DESCRIPTION (Figs 1-4)

The brass fuse body consists of nose and base sections which are screwed together with a right hand thread (20 mm major diameter, 1.3 mm pitch) and are locked by a grub screw engaging in the thread.

(a) Nose Section: The cylindrical cavity in the front of the nose section is closed by a duralumin striker dome which fits tightly in the cup-shaped upper portion of the detonator holder.
The flat-topped striker pin is held down level with the bottom of this cup-shaped portion by the striker dome. The striker dome and detonator holder are held above the base of the cylindrical cavity by a tinned copper shear pin. The lower portion of the detonator holder is 6 mm in diameter and projects below a shoulder in the nose into a second cavity. The detonator contains 0.1 gm of a composition consisting of mercury fulminate 22%, antimony sulphide 39% and potassium chlorate 39%. It is held in position in the bottom of the detonator holder by a duralumin stirrup having two lugs which project through slots in the detonator holder and seat in a shallow recess beneath the shoulder in the nose section.
For assembly two slots are provided in the shoulder through which the lugs of the stirrup pass, the stirrup and detonator holder then being turned through 90° to seat under the shoulder. A creep spring between the detonator and the base of the striker holds the detonator away from the striker even after shearing of the shear pin allows the striker assembly to set back. Until set-back of the striker assembly has occurred the detonator is prevented from moving toward the striker by the stirrup engaging beneath the shoulder. A multi-perforated brass plate fitted between the nose and base sections of the body acts as a distributor for the flash from the detonator.
The striker pin and dome, detonator holder and stirrup are made of duralumin containing the following:

Copper	..	4% approx
Magnesium	..	0.6% "
Manganese	..	0.6% "
Silicon	..	0.2% "
Iron	..	0.4% "

The aluminium fuse cover was found by spectrographic analysis to contain the following:

Silicon	..	0.6% approx
Iron	..	0.4% "
Other Impurities		0.1% "
Aluminium (by diff)		98.9% "

(b) Base Section: The base section of the fuse body contains the mechanism for setting the fuse to instantaneous or delayed action. This mechanism consists of a brass spindle with a three way channel formed by drilling a hole 2 mm in diameter diametrically through the middle of the spindle and a second radial hole, 3 mm in diameter, at right angles to, and connected with it. The diametric hole is not filled but the radial hole contains a small gunpowder delay pellet. The spindle is seated in a groove in the central cavity of the body in such a manner that slightly less than half the circumference is firmly in contact with the body. The ends of the spindle, one of which is slotted to enable it to be rotated, seat in cylindrical cavities. Access to the slotted end is provided through a hole covered by a tinfoil disc and the other end is held in position by a screwed brass plug. A steel grubscrew through the body of the fuse engages in a slot in the spindle, the ends of which serve as stops for the delay and instantaneous settings.
A central flash channel beneath the spindle leads to a perforated gunpowder pellet which is held in position by a perforated screwed brass plug, a cloth washer being inserted between the pellet and the plug. The brass magazine, which screws into the base of the fuse below this plug, contains 3 gms of pressed RDX (m.p. 202°C.) having a lead azide pellet weighing 0.3 gm in a central recess in the top. The filling is covered by a tinfoil disc and the magazine is closed by a perforated threaded brass plug to the bottom of which is attached a cloth washer. The body is threaded externally (left hand, major diameter 24 mm and pitch 2.0 mm) to screw into the nose of the projectile.

(c) Fuse Container: The fuse container consists of a cylindrical 28 SWG tinplate body 40 mm in diameter and 85 mm long, with a waxed cardboard liner and a waxed beechwood packing piece which is a neat fit in the liner. The packing piece is centrally bored to take the magazine and lower portion of the fuse. The container is closed by a threaded pressed tinplate lid on the inside of which is a wax impregnated felt disc.

3. FUNCTION

The fuse is armed by the shearing of the shear pin passing through the detonator holder and striker dome, which allows the striker assembly to set back to the base of the cavity. The stirrup, holding the detonator in position, is then free to move forward against the creep spring. (The load to compress this spring to half length is 42.6 gms). On impact the inertia of the detonator, overcoming the creep spring, carries it forward onto the striker. It is probable that shearing does not take place until impact occurs as the load required to shear the shear wire is approximately 150 lb. (68.11 kg.) and the weight of the striker assembly (striker dome, detonator holder, striker stirrup, creep spring and detonator) is 2.2 gms; this system requires a minimum acceleration of approximately 31 Kgs for shearing to occur. An acceleration of such magnitude is unlikely in a mortar which is a comparatively low velocity weapon.

The fuse as packed is set at "instantaneous", that is, with the setting slot vertical, and the diametric hole through the centre of the spindle co-axial with the flash channel. The perforated gunpowder pellet above the magazine is thus directly ignited by the flash from the detonator.
In the "delay" position, the diametric hole through the spindle is at right angles to the axis of the fuse and just above the groove in the body in which the spindle is seated and the radial hole containing the delay pellet is co-axial with and faces the flash channel. The flash from the detonator passes around the top of the spindle, through the diametric hole, and ignites the delay pellet and then the perforated gunpowder pellet.
The lead azide pellet in the top of the filling is ignited by the flash from the perforated gunpowder pellet and so initiates the R.D.X.
Three attempts were made to determine the delay given by the fuse. In two the detonator failed to ignite the delay pellet and in the third the time recorded was 0.001 sec., an extremely small time of delay.
Failure of the detonator to ignite the delay pellet in two out of three trials suggests that the fuse is unreliable when set to delayed action.

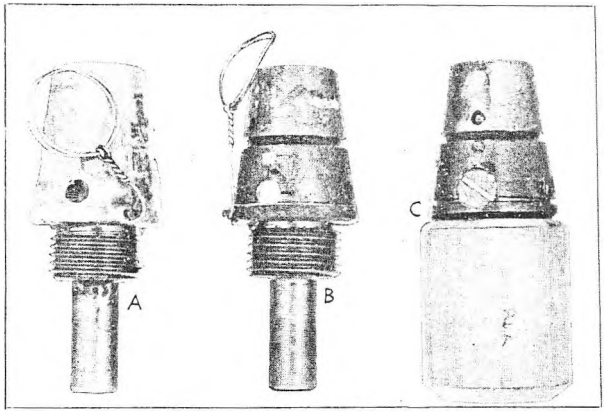
4. MARKINGS

The markings on the three fuses examined were identical except for factory and date of manufacture. The markings on the labels attached to the top of the container lids had been obliterated.
Translation of markings on two of fuse covers gave "May 1942" and "October 1942" and "Type 100 Mortar Fuse".
The three fuse bodies were marked "May 1942 Osaka Army Arsenal", "August 1942 Osaka Army Arsenal" and "October 1942 Tokyo Army Arsenal".
The markings on the slotted ends of the delay spindles indicated "Instantaneous" and "Delay" in each case.

SOURCE: MUNITION SUPPLY LABORATORIES
(through MGO Branch)

TYPE 100 MORTAR FUSE

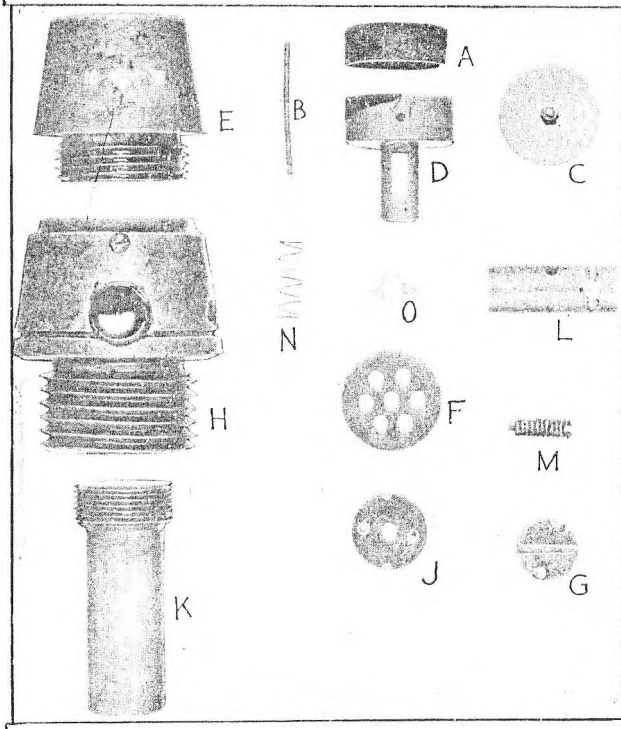
FIG 1



(A) Fuse with Cover and Removal Wire. (B) Cover Removed. (C) Fuse Inserted in Packing Block.

TYPE 100 MORTAR FUSE

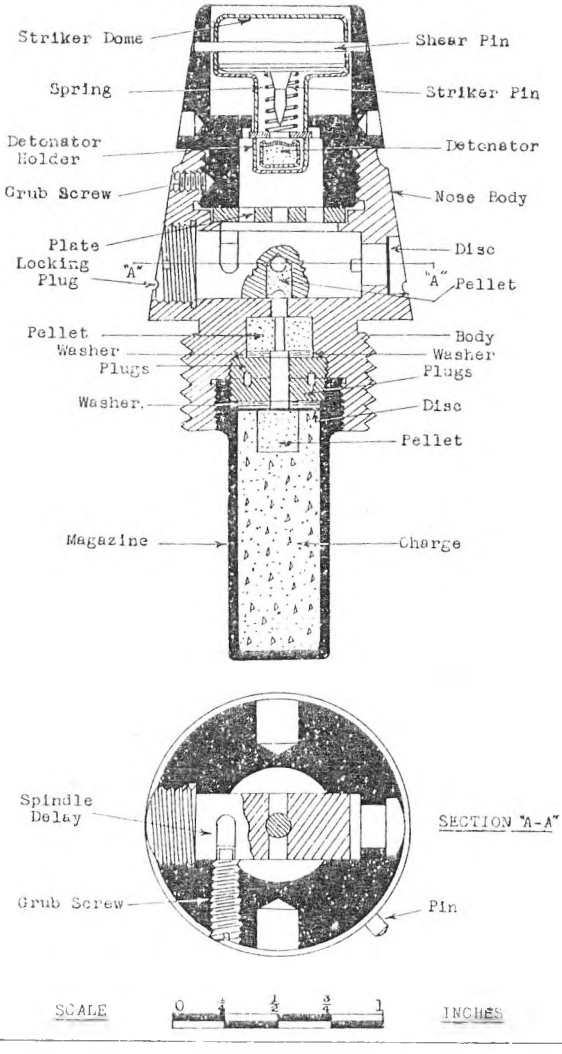
FIG 2



(A) Striker Dome. (B) Shear Wire. (C) Striker Pin.
(D) Detonator Holder. (E) Nose Body. (F) Plate.
(G) Locking Plug. (H) Body. (J) Plug.
(K) Magazine. (L) Delay Spindle. (M) Grub Screw.
(N) Spring. (O) Stirrup.

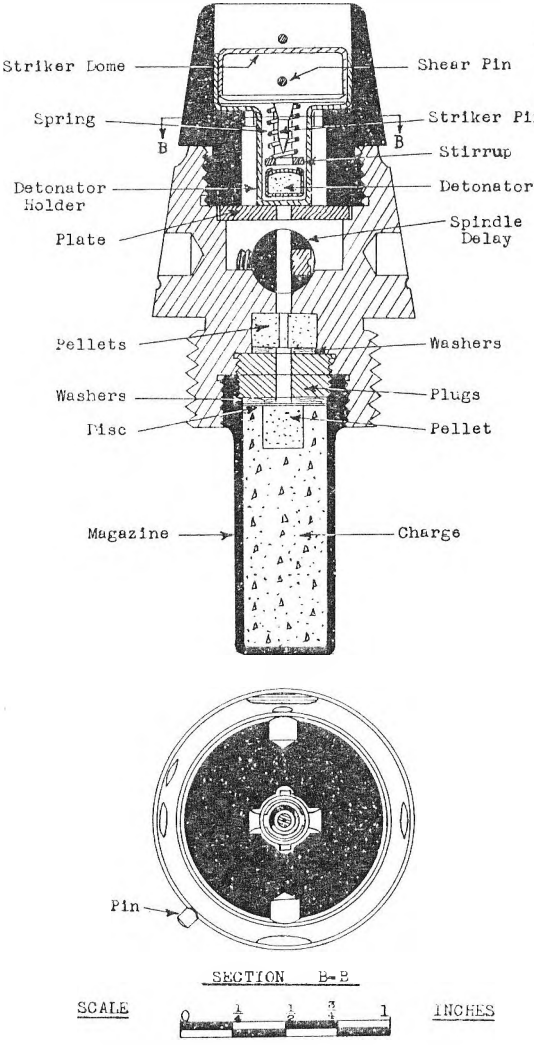
TYPE 100 MORTAR FUSE

FIG 3 Fuse Unarmed and Set for Delayed Action.



TYPE 100 MORTAR FUSE

FIG 4 Armed and Set for Instantaneous Action.



SOAP BAR BOOBY TRAP

1. GENERAL

This item is an incendiary device moulded in the form of a bar of "Ivory" brand soap. The specimen was incomplete as the ignition system was missing and one quarter of the bar had been cut away.

2. DESCRIPTION (Figs 1-2)

The bar is in the form of a parallelepiped, approximately 106 mm long, 68 mm wide, and 37 mm thick, with angles of 83° and 97° between the two longer sides. When complete the bar would weigh approximately 420 g. without ignition system.
On one side of the block is a depression, 67 mm long, 30 mm wide, and 2.5 mm deep, parallel to the sides in which is embossed in relief, the brand "IVORY". Embossed on the reverse side in a similar depression is the "maker's" name "PROCTOR AND GAMBLE". In the centre of and at right angles to one of the longer rectangular sides is the igniter recess which is 8 mm in diameter and 40 mm deep.
The block is painted ivory white with a nitrocellulose lacquer containing titanium dioxide and zinc oxide as pigments. The analysis of the composition, which is an unusual incendiary mixture, is as follows:-

Paraffin wax	19.4%
Rosin	10.9%
Barium nitrate	30.4%
Ferrosoferic oxide (Fe_3O_4)	9.1%
Aluminium, metal	11.1%
Magnesium, metal	11.3%
Nitrocellulose	4.4%
Gritty siliceous material	2.6%
	99.2%

3. BURNING TEST

The composition is somewhat difficult to ignite. The delay time to ignition under standard test conditions at 650°C. is 3.5 seconds, at 500°C. is over 40 seconds and below 480°C. the material does not ignite in less than 5 minutes. A hot vigorous priming composition would be required to ignite the bar.
The material burns with a relatively violent spluttering flame, but it is easily extinguished with water, and does not disrupt violently as thermite and magnesium mixtures usually do. A 1 in. cube section that was burnt to completion on a piece of pine plywood charred the surface to a depth of 3 - 4 mm. The bar would ignite wooden flooring and light wooden structures.

SOURCE:-MUNITION SUPPLY LABORATORIES
(through MGO Branch)

SOAP BAR BOOBY TRAP

FIG 1

SOAP BAR BOOBY TRAP

FIG 2 Reverse side showing Ignitor Recess and Cut-away Portion as received.

NAVY 1 KG BOMB

1. GENERAL

A new Navy 1 Kg bomb has been recovered on Mindoro, Philippine Islands. It is believed that it is an anti-personnel weapon, although the thin case will probably not produce a large or dangerous fragmentation pattern.

2. DESCRIPTION (Figs 1 - 3)

This bomb is similar in appearance to the Navy 1 Kg hollow-charge bomb, but the body is 5-9/10 ins shorter, 5/8 in. larger in diameter, and does not have a hollow-charge nose. It also carries 196.7 grams more explosive than the hollow-charge bomb.
The bomb consists of three main parts: (1) body, (2) tail assembly and (3) fuse. The body is made of 1/32 in. steel, and is lacquered on the inside. The Type 97 (T N T 60%, H N D 40%) filling is cast directly into the body. The tail assembly is made of light tinned steel and is secured to the fuse body by four screws. The fuse body is made of an aluminium alloy, and screws directly into the main body of the bomb. The tail assembly and fuse are aluminium coloured, but the main body is steel gray. A 1 Kg bomb of identical construction, but with a black body and aluminium coloured tail, has also been reported. The fuse is integral with the tail section, and is very similar to the B-5(b) except for a reduction gear system used to slow down the arming process. The fuse is composed of the following parts: (1) two small arming vanes held in the safe position by a drogue, (2) an arming stem, (3) gear frame containing the arming stem gear, intermediate gear, pinion gear, and arming spindle gear, (4) detent retaining spring, (5) safety detent, (6) arming spindle, (7) heavy inertia striker, (8) weak creep spring, and (9) fuse body. An HE gaine, identical with that in the 1 Kg hollow-charge bomb, threads into the base of the fuse body. The designation of the fuse will probably be B-5(c).
Other details of this bomb are:-

Overall length	11-3/8 ins
Length of body	5-1/2 ins
Diameter of body	2-3/8 ins
Body wall thickness	1/32 in.
Total weight	2 lb 3 oz(1Kg)
Empty weight	1 lb 2 oz($\frac{1}{2}$Kg)
Weight of H.E.	1 lb 1 oz($\frac{1}{2}$Kg)

The aerial burst container, which carries 36 bombs, has not been recovered but was inspected in the field. It is made of three metal side pieces fitted around two hexagonal end pieces. The side pieces are held together by three metal bands, one at each end, and one at the centre. The forward end piece contains a pocket for a D-4(a) fuse.

3. OPERATION

After the release of the container from the plane, the

D-4(a) bursts the bands holding the container together, allowing the bombs to spill out. As each bomb falls free, the drogue retaining the vanes is carried away by the wind, allowing the vanes to rotate. The motion of the vanes is transmitted through the reduction gear system to the spindle which is threaded out of the striker.
To prevent rotation of the striker, a key and keyway system is incorporated in the fuse body and striker. As the spindle rises, it also lifts the gear frame to which is secured a pin retaining the safety detent. The safety detent fits through the fuse body into the striker to hold it in position. With the spindle and detent removed, the heavy striker is held up only by a weak creep spring, against which it rides on impact, initiating the gaine.

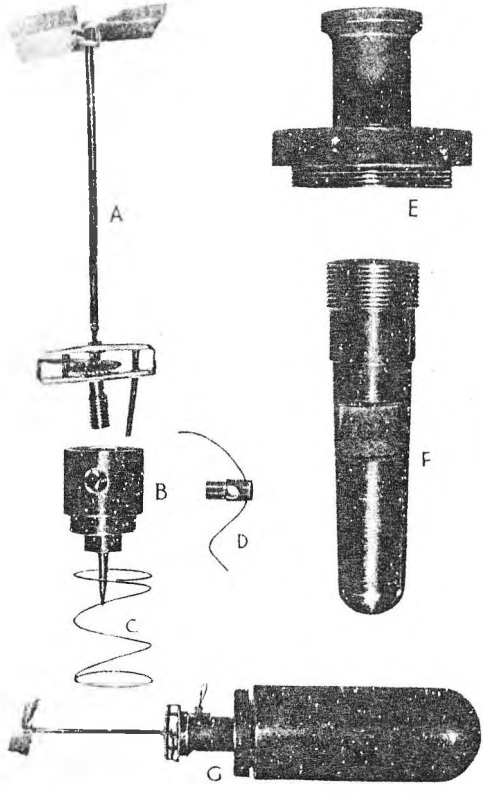
(SOURCE:- M.E.I.U.)

NAVY I KG BOMB

FIG I

NAVY 1 KG BOMB

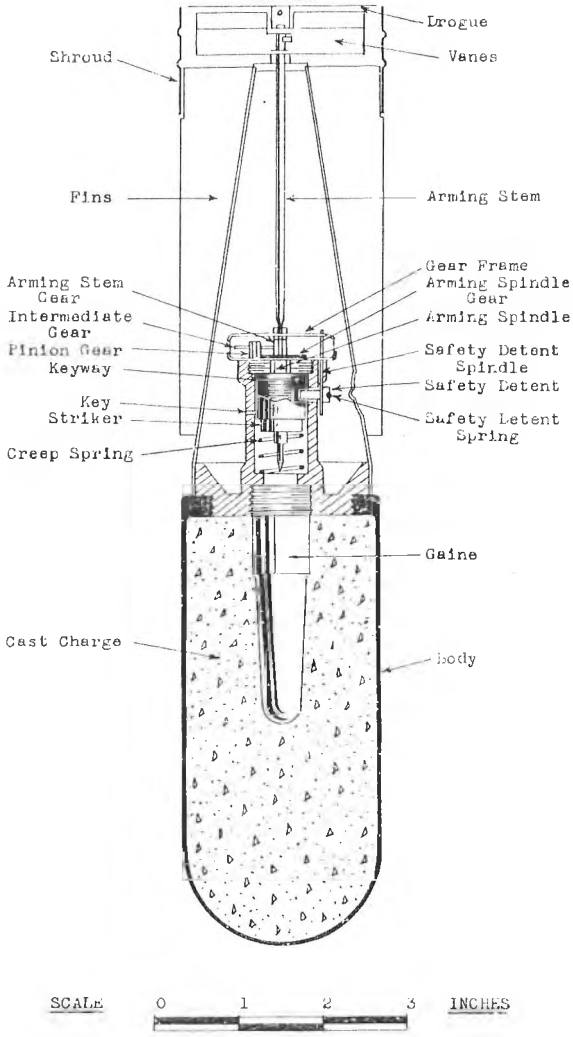
FIG 2



(A) Vane and Reduction Gear Assembly. (B) Striker.
(C) Creep Spring. (D) Safety Detent. (E) Fuse Body.
(F) Gaine. (G) Bomb with Tail Removed.

NAVY 1 KG BOMB

FIG 3



CERAMIC HAND GRENADE

1. GENERAL

A new type of "Ceramic" hand grenade was recovered from the Ormoc area of Leyte, Philippine Islands. The construction is very simple, and seems to be designed primarily for blast effect. It weighs .88 lb and 60 are packed in a wooden case, with excelsior padding.

2. DESCRIPTION (Figs 1 - 3)

The grenade is a sphere about 3 ins in diameter, with a short filler neck. Externally it resembles an old fashioned bomb shell.
The grenade body is made of glazed pottery, though some appear to be of white porcelain. Both types are of the same size and function in a similar manner.
A close fitting, tan coloured rubber cover is slipped over the grenade, covering it entirely except for the filler neck. For carrying purposes a loop of white tape is tied into a groove in the neck. The match-head striker of the fuse projects slightly from the filling hole.
The entire assembly at the neck is covered by another small slip-on rubber cover. This cover also serves to retain in place a small wooden block, covered with a match striking composition. The explosive filler is a loose charge of type 88 explosive.
The fuse is very simple. A one inch length of safety fuse with a detonator crimped on one end and a particle of match-head composition on the other is set into a black rubber plug, which is cemented into the filling hole in such a manner that the match-head composition is exposed.
A small, loose wooden block with abrasive composition on one side is retained in place above the fuse head by the slip-on rubber cover. This is used to strike the match on the fuse. Burning time is 5 secs.

3. OPERATION

To use this weapon, it is grasped in the right hand with the striker down, the rubber cover is removed from the fuse, and the striker block scratched across the match-head composition
As soon as the fuse is lighted the grenade should be thrown. It has a very sharp report and gives off a sizable cloud of white smoke. Care must be taken in throwing to prevent the grenade from striking a hard object as it breaks easily, scattering the explosive charge.

4. PERFORMANCE

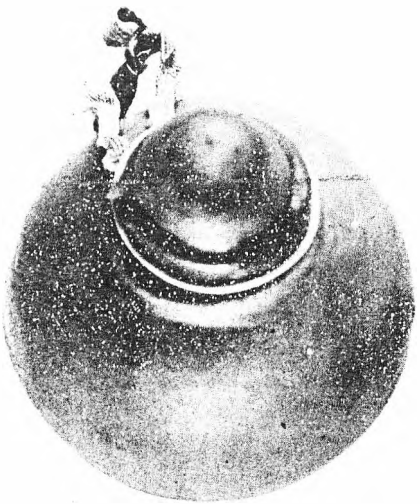
There is considerable blast but practically no fragmentation connected with the explosion. It is believed that the maximum effective radius is 15 yds. The match-heads are believed to be very sensitive to

moisture and probably will result in a fairly high percentage of duds. One of the three grenades tested failed for this reason.

(SOURCE:- USASOS)

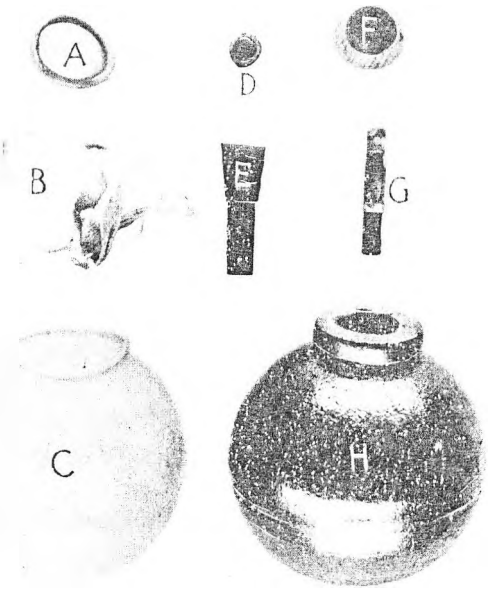
CERAMIC HAND GRENADE

FIG 1 Grenade in Rubber Casing, with Carrying String Attached.



CERAMIC HAND GRENADE

FIG 2



(A) Small Rubber Cap. (B) Carrying String. (C) Rubber Case. (D) Match Composition. (E) Fuse - Adapter. (F) Striker Block. (G) Fuse and Detonator. (H) Grenade Body.

81 MM BARRAGE & FLARE MORTAR SHELL

1. GENERAL

Two new types of 81 mm mortar shells have recently been recovered in the Ormoc area of Leyte, Philippine Islands. These are a flare or illuminating shell, and a "barrage mortar" AA shell. The Japanese nomenclature for this ammunition is as yet unknown.

2. DESCRIPTION (Figs 1-5)

The two types of projectiles are externally of the same design but can be distinguished by the fact that the barrage mortar shell is entirely black, except for the light tan, wooden nose plug, while the flare shell is light gray in colour and has a red wooden nose plug. Dimensions are as follows:

Calibre	81 mm
Length, overall	21 3/8 ins
Size of fins	7/8 ins by 4 3/4 ins
Diameter of flare or bomb cylinder	1-9/16 ins

The shells are stabilised in flight by fins, and each one is packed in a separate tinned metal container. The container is 21½ ins long and 3-5/16 ins in diameter. The rounds are packed eight to one wooden box.

3. FUNCTIONING OF FLARE SHELL

Upon striking the firing pin of the mortar, the primer is ignited, and this in turn ignites the loose black powder in the base of the round. This powder ignites the propellant and also a 15 secs delay train.
The shell is propelled from the mortar and continues in flight until the 15 second delay train reaches the ejecting charge of black powder. The ejecting charge forces out the wooden nose plug, the two parachutes, and the flare contained in the main cylinder body of the projectile.
The burning of the ejecting charge also ignites the flare, which seems to be a magnesium composition. The flare floats to the ground on the two parachutes, the smaller of which is attached to the flare composition cylinder by 14 ins strands, while the larger parachute suspends the cylinder from a 13 ft cord. A hole 4½ ins in diameter in the top of the upper parachute is apparently designed to reduce swinging.

4. FUNCTIONING OF BARRAGE MORTAR SHELL

The barrage mortar shell functions in the same manner as the flare shell up to the ignition of the black powder expelling charge.
In the case of the barrage mortar shell, the ejecting charge forces out the wooden nose plug, two parachutes, the suspension cord, and the explosive cylinder. At the same time a 40 secs delay train, which extends through the high explosive cylinder, is ignited. The

explosive cylinder is suspended by a small parachute attached to the cylinder by 12 in. strands, and by a larger parachute attached to the explosive cylinder by a 30 ft suspension cord. The end of the suspension cord is covered with match composition, and acts as a pull igniter.
If an airplane strikes the suspension cord of the floating high explosive assembly, the jerk on the cord pulls the end of the cord through the primer thus causing detonation of the high explosive. This action is identical to that of the 70 mm barrage mortar shell. If the pull igniter is not operated the burning train of the 40 secs delay pellet reaches the detonator and explodes the explosive cylinder in the air. The high explosive cylinder contains three hollow pellets; one of tetryl, 1½ ins in diameter by 1¼ ins long, and two of granular TNT, each 1¼ ins in diameter by 2⅝ ins long.

5. REMARKS

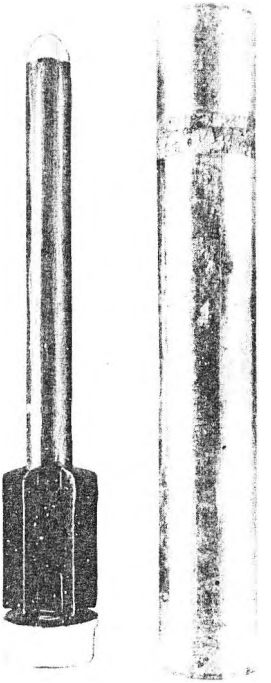
As firing tests have not been conducted, no concrete data on ranges can be given. However, those who have seen the shells fired state that they reach an altitude of approximately 1000 ft.
In view of the 15 secs time of flight, this estimated altitude seems incredibly low, either in comparison with the altitude attained by the 70 mm barrage mortar shell, described in AMF Tech Int Summaries Nos. 6, 11 and 15, or in comparison with the lowest muzzle velocity (235 ft per sec) obtainable with US M43A1 81 mm mortar ammunition.

(SOURCE:- USASOS)

81 MM BARRAGE & FLARE MORTAR SHELL

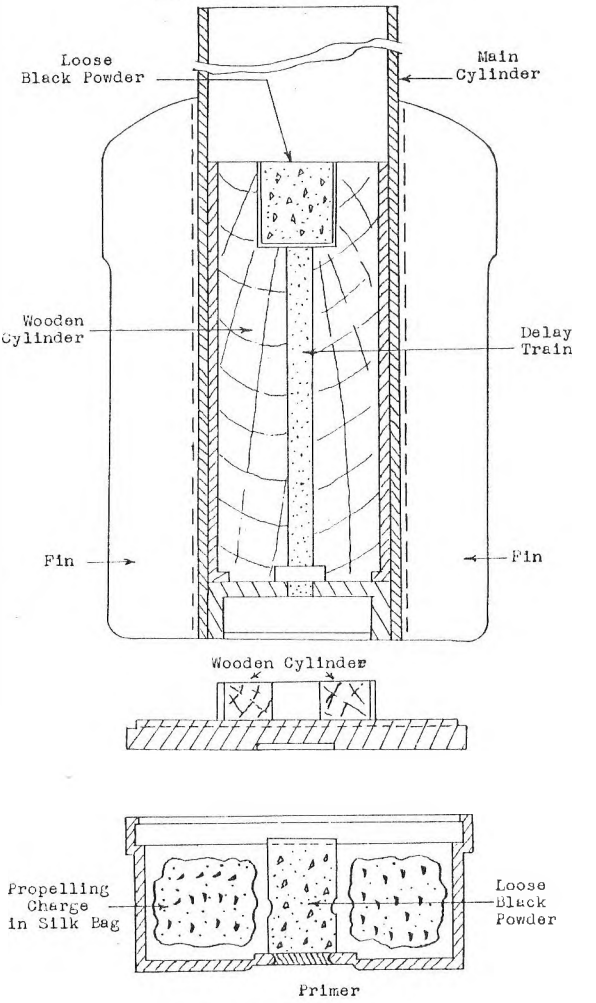
FIG 1

Barrage Mortar and Packing Case.



81 MM BARRAGE & FLARE MORTAR SHELL

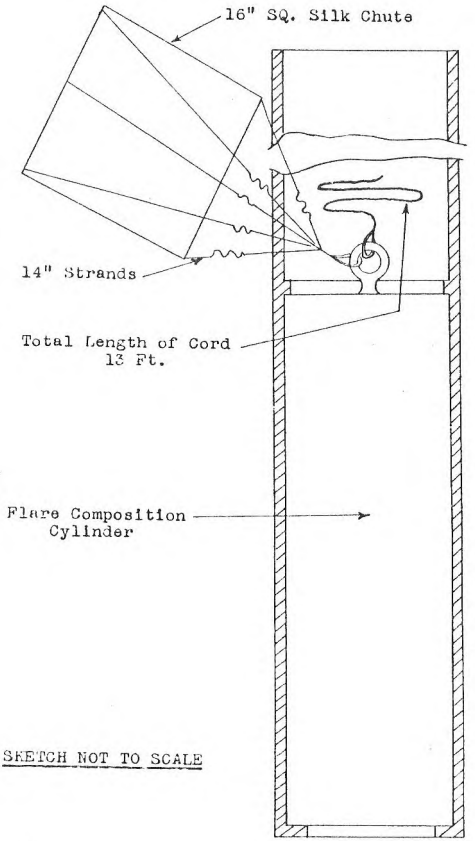
FIG 2 Flare Mortar Shell.



SKETCHES NOT TO SCALE

81 MM BARRAGE & FLARE MORTAR SHELL

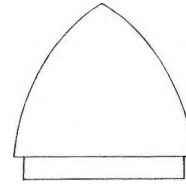
FIG 3 Flare Mortar Shell



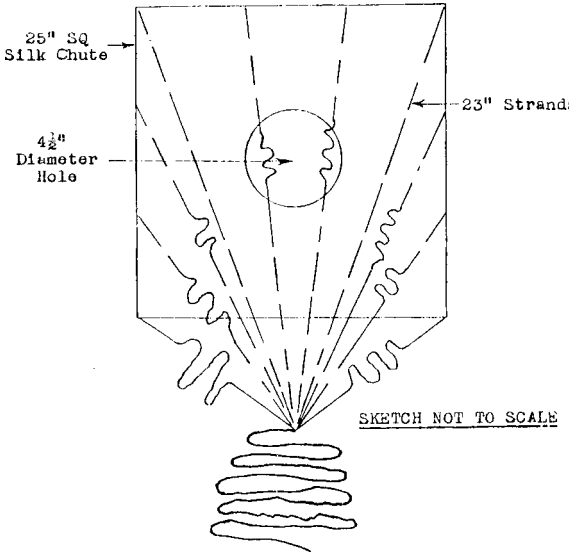
SKETCH NOT TO SCALE

81 MM BARRAGE & FLARE MORTAR SHELL

FIG 4 Flare Mortar Shell.



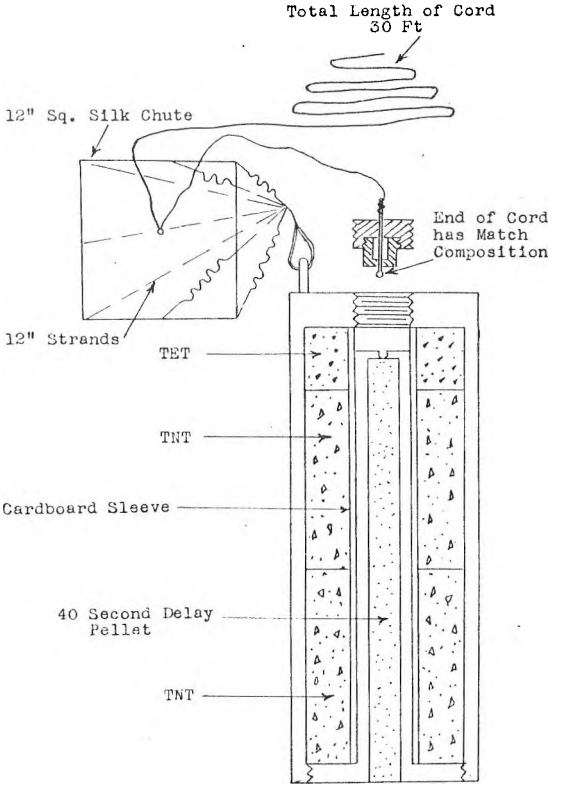
WOODEN NOSE



PARACHUTE COMPONENTS

81 MM BARRAGE & FLARE MORTAR SHELL

FIG 5 Barrage Mortar Shell.



SKETCH NOT TO SCALE

15 CM MORTAR BOMB

1. GENERAL

This bomb is similar in shape to other Japanese Army finned mortar bombs and was recovered on Pelellu Island, Palau Group.

2. DESCRIPTION (Figs 1-2)

The main components consist of a fuse and adapter, body and tail unit. The weight without fuse or propellant is 25.7 Kg. Weight of filling is 6 Kg.

(a) Body: This is of one piece construction, roughly machined and has a threaded opening in the nose to receive the fuse adapter ring. The bourrelet is 150 mm in diameter, well machined and has four grooves. The fuse opening is closed by a composition plug during transit. The main filling is cast into the body and appears to be T N T.

(b) Fuse and Adapter: The adapter ring takes the Type 93 mortar fuse. This fuse has been found in Japanese 81 mm and 90 mm mortar bombs and has been previously described in AMF Technical Intelligence Summary No. 6.
The bottom of the adapter ring is internally threaded to take the lacquered steel booster cup. This cup is fitted with a shaped aluminium container which receives the gaine of the fuse. Surrounding the forward end of the booster is a felt washer which serves as a cushion for the main charge. The booster is a 1 oz. picric pellet.

(c) Tail Unit: The tail fin assembly screws into a female threaded opening in the base of the body. It consists of a male plug to which is welded a cylindrical steel tube. Welded to this tube are six fins shaped to receive the six silk bags containing the propellant charges. Between each set of fins are five gas escape holes for the propellant gases from the cartridge which fits inside the steel tube. The cartridge is held in place by a ring cap threaded to fit over the end of the tube. The propellant charge consists of a primary cartridge containing 56 gms of propellant and six blue lacquered silk bags each containing 92 gms of the same propellant.
The primary cartridge resembles a shotgun shell and fits inside the steel tube of the tail unit.
Analysis of this propellant is pending, but it is believed to be similar to that used in 81 mm mortar shell reported in AMF Technical Intelligence Summary No. 6.

(d) Markings: The bomb is painted black overall with an uneven red band painted around the nose of the adapter ring. There is a 3/4 in. yellow band 7/16 in behind the bourrelet and a 9/16 in. white band painted

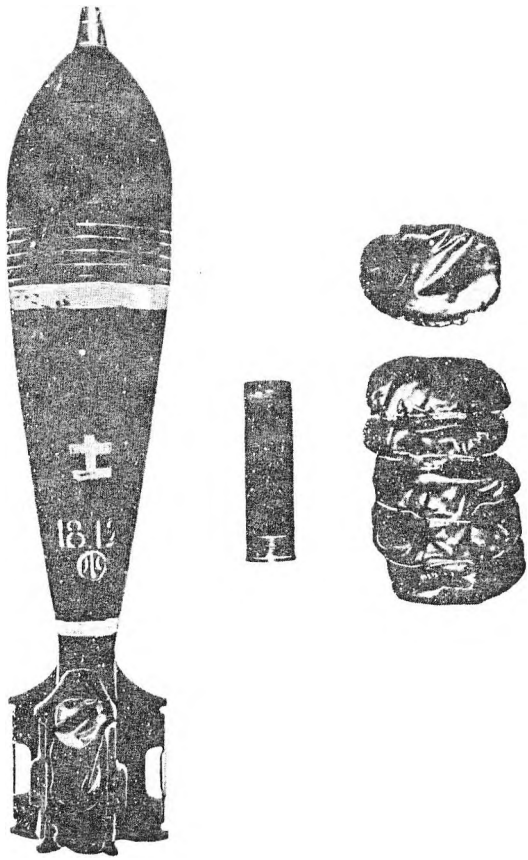
1/8 in. forward of the junction of the body and the fin assembly. Painted on the side of the body was a normal plus and minus ballistic sign indicating that the bomb is within 0.5% of the specified weight. The numerals 18.12 painted in white on the body give the date of filling as December 1943. A further symbol means that the bomb was filled at Kokura Army Ordnance Branch depot.
Stamped on the bomb are markings which give the place and date of manufacture as Osaka Army Arsenal and May 1940 respectively. The assembly number "500" appears on base of the body, adapter ring, fin assembly and base ring cap.
Raised characters on the nose plug indicate "left hand thread".
Two sets of markings appear on the packing box. The first characters are translated "97 Medium Mortar" and the second set are read "14th Year 10 AA; 91 Long Pointed Projectile". It is not known to what these second characters refer since Type 91 10 cm AA Projectile is too long to fit in the packing box.

SOURCE: MEIU No. 1

15 CM MORTAR BOMB

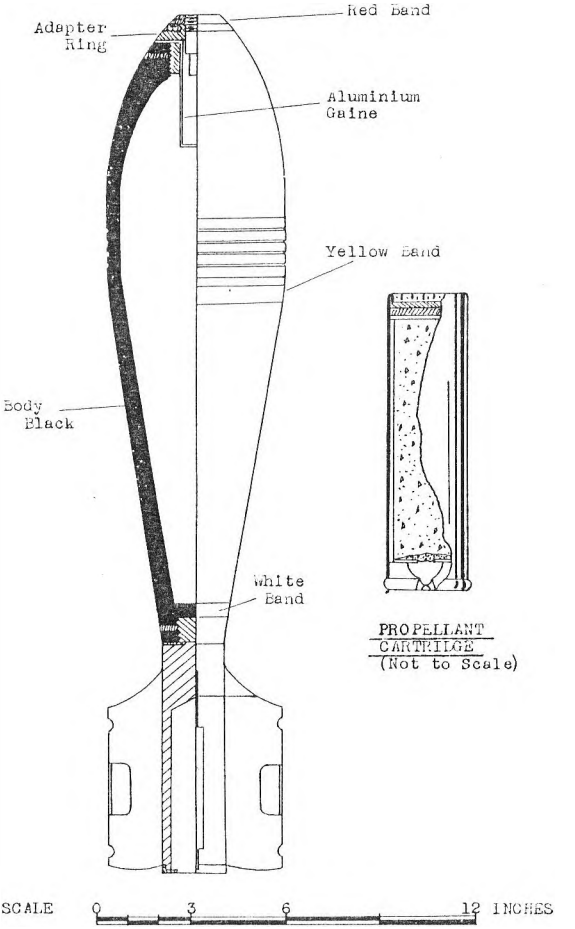
FIG I

Complete Bomb, Propelling Cartridge, and Increments



15 CM MORTAR BOMB

FIG 2



NEW TYPE FLOATING MINE K 2

1. GENERAL

This mine is designed to be laid by aircraft up-current of an anchorage. It is possible that MTB's may also be used to lay the mine. The main feature is its extreme sensitivity as the horns respond to a pressure of as little as 5 lbs.

2. DESCRIPTION (Figs 1-3)

The mine consists of two separate parts, namely body containing the explosive charge and the finned tail-piece incorporating a buoyancy chamber. The two parts are linked by a 6 ft wire and are held together by a soluble connecting washer to form a single unit. The overall length of the mine is 6 ft 1 in., diameter 14 ins and weight 300 lbs.

3. METHOD OF ARMING

A safety pin is released as the mine leaves the aircraft. At a depth of 20 ft the detonator is hydrostatically inserted in the primer. The positive buoyancy of the tail piece carries the mine to the surface where it remains, still as a single unit, until the connecting washer dissolves.
The body of the mine then sinks to the extent of the connecting wire, the pull of which frees the three horns which in turn spring out into a locked armed position.
The buoyancy chamber is the only visible part of the mine at this stage and is painted light blue.

4. DISPOSAL

A soluble plug, incorporated in the float, dissolves slowly after arming, thus causing the float to flood gradually and the mine to sink to the bottom. The time taken by this operation is not known, but it certainly exceeds one hour. A quick method of effective disposal is to perforate the float.

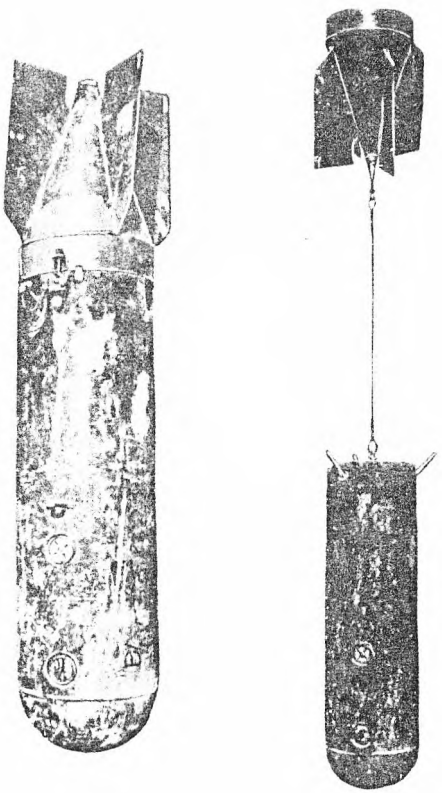
5. COMMENT

This is the first indication of the influence of German design in Japanese underwater ordnance, since part of the mechanical arming closely resembles that employed in two types of German ground mines.

SOURCE: CHIEF OF IMP STAFF - EAST INDIES FLEET

NEW TYPE FLOATING MINE K 2

FIG 1 Complete Unit, and Mine in Armed Position.



NEW TYPE FLOATING MINE K 2

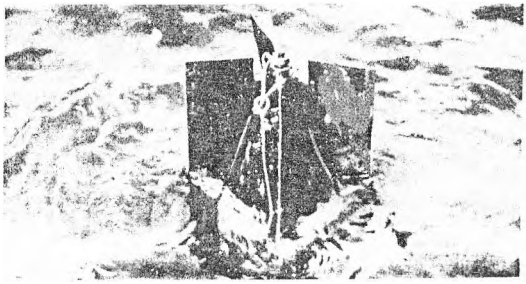


FIG 2 Mine Floating Prior to Washer Dissolving.

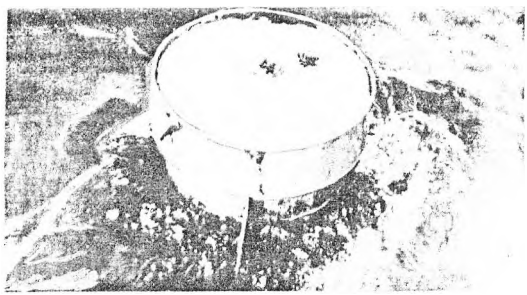


FIG 3 Buoyancy Chamber on Surface.

500 WATT TRANSMITTER

TYPE 95 MK 4 REVISION 1

1. GENERAL

This Wireless Set is a five stage CW transmitter having a power output of approximately 500 watts, with an operating range of 300 to 12,000 miles depending on time andfrequency of operation.
The frequency range covered is continuous from 3.44 mC to 19.9 mC in seven bands. A separate power supply pack is provided which requires a three-phase 220-volt source of supply. Provisions are made for connecting separate modulation equipment for grid modulated phone operation.

2. DESCRIPTION (Figs 1-14)

(a) Transmitter: The transmitter is housed in a rack 55 ins high, 30 ins wide and 26 ins deep, and the power supplies are mounted in a rack 51 ins high, 29½ ins wide and 21 ins deep. The power supply and transmitter racks weigh approximately 2300 pounds total.
The transmitter is of conventional though out-dated design. The nomenclature indicates army acceptance of the design in 1935. The dating of the component parts indicates that the transmitter was assembled later than September 1941, and the power supply later than October 1942. However, it is impossible to give definite dates of manufacture, since all nameplates had been removed from this equipment prior to arrival at this Laboratory. The transmitter consists of a triode Hartley oscillator, three tetrode amplifier stages of increasing power, and a high-power final stage using a single tetrode tube. The parallel-fed Hartley oscillator stage may be changed to a crystal oscillator, with a choice of four crystal-controlled channels, by means of switches provided.
The oscillator valve is a Japanese type UX-202-A which is identical in appearance to American type 45 (VT-45), but has a closer spaced grid structure indicating a higher amplification factor. The first amplifier valve is a Japanese type D-865 and is similar to the American type 865 (VT-55). The second amplifier is a Japanese type UV-814. The UV-814 is a screen grid valve which is in no way similar to the smaller American type 814, a beam tetrode. This valve is the same size and shape as the Amperex type 203H and uses the same type of plate mounting and base construction. However, it uses a screw terminal in place of the plate cap used on the Amperex valve. The third amplifier is a D-860 type valve and the final stage is a single UV-861. These valves appear nearly identical to the American types 860 (VT-17) and 861 (VT-1C).
It was found that the Japanese UV-861 valve will operate safely to 400 ma plate current peaks. The power amplifier efficiency is 49.5% when delivering its maximum power output of 450 watts. Tapped coils are used in each stage to cover the frequency range of

stages. A time delay relay is incorporated to turn the power supplies on after the transmitting and rectifier filaments have heated. The power supplies use considerably more filtering than is necessary for supplies of this type.

Power drains of the set are as follows:

Filament	11 V	20 Amps
Plate Supply	3200 V	300-350 Ma
	1500 V	110 Ma
	550 V	60 Ma.
Bias	200 V	100 Ma
Supply Line	220 V	3 phase 8.25 Amps per line.

A 3-phase induction regulator of the blocked rotor type is used as a voltage regulator. The 220 volts can be raised or lowered 25-volts by adjusting the position of the rotor. The rotor position is controlled by a geared down 3-phase motor. The starting, stopping, and direction of armature rotation is controlled by a magnetic switch and a system of relays which can be set to respond when the voltage rises or falls to a predetermined value adjustable from 1% to 3% change. Controls can also be set for manual switch operation or for hand cranking. The maximum power handling capacity of the regulator is 5KVA.

The filament supply is a single source dc voltage obtained from a full wave, 3-phase, dry-disc rectifier system capable of furnishing 16 volts, 30 amperes. Damage from over-current is prevented by three winding reactors in the 3-phase power line supplying the filament transformer. The dc output current is fed back through the reactors and controls the reactance by dc magnetic saturation of the core. Under normal operation, the core is saturated by dc in the third winding and so little reactance is present to drop the line voltage. On overload, the dc output current backs out the third windings saturation and the reactors offer higher impedance and drop the line voltage supplied to the filament transformer.

(c) **Aerial Tuner**: A separate aerial tuner, is used for feeding aerials that are multiples of one quarter wavelength long. Switches make possible a change from voltage to current feed depending on whether the aerial is an odd or even number of one-quarter wavelengths long. With this tuner the aerial lengths must be very nearly the correct length. It was found that the tuner losses above 10 mc were high and the use of good grade American components in place of those in the tuner would give better results.

3. PREPARING FOR OPERATION

All connections from the transmitter to the power supply unit, to the incoming 3-phase 220 volt supply line, to the key, and to an external grid-modulation unit, if one is used, should be made before the initial starting up of the set. Wiring between the power supply and the transmitter should be made with a high voltage type cable similar to type CO-139 to provide insulation for the 3000 volt potential difference between these wires and ground.

The following switches are then set -

(a) Transmitter 5 step plate voltage switch to the bottom off position.

(b) Transmitter filament voltage adjustment control to zero.

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	1500 V	110 Ma
	550 V	60 Ma.
Bias	200 V	100 Ma
Supply Line	220 V	3 phase 8.25 Amps per line.

A 3-phase induction regulator of the blocked rotor type is used as a voltage regulator. The 220 volts can be raised or lowered 25-volts by adjusting the position of the rotor. The rotor position is controlled by a geared down 3-phase motor. The starting, stopping, and direction of armature rotation is controlled by a magnetic switch and a system of relays which can be set to respond when the voltage rises or falls to a predetermined value adjustable from 1% to 3% change. Controls can also be set for manual switch operation or for hand cranking. The maximum power handling capacity of the regulator is 5KVA.

The filament supply is a single source dc voltage obtained from a full wave, 3-phase, dry-disc rectifier system capable of furnishing 16 volts, 30 amperes. Damage from over-current is prevented by three winding reactors in the 3-phase power line supplying the filament transformer. The dc output current is fed back through the reactors and controls the reactance by dc magnetic saturation of the core. Under normal operation, the core is saturated by dc in the third winding and so little reactance is present to drop the line voltage. On overload, the dc output current backs out the third windings saturation and the reactors offer higher impedance and drop the line voltage supplied to the filament transformer.

(c) **Aerial Tuner:** A separate aerial tuner, is used for feeding aerials that are multiples of one quarter wavelength long. Switches make possible a change from voltage to current feed depending on whether the aerial is an odd or even number of one-quarter wavelengths long. With this tuner the aerial lengths must be very nearly the correct length. It was found that the tuner losses above 10 mc were high and the use of good grade American components in place of those in the tuner would give better results.

3. PREPARING FOR OPERATION

All connections from the transmitter to the power supply unit, to the incoming 3-phase 220 volt supply line, to the key, and to an external grid-modulation unit, if one is used, should be made before the initial starting up of the set. Wiring between the power supply and the transmitter should be made with a high voltage type cable similar to type CO-129 to provide insulation for the 3000 volt potential difference between these wires and ground.

The following switches are then set -

(a) Transmitter 5 step plate voltage switch to the bottom off position.

(b) Transmitter filament voltage adjustment control to zero.

(c) Power supply unit plate voltage switch to the low voltage, tuning position (anti-clockwise position).
(d) Switch NO.17 (automatic voltage control-manual voltage control) and NO.21 (regulator on-off) to the lower off position . (These switches are located behind the large solid front panel door of the power supply unit).
(e) The knife switch No.14 should be opened.
(f) The brake shaft under the upper snap cover should be rotated to the anti-clockwise position.
(g) Main power switch to the upper, or on, position. This will light the pilot light showing that power is available to operate the equipment.

4. VOLTAGE REGULATOR ADJUSTMENTS

WARNING: All panels and protective covers of the transmitter and power unit must be in place before proceeding further for the safety of the operating personnel. Contact with the 3000 volts and 1500 volts otherwise exposed is fatal.
The equipment is turned on by pressing the red button of the line switch. This operates a magnetic switch. Check the line voltage by switching the line-regulated switch to the anti-clockwise, line, position. If the voltmeter reading is between 195 and 255 volts the automatic voltage regulator can maintain the normal operating line voltage of 220 volts. Switch the line-regulated voltage switch to the clockwise, regulated, position. The voltage should read 220 volts. If the reading is lower or higher than this, it should be brought to the correct value by means of the semi-automatic motor control equipment.
The semi-automatic motor control equipment is turned on by closing the knife switch (14) and rotating the switch (18) to the right if the voltage is below 220 volts and to the left if the voltage is above 220 volts. This will operate the regulator control motor and bring the voltage to the correct value. When the voltage reaches 220 volts release the switch.
IMPORTANT NOTICE: If the voltage decreases when switch NO.18 is in the right position, or increases when in the left position, the phase rotation of the 3 phase supply is incorrect for proper functioning of the automatic voltage control and must be corrected. This correction can be made by shutting down and reversing any two adjacent 220 volt supply wires on the terminal strip at rear of the power supply unit, and placing the unit in operation with the red button as before.
The change from the semi-automatic to the automatic voltage regulator is accomplished by moving toggle switch NO.21 to the upper position, which cuts in the voltage control relay, and then moving switch NO.17 to the upper automatic position from the lower semi-automatic position. If the regulator setting was not exactly correct the relays and motor will operate to correct the setting. Subsequent starting of the equipment may be done with the switches in the above position. The automatic voltage control relay can be set to operate at 1% or 2% or 3% voltage increase or decrease. A correction adjustment is made when changing between 50 and 60 cycles.

If the regulator or control equipment fails at any time the voltage can be controlled by hand cranking. To manually crank the regulator, open the two small snap covers and the small door at the lower left hand corner of the power supply rack.
Opening the upper cover exposes the motor brake control. This shaft should be rotated clockwise to release the brake. A crank inserted in the power position allows the rotor position to be varied. The rotor position can be determined by the position of the pointer on the rotor angle indicator viewed through the small door. Clockwise rotation of the crank raises the line voltage.
After a time delay which may vary from 10-60 second, after the red push switch is pushed, a magnetic switch will operate to turn on the high voltage supplies. This time delay can be adjusted from 0-60 seconds by means of an adjustment of the time delay relay. The 50% marking is for 35 seconds and the 100% marking is for 55 seconds. The 50% position is the most desirable one to use. Check the bias supply voltage by rotating the bias-low B+ switch (47) to the anti-clockwise position. The reading should be between 200 and 300 volts. Rotate the switch to the clockwise positionand check the low voltage plate supply voltage. The reading should be between 500 and 550 volts. The final plate supply voltage should be 2400 volts when the tuning-operating voltage switch is in the anti-clockwise position and 3200 volts when in the clockwise operating position.

5. TRANSMITTER ADJUSTMENTS

Set the filament voltage to the red, 11 volt line on the filament voltage meter in the transmitter rack, by rotating the filament voltage from 0 to some mid value, near position 7. The filament current as read on the 50 amps filament current meter on the power unit should be about 20 amps if all valves are operating normally. If 11 volts cannot be obtained at this setting a correction may be made by adjusting the four 12-14-16 volt links at the rear of the power unit.
Set the main band change switch to the position, 1 to 7, indicated on the calibration chart for the frequency desired. Set the master oscillator-crystal control switch to the operation desired. Master oscillator is the anti-clockwise position. If crystal operation is selected pull out the crystal holder tray and check to see that the proper crystal is in place for the band selected. Replace the tray and set the crystal selector switch to the correct position.
Adjust the send-tuning-off switch to the middle, tuning position. This in effect holds the key down for the tune up period. Switch the power supply high voltage switch to the anti-clockwise tuning position and switch the 5 position high voltage switch on the transmitter to position 1. The oscillator plate milliammeter should read between 25 and 40 ma.
Switch the five position switch to position 2 and tune the 1st buffer-amplifier tuning condenser until the lowest dip is obtained in the milliammeter located directly above this control. The current should decrease to about half value.
Switch the five position high voltage switch to the 3rd position and tune the 2nd buffer-doubler to minimum dip

on the meter 3 located above. Switch the five position high voltage switch to position 4 and tune the driver stage until the lowest dip is obtained on the milliammeter located above the tuning control. The circuit breaker will open the plate circuit at 200 ma.
Set the final tuning condenser to about a mid-position with aerial-coupling link clear back.
Switch the five position switch to position 5 to apply voltage to the final amplifier stage. Rotate the final tuning inductance until a dip occurs in the current read on the milliammeter for the final plate circuit. The plate current of the Japanese UV-861 valve should never be allowed to go above 350 milliamperes for any appreciable length of time. At 400 milliamperes the final circuit breaker opens. The breaker may be reset with a front panel reset control.
When the final amplifier stage has been tuned for minimum current the high voltage power switch should be changed from the tuning to the clockwise operating position, if the plate current is less than 300 ma. The milliammeter readings should be: oscillator 25 to 45 ma., 1st buffer 15 ma., 2nd buffer 25 ma., driver 50 ma., and final 350 ma.

6. VALVE SUBSTITUTION

The American type 861 valve requires higher bias than the Japanese type UV 861 and will not safely handle as high a plate current, the upper current limit being 300 ma. instead of the 400 ma. circuit breaker setting above. When using an American type 861, 135 volts additional battery bias must be added. This can best be done by inserting the batteries (3 ea.BA-26 or 1 ea. BA-33 or equivalent) between the grid modulation terminals on the rear of the transmitter.
CAUTION: These bias batteries will be at 300 volts negative potential and must be insulated from the racks and ground. The Japanese 861 valve can operate at 350 ma. while the American 861 valve should not be operated above 250 ma.

7. AERIAL TUNING

The aerial coupling control should be rotated clockwise, bringing the coupling loop closer to the final tank coil. If the aerial is an odd multiple of a quarter-wavelength long, the lower centrally located switch should be put in the left position and the tuning condenser and coil should be adjusted for maximum current as indicated on the tuner meter.
If the aerial is an even multiple of a quarter-wavelength long the lower switch should be in the right position and the condenser tuned for maximum current on the R.F. meter of the transmitter. The aerial used must be accurately cut to some multiple of a quarter wavelength.

SOURCE: SIGNAL CORPS GROUND SIGNAL SERVICE
BRADLEY BEACH, N.J.

500 WATT TRANSMITTER

INDEX TO FIG 1.

(A) Dial of Aerial Coupling.
(B) Dial of Tuning Coil.
(C) Tuning and Coupling.
(D) Tuning Condenser.
(E) Aerial Current Meter.
(F) Final Plate Current Meter.
(G) Door to Final Amplifier.
(H) Oscillator Plate Current Meter.
(J) Oscillator Excitation Meter.
(K) Main Bandchange Switch.
(L) Filament Voltmeter.
(M) Self Excited Crystal.
(N) Oscillator Tuning Condenser and Bandchange Switch.
(O) Driver Plate Current Meter.
(P) Driver Tuning.
(Q) Send-Tuning-Off Switch.
(R) Crystal Selection.
(S) Filament Voltage Adjustment.
(T) Overload Relay Reset.
(U) Plate Current Meter.
(V) Plate Voltage Switch, 5 Steps.
(W) Second Buffer Tuning.
(X) First Buffer Tuning.
(Y) Second Buffer Plate Current Meter.

INDEX TO FIG 2.

(A) Line Current Meter.
(B) Line Voltage Meter.
(C) Filament Current.
(D) Low B+ Voltage
(E) Final Plate Voltage.
(F) Line-Regulated Voltmeter Switch.
(G) Bias - Low B+ Voltmeter Switch.
(H) Door to Valves.
(J) Pilot Light.
(K) Operating Line Switch.
(L) Main Power Switch.
(M) Low Voltage for Tuning, High Voltage for Operating.
(N) Door to Regulator Rotor Angle Indicator.
(O) Brake Release.
(P) Rotor Angle Set (Manual)
(Q) Door to Automatic Voltage Control Equipment.

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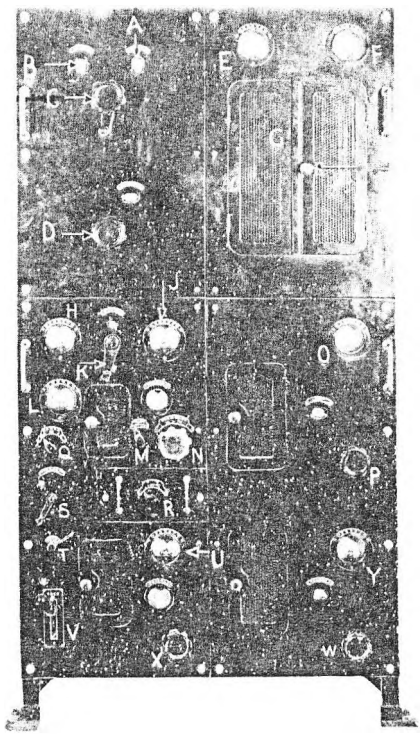
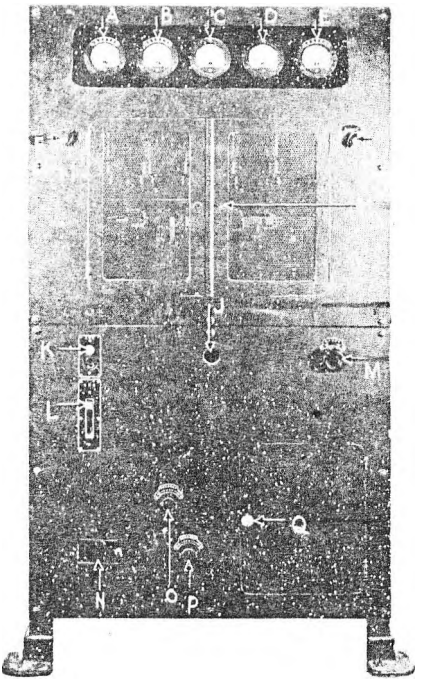
500 WATT TRANSMITTER

FIG 1 Transmitter Component.



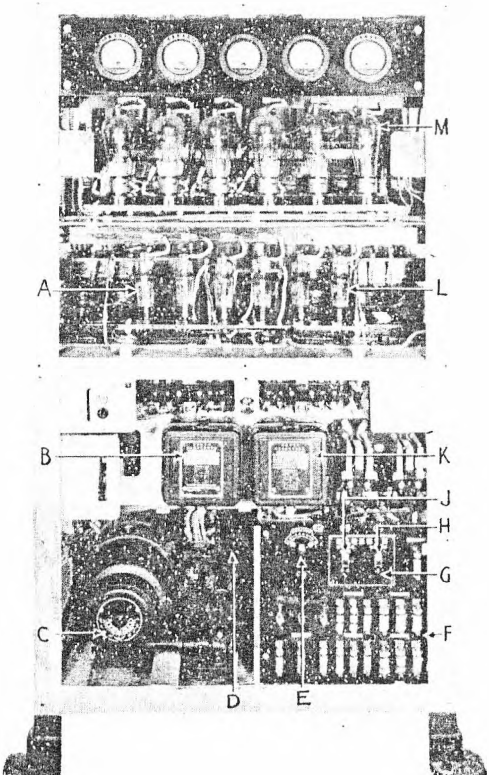
500 WATT TRANSMITTER

FIG 2 Power Supply Unit.



500 WATT TRANSMITTER

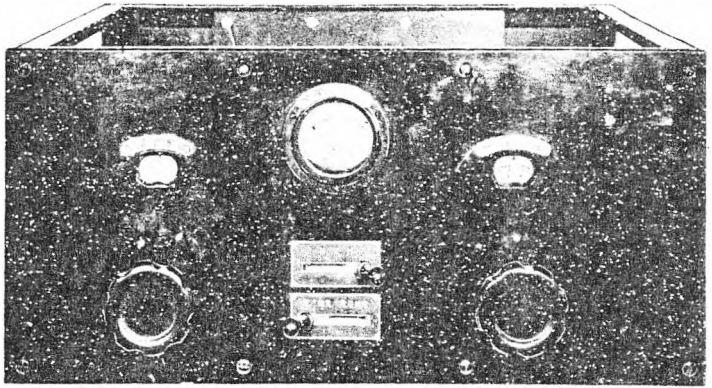
FIG 3 Power Supply Unit with Panels Removed.



(A) 3 ∅ 500 V. Supply. (B) Time Delay Relay. (C) (C) Induction Regulator. (D) Regulator Drive Motor. (E) Manual Volt. Control. (F) Fuses. (G) Volt. Control Panel. (H) Regulator On-Off. (J) Auto-Manual. (K) Voltage Control Relay. (L) 3 ∅ 300 V. Bias Supply. (M) 3 ∅ 3000 Volt Supply.

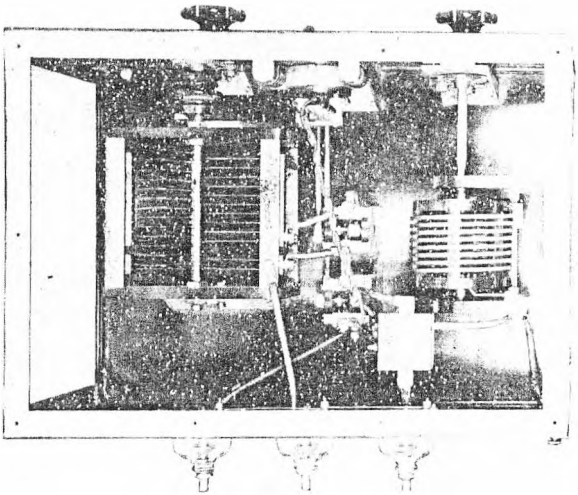
500 WATT TRANSMITTER

FIG 4 Aerial Tuner, Front View.



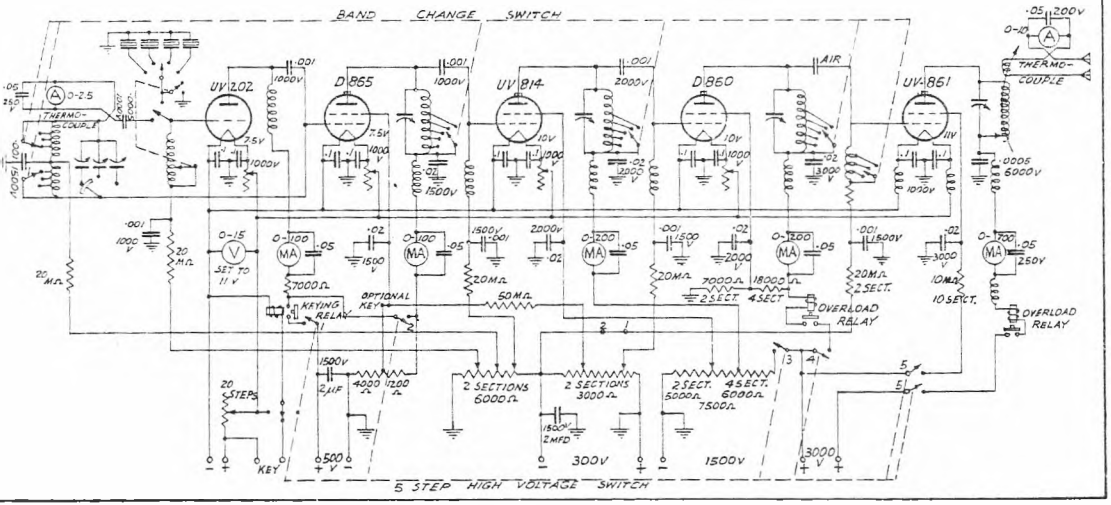
500 WATT TRANSMITTER

FIG 5 Aerial Tuner, Top View.



500 WATT TRANSMITTER

FIG 6 Transmitter Circuit Diagram



500 WATT TRANSMITTER TYPE 95 MK 4 - REVISION 1.

KEY TO POWER SUPPLY CIRCUIT

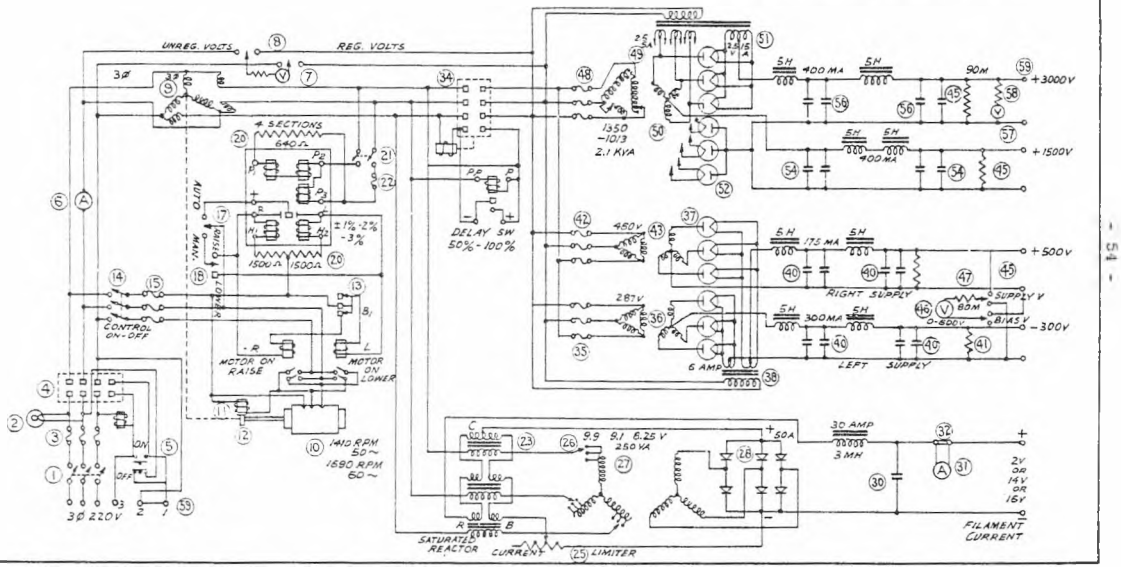
No.	Part	Value	Function
1	Switch 3PST knife		Master on-off
2	Pilot light		Power on indicator
3	Fuse	15 a	Main power fuse
4	Circuit breaker		
5	Switch	dual push button	Circuit breaker control
6	Ammeter	0-15 a	Line Current meter
7	Voltmeter	0-300 v.	Line voltage
8	Switch DPDT rotary		Regulated and unregulated voltage
9	3-phase induction regulator		± 10% induction regulator
10	3-phase motor		Regulator drive
11	Coil		Break actuating coil
12	Brake		To prevent regulator overswing
13	Limits stops		Stops rotary at maximum displacement
14	Switch 3PST knife switch		Voltage regulator on-off
15	Fuse	3 a.	
17	Switch SPDT		Automatic-manual
18	Switch SPDT		Raise-lower
20	Resistor	1500 ohms	
20	Resistor	1500 ohms	
20	Resistor 4 section	640 ohms	
21	Switch DPST		Voltage regulator on-off
22	Fuse	1 a.	
23	Transformer		
25	Resistor		
26	Switch SP3T		
27			
28	Dry rectifier (6 Sections parallel)	50 a.	
30	Condenser	4000 30 v.	
31	Ammeter	0-50 a.	
32	Metershunt	50 a.	
34	Circuit breaker		
35	Fuse	1 a.	
36	3-phase transformer	220-287 v.	
37	Valve HX 968 (6 ea)		Rectifier
38	Transformer		Filament
40	Condenser	4 mfd.2000 v.	Filter condenser
41	Resistor	12 k ohms	Bleeder
42	Fuse	1 a.	
43	3-phase transformer	220-460 v.	
45	Resistor (2 section)	30 k ohms	Bleeder 500 v. supply
45	Resistor (3 section)	45 k ohms	Bleeder 1500 volt supply
45	Resistor (6 section)	90 k ohms	Bleeder 3000 volt supply
48	Fuse		
49	Transformer		High voltage

No.	Part	Value	Function
50	Transformer	tapped primary	2.1 K.V.A.
51	Transformer	2.5 v.	15 a. Filament
52	Valve H830 or HX-966B	6 ea	Rectifier
54	Condenser	4 mfd. 5000 v.	Filter condenser
56	Condenser	4 mfd. 7000 v.	Filter condenser
57	Voltmeter		
58	Resistor	520 k ohms	
59	Terminal strip		

Note: No component parts were found for the numbers that have not been included in the power supply parts list.

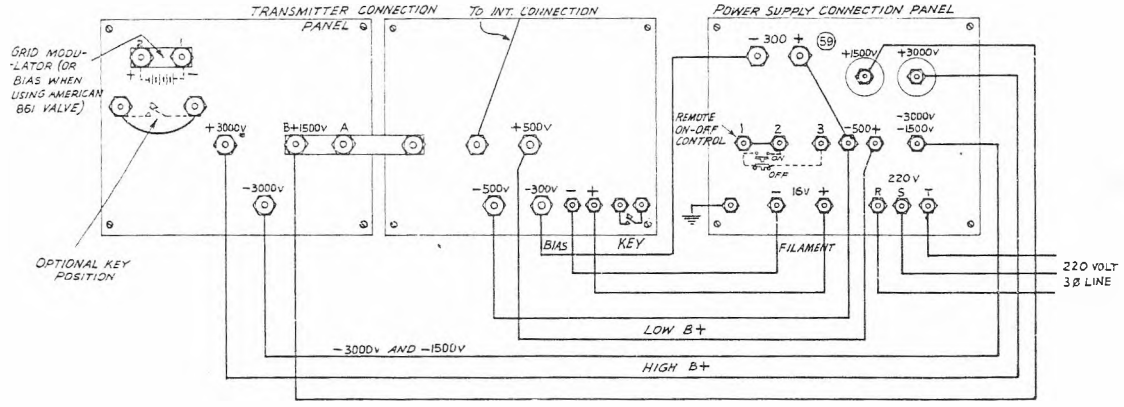
500 WATT TRANSMITTER

FIG 7 Power Supply Circuit Diagram



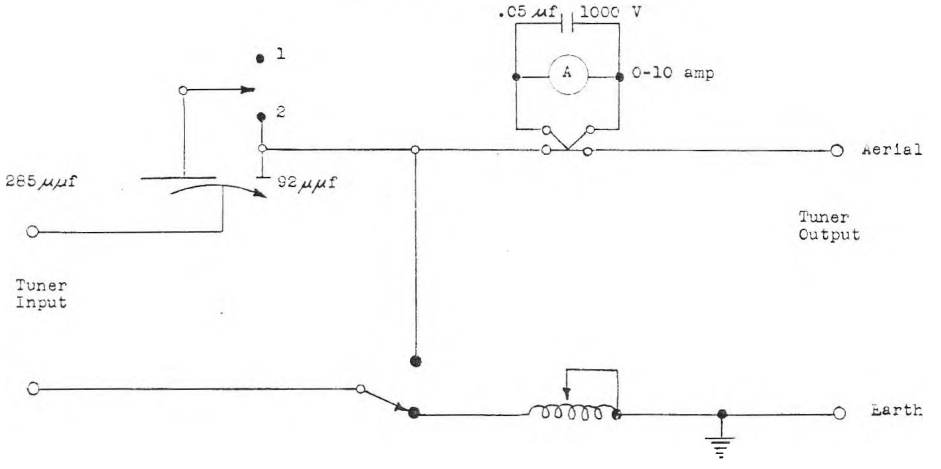
500 WATT TRANSMITTER

FIG 8 Connections from Power Pack to Transmitter



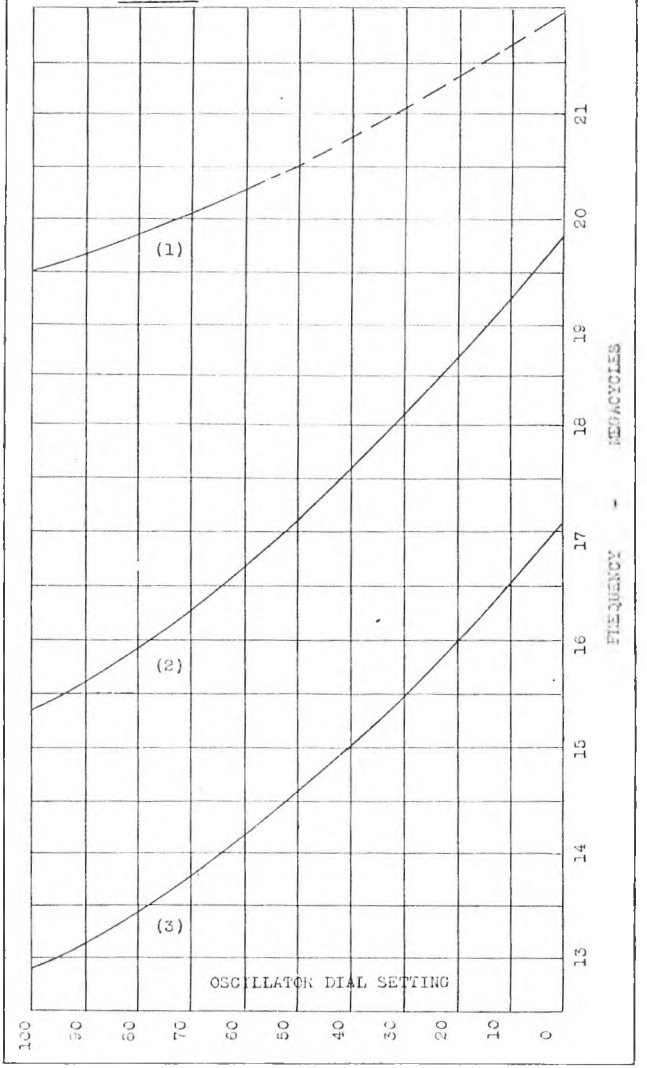
500 WATT TRANSMITTER

FIG 9 Aerial Tuning Unit Diagram



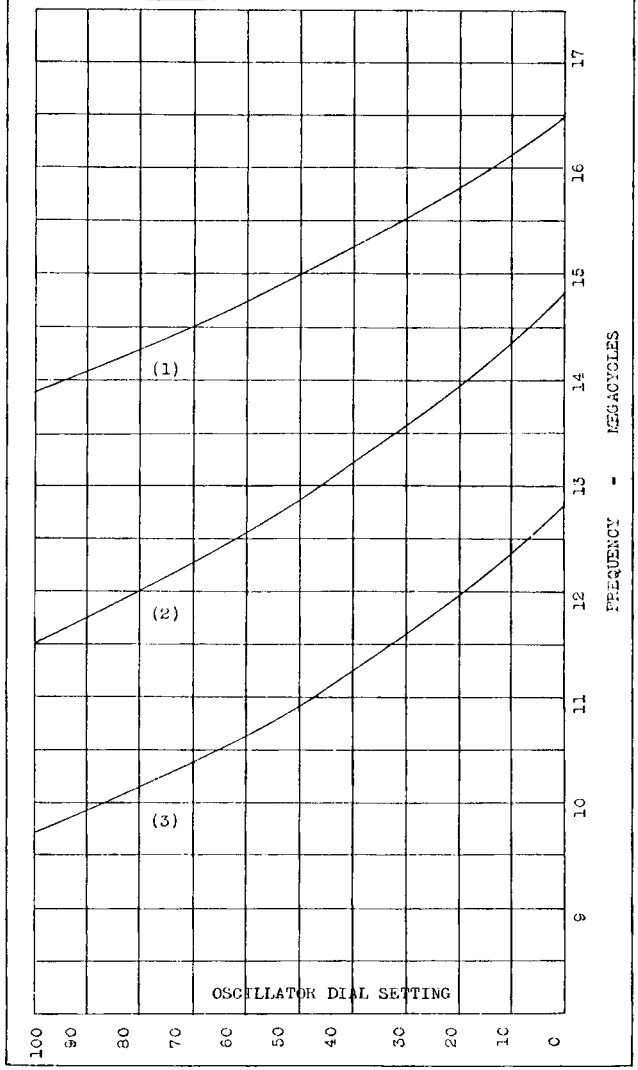
500 WATT TRANSMITTER

FIG 10 Calibration Curve. Band 1 & 2



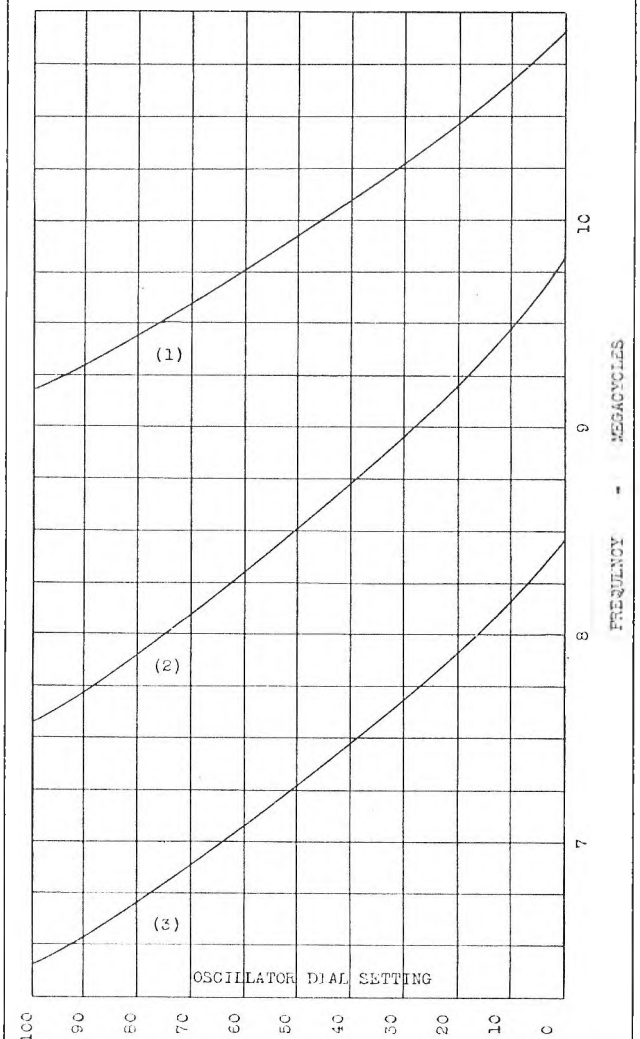
500 WATT TRANSMITTER

FIG 11 Calibration Curve. Band 3 & 4



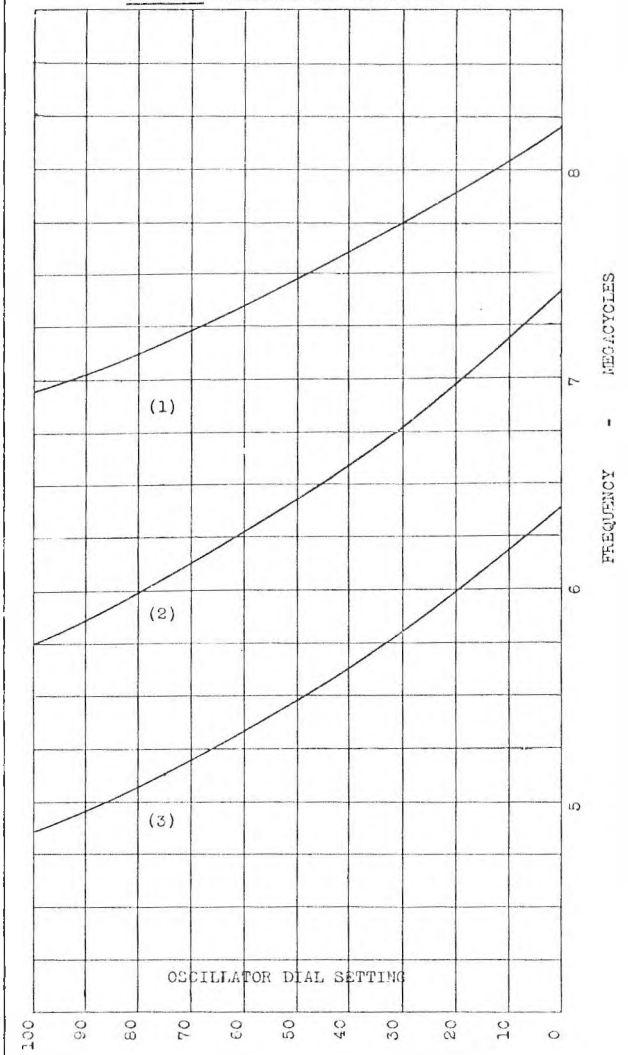
500 WATT TRANSMITTER

FIG 12 Calibration Curve. Band 5



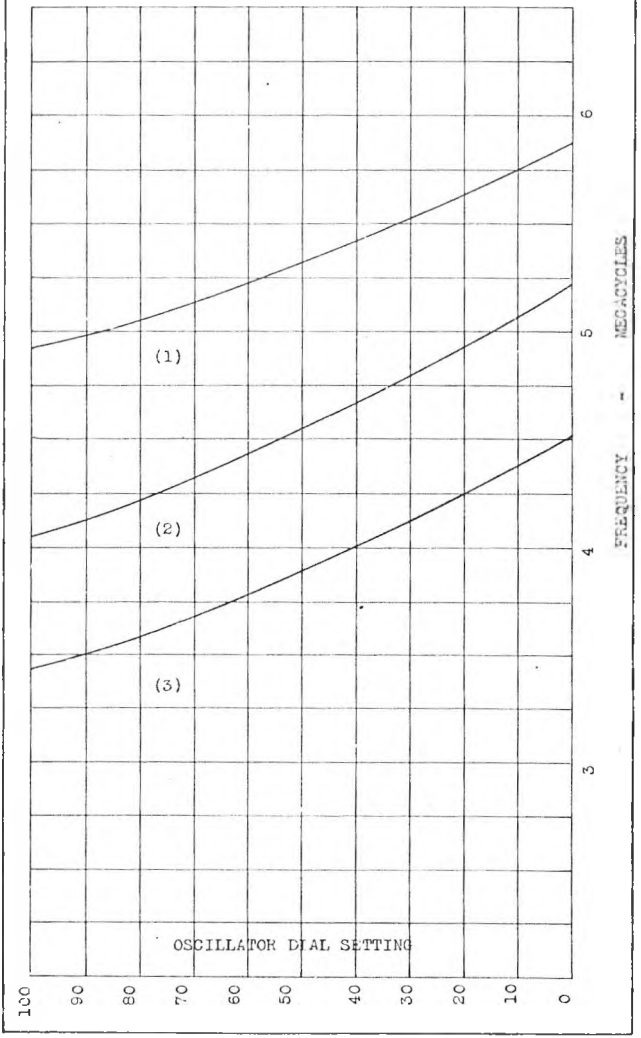
500 WATT TRANSMITTER

FIG 13 Calibration Curve. Band 6



500 WATT TRANSMITTER

FIG 14 Calibration Curve. Band 7



VERY CARTRIDGES

1. GENERAL

The cartridges examined are of five different types; three for daylight signalling having black, white and yellow smokes and two for either day or night with red and green flares. The cartridges can be fired from Type 94 Very Pistol and Triple Barrel Signal Pistol described in AMF Technical Intelligence Summaries Nos. 12 and 15 respectively.

2. DESCRIPTION (Fig 1 - 3)

(a) Body: This component consists of a cardboard cylinder 9.6 cm (3.8 ins) long and 2.6 cm (1 in.) diameter covered by a thin coloured paper of distinguishing colour on which is a small label 4.3 cm by 1.8 cm. The translation of these labels reads:-

"Manufactured Feb 43
Item Q
Japan Pyrotechnic (Naval)"

A rimmed brass case 1.8 cm long at the base carries the propellant unit which consists of a primer cap, anvil and a small charge of black powder weighing between 1.24 and 1.55 gm. The primer cap is waterproofed with a layer of shellac. The propellant charge is held in place by a fibre wad 0.5 cm thick having a hole 0.7 cm diam in the centre. On this wad the base of the signal pellet rests. Above the pellet is another fibre wad 0.6 cm thick, two thin discs of cardboard, a spacer and three further discs of cardboard. The end of the cartridge is closed by a cardboard disc 0.2 cm thick recessed and shellacked. On the smoke cartridges used for daylight signalling this disc bore the Japanese character for "Dragon". The red cartridge bears two annular grooves 0.2 cm wide, 0.5 cm apart on the brass case and the green cartridge, one, for night identification.

(b) Signal Pellets: Three of these pellets, red, green and white, are similar in construction. Each is a solid cylinder 2.7 cm long 2.4 cm in diam covered in shellac and wrapped in four layers of gummed brown paper. On one end the red and green pellets are coloured with a dye of the corresponding colour. The other end is, however, unwrapped, coated with mealed black powder and in contact with the propellant charge. The black pellet is entirely unwrapped and completely coated with mealed black powder.
The yellow pellet is a small cylindrical cardboard container 3.2 cm x 2.4 cm filled with the smoke mixture. Ignition is effected by means of two match trains, one running axially from the centre of the base to a depth of approx 1 cm where it joins the other which runs diametrically through the container. The ends of these trains are linked externally by a strip of paper approx 1 cm wide coated with black powder. The top of the container is marked with a yellow dye for identification.

3. ANALYSIS

(a) Propellants:

	Red	Green	White Smoke	Black Smoke	Yellow Smoke
Potassium Nitrate	74.8	74.5	75.5	72.8	73.8
Sulphur	7.6	9.1	8.6	12.9	8.8
Carbon (by diff)	16.3	15.3	15.7	11.3	16.3
Moisture	1.3	1.1	0.2	3.0	1.1

(b) Signal Pellets:

	Red	Green	White Smoke	Black Smoke	Yellow Smoke
Potassium Nitrate			62.4		41.5
Potassium Chlorate	59.2	37.8		62.0	
Barium Nitrate		38.0			
Strontium Carbonate	14.4				
Antimony Trisulphide		4.4			
Arsenic Trisulphide					56.1 x
Pitch and Carbon				37.0 x	
Magnesium			14.8		
Sulphur			11.9		1.0
Carbon	24.9x	18.8x	9.6x		
Moisture	1.5	1.0	1.3	1.0	1.4

x = by difference

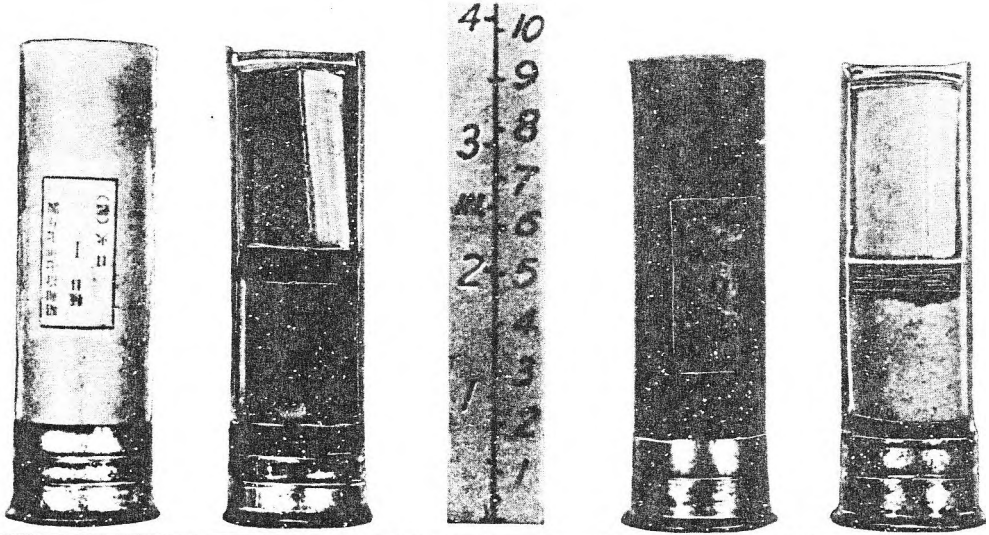
(c) Percussion Caps: Qualitative analysis showed the presence of mercury fulminate, antimony trisulphide and potassium chlorate.

SOURCE: 2/1 AUST C.W. LABORATORY R.A.E.

VERY CARTRIDGES

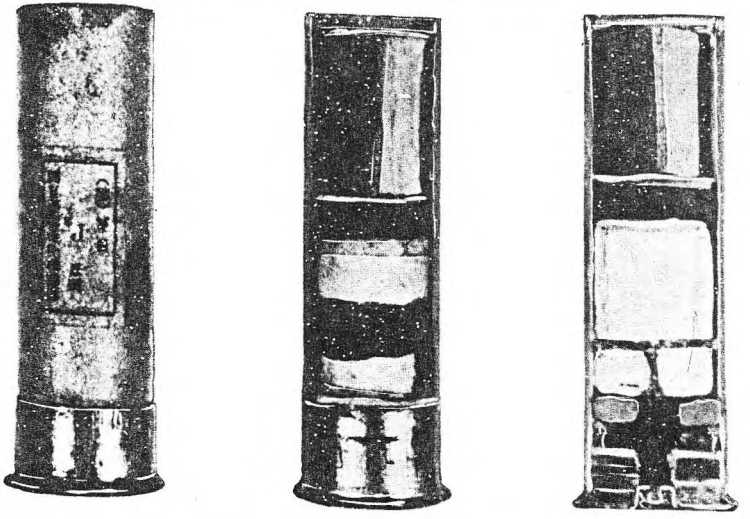
FIG I

Complete and Sectional Views of RED (Left) and GREEN Cartridges.



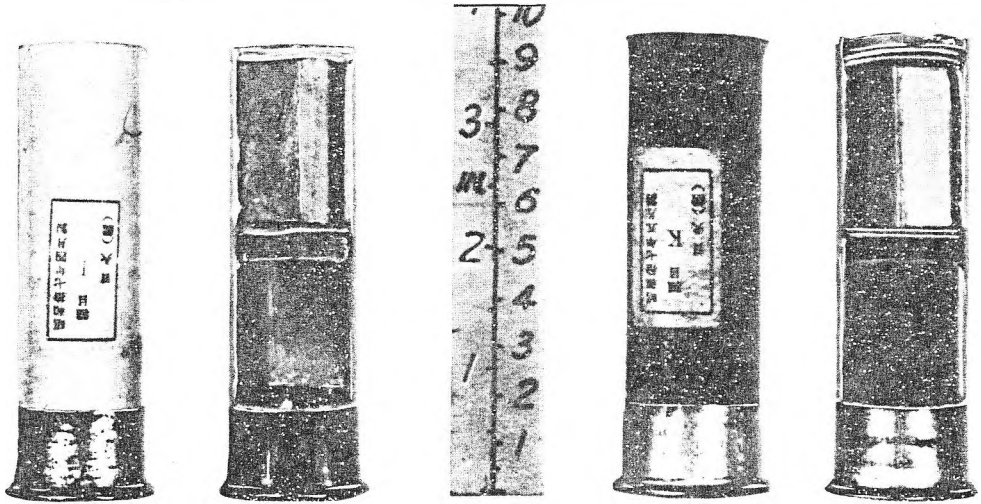
VERY CARTRIDGES FIG 2

Complete and Sectional Views of YELLOW Cartridges.



VERY CARTRIDGES FIG 3

Complete and Sectional Views of WHITE (Left) and BLACK Cartridges.



PARACHUTE FLARE

MODEL 2 REVISION I

1. GENERAL

This pyrotechnic is well made and consists essentially of a waterproof metal outer container with a metal clad flare, pull igniter and parachute.

2. DESCRIPTION (Figs 1 - 4)

The flare as received was in good condition but functioning trials have not been carried out. A large label on the outer container gave the following information:-

"Manufactured March 1939 Lot No. 43
Parachute Flare Model 2 Revision 1
Japan Pyrotechnic Co. Ltd."

Two contradictory markings were also present on this label, indicating a Naval store and Tokyo Army Ordnance respectively. The complete flare weighs 4.76 Kg (10 1/2 lbs) is 64 cm long and 8 cm in diameter.

(a) Container: This part consists of a cylindrical tinned iron tube (26 SWG) with a rolled and soldered longitudinal seam. It is fitted with three lids and a metal tear off strip. The lower lid is a push fit, has a depth of 3/8 in. and is riveted and soldered to the tube. The upper end of the tube has a lid, similar to the lower lid, with a central opening 1.7 cm diameter to receive a tinplate tube which is swaged over to keep the lid in position.
The lid is finally sealed with a gummed paper strip and the tube is finally closed by a deep push-on lid and sealed with a soldered tear-off strip 2.5 cm wide.

(b) Parachute: This is packed in the top half of the container with the pull cord through the centre. It is made of orange coloured cotton fabric and is attached to the flare by 40 shrouds of 1 mm diameter white cotton twine, terminating in a 1 metre length 42 x 36 SWG flexible steel cable.
The pull cord is kept clear of the folded parachute by a 26 cm length of rolled tinplate tubing 1.3 cm diameter swaged outwards at its upper end to retain the inner top cover in position. The cord is separated from this metal tube by a 24.5 cm length of white cardboard tube 1 cm in diameter. The parachute diameter (air-filled) is 195 cm (6.4 ft).

(c) Ignition System: It consists of a 42 cm length of white cotton twine with a large loop in the upper end. The pull igniter consists of the firing pin assembly, body, percussion cap and flash chamber and quickmatch. The quickmatch is formed of four 19.5 cm strands of cotton twine impregnated with black powder. The pull igniter is well designed, is made of brass with exception of striker and spring and is machined on all surfaces. Its weight is 240 gms.

(d) Flare: This component consists of a spirally corrugated 26 SWG zinc container with a central tube of drawn 24 SWG copper. This tube is swaged outwards at either end and serves to house the ignition system and also retain the perforated metal plate which forms the base of the flare container. Three 6 cm wide pieces of felt are wrapped around the zinc case at equal intervals and serve as gas checks for the expelling charge. The top of the flare case is closed by a wooden disc 1.5 cm thick and a pressed copper cap which is anchored to the block by four woodscrews. This copper cap of 18 SWG has, soldered to its upper surface, two lugs for the attachment of the parachute. The lower end of the case is closed by a cardboard and a 26 SWG metal disc each with a central hole for the passage of the central copper tube and sixteen 4 mm holes through which are threaded eight 5 cm lengths of quickmatch. To complete the closure of the lower end a further wooden disc 1.5 cm thick, with a central hole of 4 cm in diameter forming a cavity for the quickmatch, is held in place by the overturned edge of the zinc case. The flare weighs 3.76 Kg, is 36.5 cm long and 7 cm diameter.

The flare contains two mixtures, a 1 cm layer of ignition and propellant compound which gave the following analysis:-

Sulphur	18.5%
Potassium nitrate ..	51.2%
Antimony trisulphide..	30.3%
Aluminium	Trace

and the remainder of the flare compound proper, with the following composition:-

Wax	9.3%
Barium nitrate	47.5%
Aluminium	15.1%
Magnesium	29.6%

3. FUNCTIONING

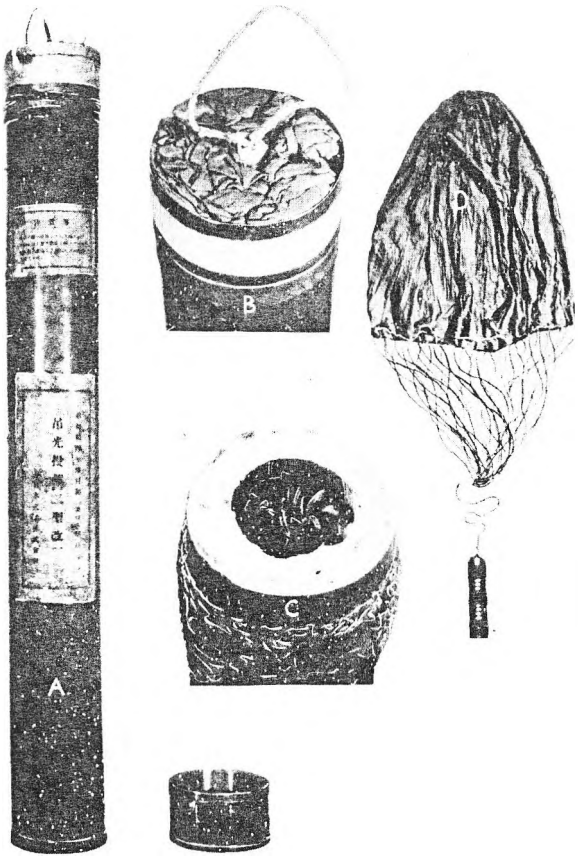
When the flare is dropped with the pull cord firmly held, the locking piece and striker are pulled up until the locking piece clears the top of the body. At this point the locking piece clears the striker and allows it, under the pressure of the striker pin, to travel downwards and strike the percussion cap.

The flash from the latter ignites the matchhead mixture which burns through and ignites the black powder in the flash chamber. The flash from this powder initiates the quickmatch which in turn ignites the ignition compound. This latter serves the dual purpose of expelling the flare and the parachute from the outer container and also ignites the flare composition. The delay between functioning of the pull igniter and expulsion of the flare from the outer container is approximately 7 secs.

SOURCE: 2/1 AUST C.W. LABORATORY R.A.E.

PARACHUTE FLARE

FIG I

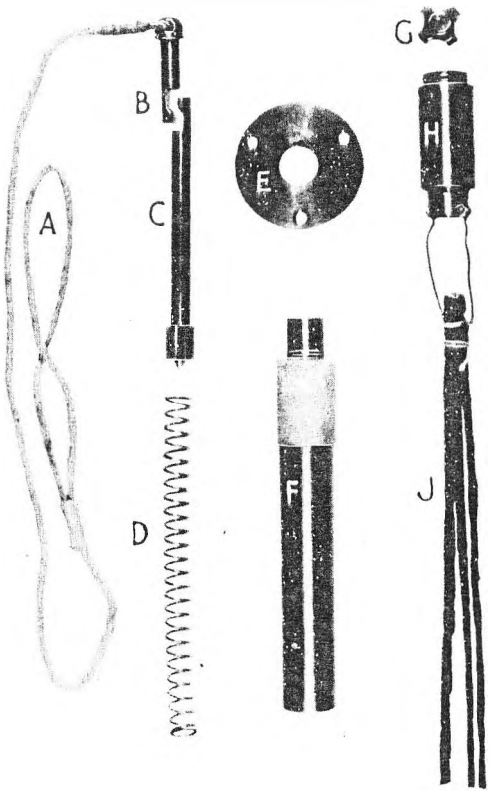


(A) Container. (B) Packed Parachute and Loop.
(C) Quickmatch Ends. (D) Parachute and Flare.

PARACHUTE FLARE

FIG 2

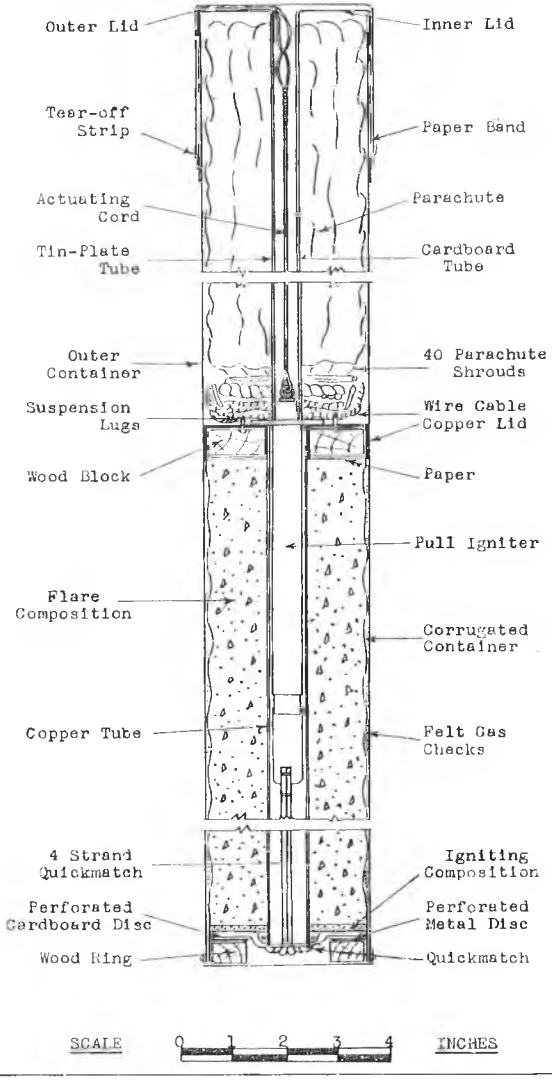
Pull-Igniter Components.



(A) Actuating Cord. (B) Locking Piece. (C) Striker.
(D) Striker Spring. (E) Retaining Plate. (F) Body.
(G) Percussion Cap. (H) Percussion Chamber.
(J) Quickmatch.

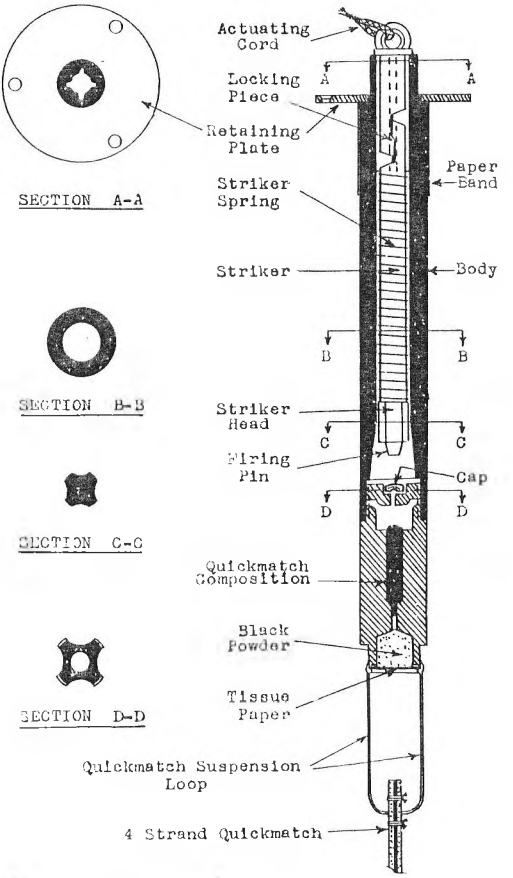
PARACHUTE FLARE

FIG 3 Section Through Flare.



PARACHUTE FLARE

FIG 4 Section through Pull-Igniter.



C D SPOTTING BINOCULARS & TRIPOD

1. GENERAL

These binoculars are evidently used for coastal defence target identification and spotting. An elevation scale graduated in increments of 5 degrees from minus 30 to plus 60 degrees is attached between the objective housing of the binoculars. An azimuth scale graduated in units of one degree, is fastened to the binocular support on the tripod.

2. DESCRIPTION (Figs 1-2)

(a) Binoculars: The general characteristics are as follows:

Power	20 diameters
Field of view	3°
Dia. of entrance of pupil	120 mm (4.72 ins)
Dia. of exit pupil	6 mm (.236 in.)
Inter-objective distance	165 mm (6.5 ins)
Inter-pupillary distance	58 to 72 mm (2.28 to 2.83 ins)
Diopter movement	minus 4 to plus 2 diopters.
Overall length	25 1/2 ins
Weight	37 lbs - 13 oz.

The reticle design consists of a vertical line flanked on each side by a horizontal mil scale graduated in units of one mil and numbered every five mils from 0 to 20. A window is provided for artificial lighting of the reticle.
The erecting system consists of two 90 degrees prisms attached to the base of a porro prism. The focusing movement consists of a draw tube which contains the optical parts and a multiple thread focusing nut attached to the draw tube by means of a collar. The objective lenses are air-spaced doublets. The binocular body is a cast-aluminium housing and the remaining major parts are made of brass. The sunshades are staked by holding screws and are not adjustable. The lower vertical spindle has a key that mates with a key way in the binocular mount and locks the two parts against independent rotation. The binoculars are locked to the mount by the split ring arrangement of the adapter.

(b) Tripod: This component has an overall length of 59 1/4 ins with the legs folded and weighs 54 lbs. The legs are constructed of tubular steel and are interconnected by a chain attached to the cross piece of the leg. A fourth length of chain suspended from the centre is presumably used to anchor the instrument in place.
The tripod head, made of cast-aluminium is attached to the legs by a simple bolt hinge-pin arrangement. Fastened to the head is an adapter for the lower support tube of the telescope mount. The elevating gear of the tripod consists of a worm, operated by a hand wheel and worm wheel that engages both the worm and elevation

rack attached to the lower support tube. A box, holding ray filters, is also attached to the adapter. The telescope mount consists of a goose-necked adapter fitted over a vertical spindle. An azimuth scale, divided in two semi-circles and graduated in degrees from 0 to 180, is fastened to the stationary part of the mount.

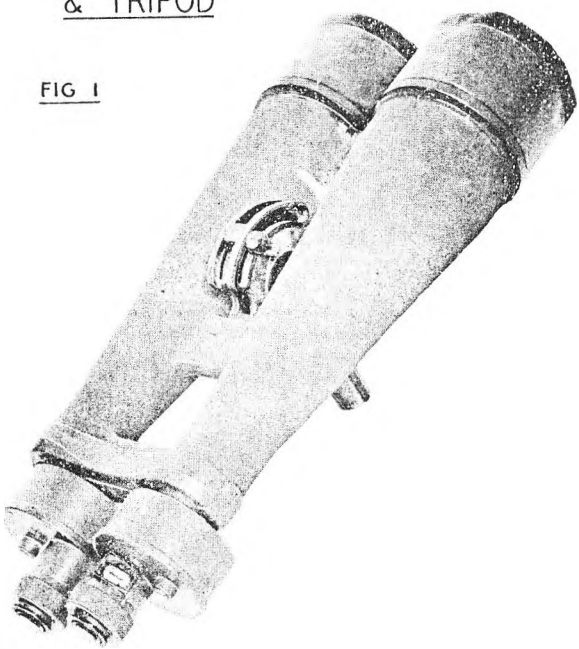
3. COMMENTS

The coarseness of the elevation scale and azimuth scale suggest that these binoculars are primarily used for target identification and observation. The weight and size would cause them to be impractical for anything less than semi-permanent installation such as heavy artillery emplacements.

SOURCE:- ABERDEEN PROVING GROUND, MD.

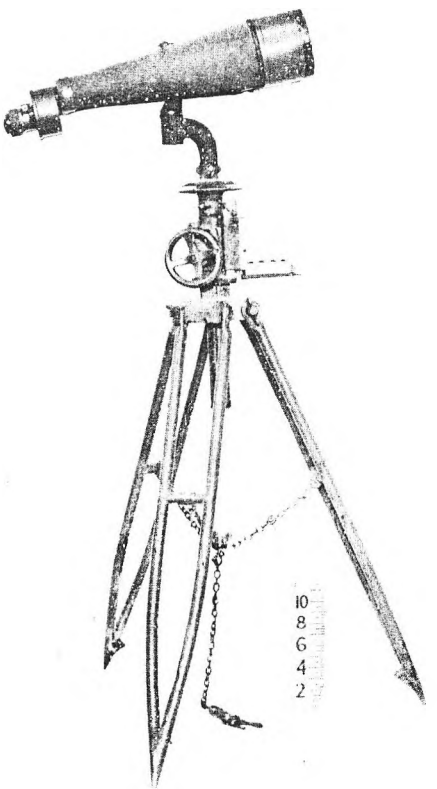
C D SPOTTING BINOCULARS & TRIPOD

FIG 1



C D SPOTTING BINOCULARS & TRIPOD

FIG 2



1 METRE BASE RANGE FINDER

1. GENERAL

This range finder is of the inverted field, coincidence type with an optical length of 1 metre. A range scale is calibrated for measuring ranges from 200 to 10,000 metres. Only enough disassembly was made to learn the operating principles of the instrument and its general construction.

2. DESCRIPTION (Fig 1)

The instrument is very similar in appearance to the German EM 34 in that the range roller, height of image roller, and coincidence adjusting roller are located on the right side and covered by a common ring. Additional characteristics are as follows:

Power	12 diameters
Field of view	$3^{o}20'$
Range of measuring limits ..	200 to 10,000 metres
Diopter movement	plus 2 to minus 4
Range correction units ..	0 to 34 diopters
Base length	1 metre
Overall length	46 ins
Weight	20 lbs 12 oz.

The optical tube is of steel and is contained in an outer brass tube that is covered with an asbestos treated covering. The end windows are wedge-shaped but the method of mounting the windows suggests that this variance from parallel is a tolerance and not a means of adjusting the rangefinder. (Rotation of the window holder breaks the seal and translates the window in relation to the end-box).

The end-boxes contain the penta-prisms which are fitted into a holder and attached to a plate. A brass disc and retaining cover hold the prism assembly in place, and a lug and key way correctly position the prism assembly to the instrument. The buffer assembly is then placed over the end box assembly as a final cover. Each end box is fitted with a desiccating port and plug for drying the instrument.

Range is measured by translating a wedge through the medium of the range roller, and at the same time a translucent range drum is rotated in the left side of the field of view. The range measuring wedge is located between the right objective and ocular prism. Coincidence is adjusted by rotating a correction wedge placed between the right penta prism and right objective. The range correction wedge is fitted with a scale, graduated from 0 to 34, to show how much the wedge has been rotated.

Height of image is adjusted by tilting a plate of plano-parallel glass located between the left objective and ocular prism. This action of the plate causes the upper image to be raised or lowered in the field of view.

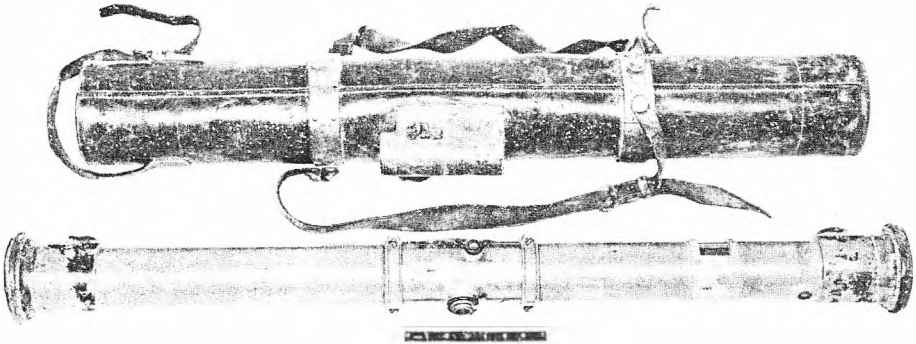
3. REMARKS

The field of view of this instrument resembles the field of view of the German EM 34, 70 cm base range finder in that the inverted field is seen as a small insert in the general field, and a range scale is visible for determining range without consulting an exterior scale. An auxiliary eye-piece spaced about 90° from the main eye-piece allows a second person to note the range scale setting.
The instrument appears to be well made and the sealing is effective. The overall design shows a German interest.

(SOURCE:- ABERDEEN PROVING GROUND, MD)

1 METRE BASE RANGE FINDER

FIG 1



ELBOW TELESCOPE FOR 8CM AA GUN

1. GENERAL

This instrument has been identified as being used with the 10th Year (Taisho) 8 cm AA gun. Because of the simplicity of the reticle design it may be used for either deflection or elevation.

2. DESCRIPTION (Fig 1)

The instrument is a simple elbow telescope employing an Amici Prism for the erecting system. The body and other metallic parts are made of brass. General characteristics are as follows:-

Power	7 diameters
Field of View	10 degrees
Diameter of Entrance Pupil	49 mm
Diameter of Exit Pupil	7 mm
Diopter movement	Plus 2 to minus 4 diopters
Overall length	15-3/8 ins
Weight	12 lbs 10 ozs.

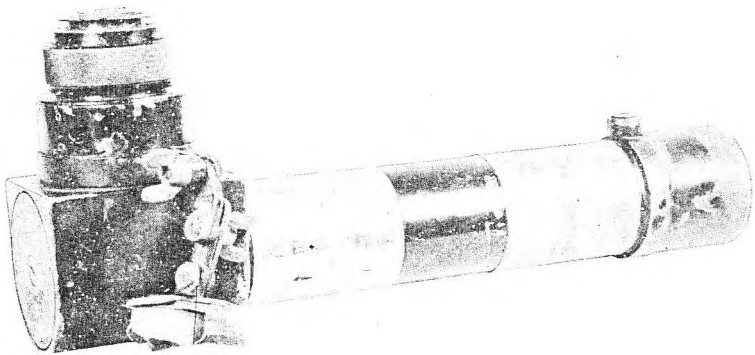
The reticle design consists of a simple cross formed by a vertical and horizontal line etched on a piece of plano-parallel glass. The reticle is placed in a holder and the holder retained in the telescope body by four holding screws spaced about the periphery of the reticle cell.
There is no apparent means of adjusting the line of sight through the telescope.
The focusing movement is of the draw-tube type.
Desiccating vents are provided for drying the interior of the instrument. These vents are normally kept closed by plugs.

3. COMMENTS

This is a heavy telescope but there is nothing unusual incorporated in its design.

(SOURCE: ABERDEEN PROVING GROUND, MD)

ELBOW TELESCOPE FOR 8 CM AA GUN FIG 1



PACK EQUIPMENT

1. GENERAL

A study of Japanese Packs shows that they follow a general pattern, more or less uniform in design. They are, with but few exceptions, of one unit design requiring only the placement of articles within the pack, with rigid adherence to contents and offer a low silhouette and prompt access to frequently used items.
Space is provided for food, usually emergency rations and/or canned goods. Harnesses are made with a minimum of metal and all packs have provision for the attachment of a blanket roll.

2. DESCRIPTION (Figs 1-12)

In this report the haversack, lightweight pack (NCOs and officers), field pack (Haino), and transport pack are discussed in detail.

(a) Haversack: This is the model commonly used by the Japanese soldier in all climates. Like other Japanese equipage, it is remarkable for its lack of metal, the two rings on either shoulder strap being the only metal parts. Tie tapes are used for attaching various items of clothing and equipment to the pack.
A horseshoe blanket roll is frequently attached to the top and sides of the pack. The raincoat is rolled and held in place on the top of this. The shelterhalf is usually rolled with the blanket to provide a protective cover against weather. The messkit is strapped to the front surface, and the entrenching shovel is attached to the left side with the handle removed from the blade. In this way the large number of straps (23) attached to the pack all have a specific function.
The pack weighs approximately 2½ lbs. Its dimensions are: height-13½ ins, width-12 ins, and depth-3 ins. The body consists of four pieces of fabric stitched together, one piece forming the front and bottom, another the back and back cover flap and two others forming each of the side insets and side flaps. The pack is closed by tying the side flaps together, then securing the cover flap to the front ties. A pocket, 10 ins high, is sewed into the inside back of the pack. This is closed by tying to the back. The pack is not treated for fire resistance, water repellency is fair and colour resembles U.S. Standard Mineral O.D. No. 3. Design, quality of materials and workmanship are good. Elimination of nearly all metal parts results in a considerable saving of metal, rapid production methods, a saving in weight, and simplifies its adjustment by the user.
Points of interest include the simple harness arrangement. It will be noted that the shoulder straps are straight on the outside edge, but are slightly curved on the inner edge. This feature, combined with the

angle at which they join the pack, enables the straps to conform to the contours of the shoulder without wrinkling or cutting. The use of double rings is also worthy of notice as it permits easy adjustment of straps. No back or front suspender straps are used. Note that the heavy tie tapes on top of the pack are located at the BACK of the flap along the line of the shoulder straps. This holds the roll tightly in over the shoulders and tends to prevent the outward sag that so frequently results in other designs.
The tie straps along the sides are a feature not formerly evidenced in U.S. models, which provide for attachment of a blanket roll and easy access to the raincoat or shelterhalf without loosening the pack or requiring that it be removed and/or broken down.
The pack requires no rolling, simply placement of necessaries within, in no given order. A fairly low silhouette value is obtained. Disadvantages are:
Lack of sufficient flap overlap at the upper corners to furnish protection against weather, and a possible tendency of tie tapes to jam when wet, and almost certainly when frozen.
Items normally carried in this pack are as follows:
1 set underwear, 2 prs socks, 1 pr gloves, 1 collar, 1 set clothes mending gear, 1 pr sneakers, 1 cleaning rod tip, 1 set spare parts (rifle), 1 can shoe dubbin, 1 set tentpole, pins, rope, rations (2 days' supply); toilet articles.

(b) Lightweight pack (NCOs and Officers): This is similar in size to the standard Japanese haversack described above, but lighter in weight. It is made of two thicknesses of lightweight fabric to insure adequate strength.
An unusually large amount of metal is used. Most Japanese packs have only metal rings for shoulder strap adjustment, but this design incorporates a large number of rings that can be used with tapes or tent ropes for attaching equipment. The buttons for fastening the flap are not usually encountered in Japanese packs.
Weight of pack is approximately 1.2 lbs. Dimensions are: height-14 ins, width-12½ ins, depth-4 ins. It is made from two fabrics resembling U.S. 7.9 oz shelter duck and U.S. No. 10 duck. The pack is rectangular in shape, completely lined, and has three inside pockets, two on the sides and one across the back. It is closed at the top by a draw cord over which a flap is buttoned. The front, flap, and sides are fabricated from the lightweight duck while the back is made from the heavier fabric. The side insets are sloped at the bottom to make the front approximately 1 in. shorter than the back.
This pack is not treated for fire resistance, water repellency is excellent and colour most closely resembles Field Drab No. 303, U.S. Specification No. 3-1. Points of interest include the arrangement of metal rings along the sides and at the rear top to allow fastening of the blanket and raincoat in a horseshoe roll with tie straps or the tentrope. This is a departure from the haversack and offers less snag possibilities and greater flexibility for use in attaching other equipment. Again no back or front suspender straps are used. The end clips are somewhat similar to certain German types. Chapes containing

double rings for harness adjustment are attached to the sides of the pack instead of to the shoulder straps. Disadvantages are: Lack of sufficient flap overlap to furnish protection against weather, and the side attachment of ring chapes to lighter material than the shoulder straps offers more tear possibility and no apparent improvement in adjustment is gained. Items carried in this pack are similar to those carried in the haversack.

(c) Field Pack (Haino): This type is believed to have been superseded by the Haversack (Zatsuno) although it is still in common use, particularly in colder areas. The pack is built around a detachable rectangular wooden frame covered with canvas, except the back which is horsehide with the hair still remaining. Frequently the horsehide cover extends over the entire surfaces of the pack. The back and front flap are lined with white cotton. In the centre of the front flap is an opening which forms a pocket, and this is closed by two tying tapes.
The front is closed by three canvas flaps. The bottom one buckles to a strap attached at the top of the frame, and the two side flaps are secured by tying tapes. The top flap folds over the others and is secured by two straps and buckles. The pack is carried by shoulder straps attached to buckles sewed to the top and bottom, thereby making the harness detachable. There is a retaining strap on the right side of the pack and two on the left side. These straps pass through holes in the canvas and circle the frame to hold the canvas in position. The straps are fitted with buckles and eyelets and are also used to attach equipment to the pack, in addition to the horseshoe roll. The long strap attached to the front flap is used to secure the messcan. Two straps attached to the top of the pack are for securing the horseshoe roll and raincoat.
The pack weighs approximately 3 lbs. Dimensions are: height-9½ ins, width-12 ins, depth-4 ins. It is not treated for fire resistance, the water repellency is good and colour approximates U.S. Standard Mineral O.D. No. 3. Design, quality of materials and workmanship are good. Lavish use is made of leather and metal, the canvas bindings being split leather.
Points of interest include:

(i) The use of front suspenders which are a departure from normal Japanese design. They are simple flat metal "U" hooks which slip under the cartridge belt.
(ii) Shoulder straps are adjusted by the buckle and eyelet method.
(iii) Pack opens from the front instead of from the top.

Disadvantages are:

(i) Awkwardness of packing because of multiplicity of retaining straps and front opening.
(ii) Metal is of poor quality and not rust-proof. This combined with wet warped leather causes jamming of the buckles.
(iii) Smallness of pack limits its use.

Contents normally carried are the same as the haversack with the following exceptions: Tentpins, poles and

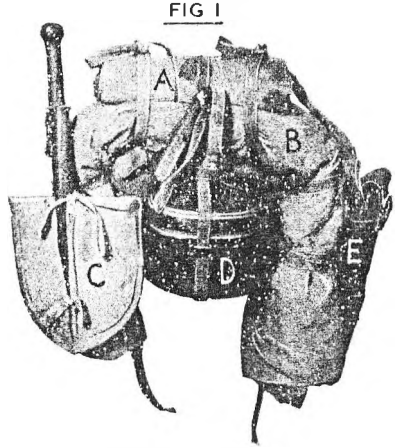
rope; rations, and spare parts kit (rifle).
This pack shows marked influence of Haversack, 1939, German, particularly the detachable harness which is a common German feature.

(d) Transport Pack: This pack has been identified by PsW as being made especially for the Transport Corps. It is used to carry essentials required on a troop movement, with the exception of a blanket which is rolled and slung over the other shoulder. It is also worn about the waist. As is frequently the case with Japanese equipment tie tapes have been substituted for metal parts.
It is essentially a sleeve stitched transversely to form two pockets, the larger of which is 25 ins by 10½ ins and the smaller, 15 ins by 10½ ins. The pack is lined throughout with white fabric. A flap on each end folds over the sleeve opening and is secured by a pair of tie laces. A tie of braided tape is stitched to the centre of the item on the side opposite the flap laces.
The pack is not treated for fire resistance, water repellency is good and colour approximates O.D. No. 3. It weighs approximately 14 ozs. Dimensions are: length-75 ins, width-10½ ins.

SOURCE : USAFPOA and WAR DEPT WASHINGTON.

PACK EQUIPMENT

FIG I



(A) Raincoat. (B) Blanket Rolled in Shelterhalf
(C) Shovel. (D) Mess Kit. (E) Pick.

PACK EQUIPMENT

TABLE 1 - CHARACTERISTICS OF HAVERSACK

Property	Textiles Body	Inside Pocket	Strap	Strap Lining
Weight, oz./sq.yd.	25.7	7.7	13.9	9/3
Texture	32.5x21	72x68	49x36	79x56
Fibre composition				
Warp	Cotton	Cotton	Cotton	Cotton
Filling	Cotton	Cotton	Cottor	Cotton
Ply - Warp	6	1	2	1
- Filling	5	1	2	1
Breaking strength lb.(Grab Method lxlx3)				
- Warp	417	132	-	-
- Filling	254	123	-	-
Tearing Strength lb.(Tongue Tear Method)				
- Warp	16	2.5	-	-
- Filling	10	2.0	-	-
Water repellency	Fair	Fair	Fair	Poor
Extractable Matter %	0.3	0.5	0.4	-
Permeability - water				
Suter, cm.	42.5	27	-	-
Suter, cc.(10 min)	1(12 in.)	3(6 in.)	-	-
Permeability - Air, Densometer - Sec./ 100 cc. of air	250	45	-	-
Permeability - Air, Permeometer - cu. ft./min./sq. ft. P.D. of 0.5 in. water.	0.2	3.4	-	-
Fire resistance	Not treated	Not treated	-	-
Type of dye	Vat	Sulphur	Vat	-
Weave	Plain	Plain	Plain	$\frac{2}{1}$ Twill

Property	Webbing	Braided Tape	Binding Tape
Weight, oz. 1/lin. yd.	0.65	0.40	0.27
Width, in.	27/32	13/16	-
Thickness, in.	0.124	0.055	0.027
No. ends	125 (Face & back)	-	71
No. binders	14	-	-
No. carriers	-	44	-
No. cores	-	15	-
Ends/carrier	-	3	-
Ends/core	-	4	-
Picks/in.	32	15	54
Ply - Warp	3	1	3
- Filling	5	-	3
- Binder	3	-	-
Fibre composition -Warp	Cotton	-	Cotton
- Filling	Cotton	-	Cotton
- Carriers	-	Cotton	-
- Core ends	-	Cotton	-

Property	Webbing	Braided Tape	Binding Tape
Breaking strength, lb.	560	146	106
Water repellency	Poor	Good	Poor
Type of dye	Sulphur	Direct	Vat
Weave	Face and back warp ends weave plain with face and back picks. Each binder weaves over and under each pick.	Flat braided	Herringbone. Two reversals of twill

Property	Cord
Feet/lb.	533
Turns x 10	
Diameter, in.	3/16
Breaking strength, lb.	76
No. strands	
No. carriers	23
Ends/carrier	2
Ply of ends	2
Picks/in.	23
Fibre composition	Cotton and rayon
Type of dye	Direct
Extractable matter, %	-

Thread	Fibre Composition	Yarn Size Cotton or Equivalent	Direction of Twist Cable	Ply	Single
No. 1	Cotton	50/3/3	Z	S	S
No. 2	Flax	6/3	-	Z	S

PACK EQUIPMENT

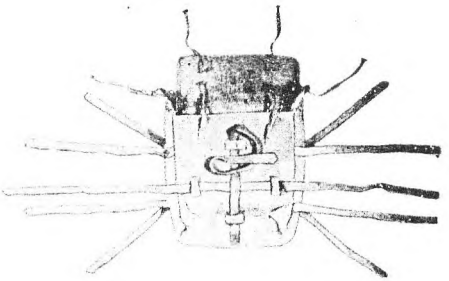


FIG 2. Front View of Haversack.

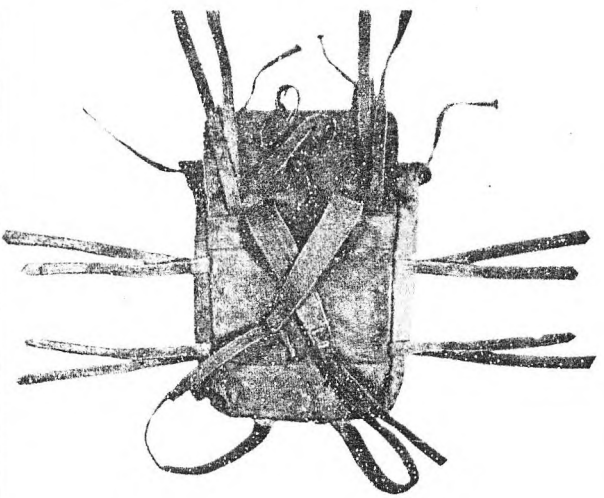
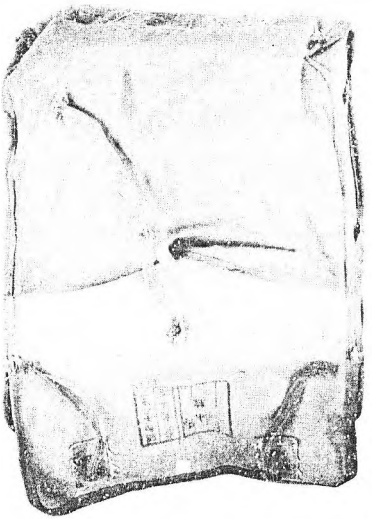
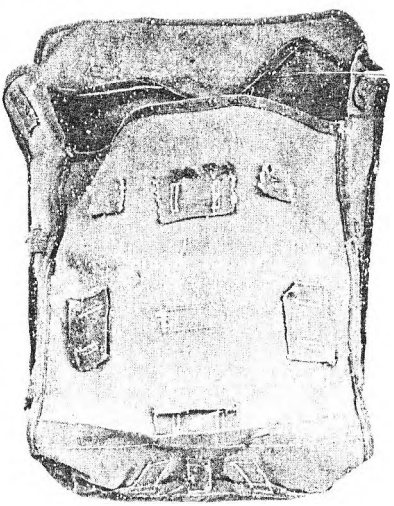


FIG. 3 Rear view of Haversack.

PACK EQUIPMENT

FIGS 4 & 5 Interior Views of Haversack.





PACK EQUIPMENT

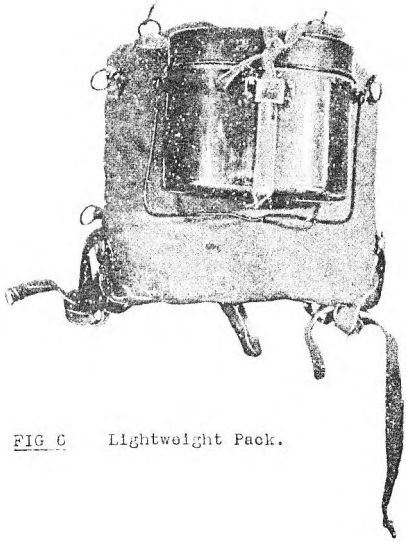


FIG 6 Lightweight Pack.

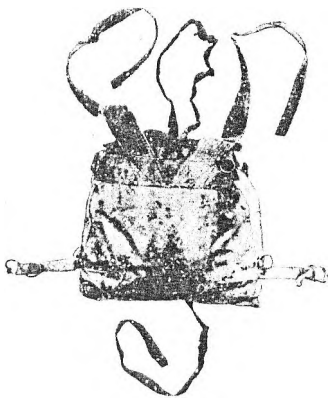


FIG 7 Lightweight Pack, Rear View.

PACK EQUIPMENT

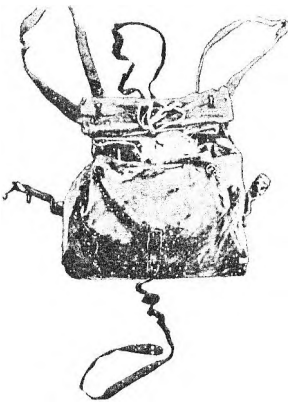


FIG 8 Lightweight Pack, Front View.

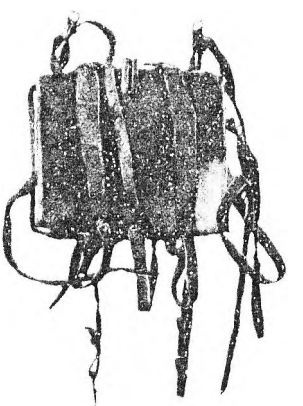


FIG 9 Field Pack, Rear View.

PACK EQUIPMENT

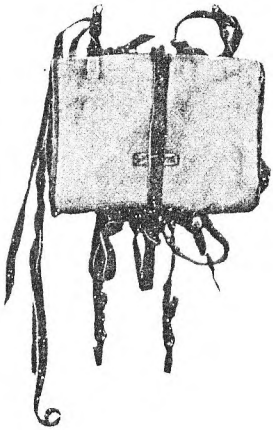


FIG 10 Field Pack, Front View.

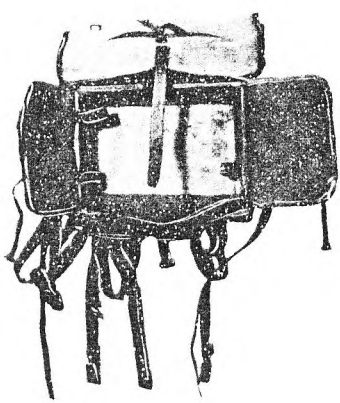
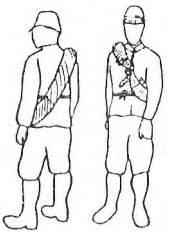
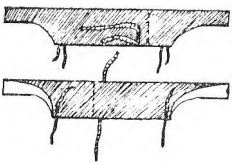


FIG 11 Field Pack, Interior View.

PACK EQUIPMENT

FIG 12 Transport Pack.





COMBINATION PRIME MOVER & BULLDOZER

1. GENERAL

Two of these vehicles, one of which was operable, were captured in the vicinity of the airfields at Hollandia, Dutch New Guinea. The vehicle examined was made at Sagami Army Arsenal in 1943. It is obvious from its construction that it was originally designed to serve this dual purpose, and that the bulldozer attachment was not a later modification. U.S. Army personnel who have operated this tractor estimate it has a maximum speed of from 20-25 m.p.h.

2. DESCRIPTION (Fig 1)

(a) Tractor: This is very similar in construction to the type 98 six ton prime mover. The engine, however, is located in the front of the tractor, and the track is driven from the rear. Only two seats are provided, the driver's being on the right hand side. Fairly extensive use is made of welding, and aluminium is widely used throughout, parts of the radiators, engine cover, fuel tanks, filter housings, clutch housing, and generator housing being among the aluminium items.
The tractor is equipped with two towing hooks in the front and a rear towing pintle, with rapid opening catch. There are two large winches at the rear, one on each side, and both extend completely across the body These winches use $\frac{3}{4}$ in. wire rope. A cable guide is provided for each winch, the guides having openings $2\frac{1}{4}$ ins high by $10\frac{1}{8}$ ins wide. The guides are welded to the rear of the body.
Hoods originally covered both the front and rear sections of the tractor. Due to the width of the vehicle as compared with the engine, and to the fact that no attempt is made to utilise the space available to provide seating accommodation, all parts of the engine and clutch, and some other parts of the vehicle, are exceptionally easy of access.
There are four fuel tanks, two located behind and to each side of the engine, one under the driver's seat, and one under the floor boards on the left side.
Pressure type grease fittings are used throughout. The final drive and winch gear boxes, however, are oil filled, using readily accessible oil fillers, and bayonet type oil gauges.

(b) Tracks and Suspension: The suspension system of this tractor may be identical with that of the type 98 six ton tractor, except for the reversal of drive. The same method of suspension is used for the two prime-movers. From available measurements, it seems probable that the bogie wheels, return rollers, idlers, and drive sprockets are interchangeable. However, the tracks on this tractor are both larger and wider than those of the type 98 six ton tractor.

There are six bogie wheels to a side, mounted in pairs on three bogies. The two rear bogies are sprung by parallel coil springs in the usual manner of modern Japanese tanks and prime movers. The front bogie is sprung on a hydraulic mechanism, the exact nature of which has not been determined. A similar mechanism seems to be used on the type 98 six ton tractor. There are two return rollers. The bogies and return rollers are of the usual type, consisting of two separate wheels joined together. Both the return rollers and the bogie wheels are rubber covered. The rubber was missing from all but two of the bogie wheels when the vehicle was captured, but operated successfully in spite of this lack. The tracks are of the common Japanese all-steel centre guide type. The tracks can be readily adjusted from the front of the tractor by use of a wrench on a shaft which moves the idler. Physical characteristics of the track and suspension system are as follows:

Width of track	10⅛ ins
Centre to centre distance, track blocks	4⅞ ins
Length of track, front to rear	13 ft 7½ ins
Width to outsides of tracks	6 ft 9¾ ins
Ground contact of track (approx)	9 ft 6 ins
Max. diameter drive sprocket	21¾ ins
Width of drive sprocket	8⅝ ins
Diameter of idler	16¾ ins
Width of idler	4½ ins
Diameter of bogie wheels	16½ ins
Width individual bogie wheel	2 ins
Total width bogie wheels	6 ins
Diameter return rollers (approx)	7 ins
Width return rollers	4¾ ins
Thickness of rubber caps	1 in.
Clearance of tractor (approx)..	13 ins
Length suspension spring in compression	16 ins

(c) Engine and Drive: The engine is a type HD 6120 made in 1943 at Kubota Ironworks, Ltd. It has a bore of 120 mm and a stroke of 160 mm., identical to that of the type 98 six ton tractor. The engines appear to be identical. However, the bulldozer engine is rated at 88 brake horsepower at 1300 r.p.m., while the engine of the type 98 tractor is rated at 110 horsepower at 1700 r.p.m. The engine is a six cylinder, water cooled, valve in head, diesel type. It is equipped with glow plug pre-heaters and a decompression mechanism for easy starting. A multiple unit fuel injection pump is used. The most distinctive feature of this engine is the use of two radiators, one located at each side of the engine. A centrifugal type water pump driven by a shaft taking power from a gear drive, is used. The two fans are gear driven. The engine is provided with an electric starter and generator. Edge type oil and fuel filters are used. The oil filter, oil breather, and bayonet type oil gauge are located on the left side of the engine as arranged in this vehicle. The hydraulic pump for bulldozer operation is mounted in front of the engine and is chain driven. There is no muffler on the vehicle, but one apparently was located on the front of theright track guard. As in the engine for the type 98 six ton tractor, there are two air intakes, one in the front of the

intake manifold, and one about one third of the distance between the front and rear of the manifold. These two air intakes were without air filters, but their arrangement indicated that they once used filters. Due to the use of two winches and a bulldozer attachment, there are a large number of controls on the vehicle. According to operators, the vehicle uses only a clutch and brake steering system, and does not use the additional epicyclic gear steering system provided on the type 98 six ton tractor. The operation of a single lever both disengages the clutch and applies the brake. The transmission is reported to provide three speeds forward and one in reverse. The transmission and gear shift lever are located between the two seats, thus requiring the driver to shift with his left hand.

3. REMOVAL OF BULLDOZER

Provision is made for rapid removal of the bulldozer. The arms supporting the blade are fastened to the shafts on the side of the tractor by split bushings, held in place by a heavy pin which is locked by a cotter pin.
To remove the bulldozer attachment, the blade is lowered to the ground, the two pins are removed from the split bushing, and two pins are removed from the hydraulically operated lifting arms. The tractor is then backed free of the attachment. It is estimated the normal tractor crew of two could remove the bulldozer attachment in approximately two minutes, leaving the tractor free for use as a prime mover. To reassemble rapidly would require a larger crew in order to properly align the parts.

(SOURCE:- USASOS)

COMBINATION PRIME MOVER & BULLDOZER FIG 1