COPY No. 112

RESTRICTED:

The Information given in this Document is not to be communicated, either directly or indirectly to the Press, or to any Person not authorised to receive it.

AUSTRALIAN MILITARY FORCES

TECHNICAL INTELLIGENCE SUMMARY

No. 19

COMPILED NOVEMBER 1944

Prepared by the General Staff Intelligence, and issued under the direction of the Commander in Chief, Headquarters, Australian Military Forces.

Reproduced by L.H.Q. Cartographic Coy., Aust. Survey Corps.

L.H.Q./MISC./9609

AUSTRALIAN MILITARY FORCES

TECHNICAL INTELLIGENCE SUMMARY

NO 19

TABLE OF CONTENTS

JAPANESE EQUIPMENT

PART (I)	WEAPONS	PAGE
6.5 mm Third Year Type MMG		2 - 4
20 cm Spin Stabilised Rocket		5 - 15
PART (II)	AMMUNITION	
37 mm HE/Incendiary Shell		16 - 20
Conical Tk/A Hand Grenade		21 - 25
PART (III)	SIGNAL EQUIPMENT	
High Power Transmitter		26 - 30
Light Beam Telephone		31 - 52
PART (IV)	CHEMICAL WARFARE	
Light Anti-Gas Trousers		53 - 56
Light Anti-Gas Jacket		57 - 59
PART (IV)	MISCELLANEOUS	
OZ Model AA Calculating Machine		60 - 77
AA Director Model 2		78 - 86
Ishii Type Section Use Water Filter ..		87 - 96

6.5 MM THIRD YEAR TYPE MMG

1. GENERAL

This weapon is year 1914 model and is now obsolete. It has been found in small numbers and the gun in question was recovered in the Marshalls area.
The 7.7 mm Juki Type 92 MMG is an improvement of this model and closely resembles it in many features.

2. DESCRIPTION (Figs 1 and 2)

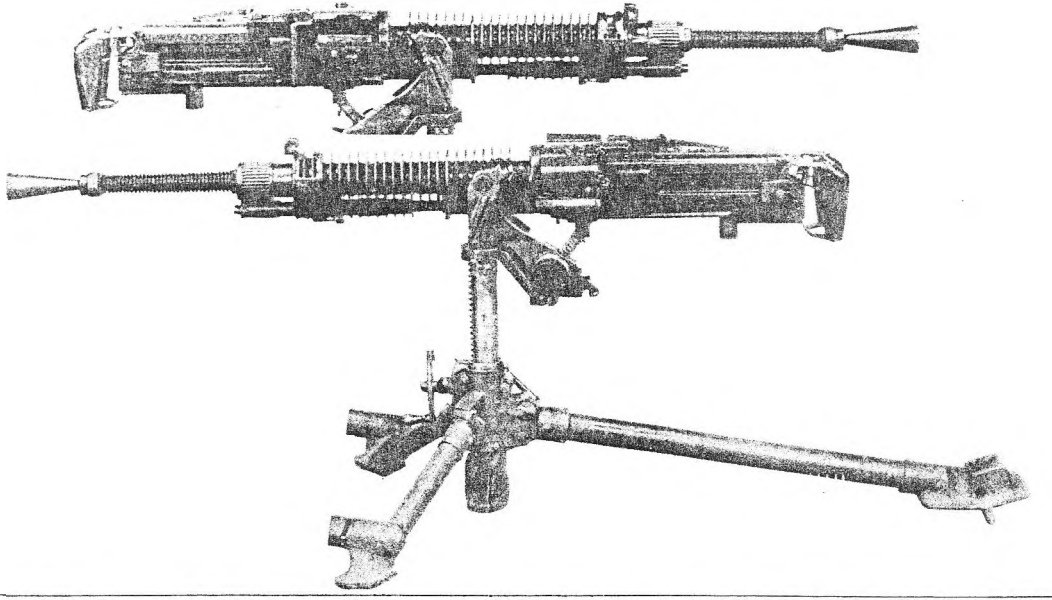
The main difference is that this gun has a calibre of 6.5 mm; other variations are as follows:-

The conventional spade grips are provided with two finger triggers. Both triggers are fixed integral with the trigger lever so that either or both will fire the weapon.
No safety mechanism is present. A folding ring type rear AA sight is permanently attached to the rear top of the body.
An adaptor, evidently for a cartwheel type front AA sight, is riveted to the front of the cooling jacket.
The rear ground sight is of the tangent curve, radius arm type offset to the right and is graduated from 300 metres (328 yds) to 2200 metres (2406 yds). The rear sight of the Model 92 is graduated from 300 to 2700 metres.
The oil reservoir is of slightly different shape and probably has a lower capacity.
The trunnions are of two diameters. That part of the trunnion, which contacts the trunnion bearing in the mount, is of smaller diameter than that portion which extends beyond the mount. The head thus formed tends to reduce the transverse motion. This head was eliminated on the Model 92.
The barrel locking nut retainer assembly is located on the right side of the cooling jacket.
Various machining cuts found in the internal parts of the earlier model were later eliminated in the interest of ease of production. Although the gas piston and bolt assemblies, barrel and barrel sleeve can be interchanged in the two models, the strip feed port in the earlier model is one-eighth of inch narrower than that in the Model 92.
Consequently the Model 3 cannot be converted for use with 7.7 mm ammunition.
This earlier Model gun can fit the same mount as the Model 92. With modified 7.7 mm feed strips (strip changed by merely bending down the tabs so that the smaller 6.5 mm rounds are firmly gripped) the weapon fires successfully. The low cyclic rate was comparable with that of the Model 92.
Markings on the gun examined indicated date of manufacture as August 1920.

(SOURCE:- AU of S, G-2, USAFPOA)

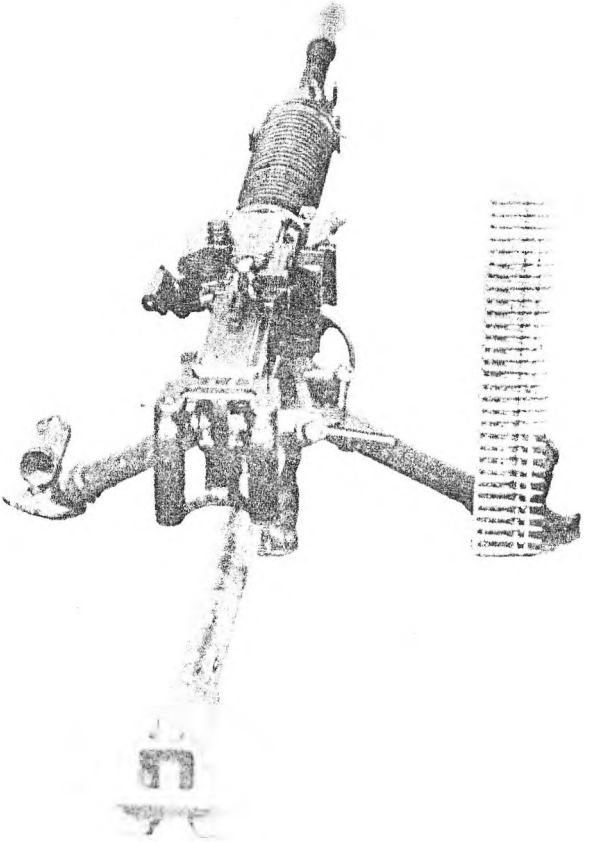
6.5 MM THIRD YEAR TYPE M M G

FIG 1 SIDE VIEWS



6.5 MM THIRD YEAR TYPE M M G

FIG 2 REAR VIEW



20 CM SPIN STABILISED ROCKET

1. GENERAL.

This equipment consists of a rocket assembly and a crudely constructed launching device for ground use. It is a relatively short range weapon and is probably designed for barrage fire. The stabilizing effect is gained by means of clockwise rotation imparted to the projectile due to the gas jets in the propellant unit being set at an angle from the plane of the propellant tubes.

This report is based on additional information gained from examination of equipment recovered at Leyte Island, Philippine Group.

2. DESCRIPTION. (figs 1 - 5)

(a) Rocket Assembly.

The complete round without fuse is 102.3 cms long (approx 41 ins.) and weighs 90.1 Kg (198.3 lbs). It consists of a projectile, propellant unit and nose fuse.

(1) Projectile.

This round has a much thinner case and higher loading factor than any known naval ammunition. It has an ogival nose and a straight body. The male base plate is brought out flush with the projectile body by means of a flange. Behind the flange is a second set of threads to take the propellant unit. A single set screw locks the base plate to the projectile. The explosive charge was trinitroanisol cast directly into the lacquered interior of the case.
The entire round was coloured maroon with the nose tipped with a green band. A yellow band is present at the junction of the projectile and propellant unit, presumably to indicate the centre of gravity. These colours conform to the standard colour scheme for naval projectiles.
No stencillings to indicate explosive manufacture could be distinguished and a paper label attached to the body was badly damaged and could not be read.
A label in the nose fuse pocket gave the following information on the explosive charge:-

Explosive	-	Type 91
Lot	-	933
Cast	-	June 1944 at Kure.

Further characteristics of the projectile are as follows:-

Overall length without fuse	588.0 mm.
Weight complete without fuse....	49.9 Kg.

Weight of H.E. filling.....	17.5 Kg.
Loading factor.....	35.3%
Body diameter.....	210.5 mm.
Wall thickness.....	12.0 mm.
Width of green band.....	54.0 mm.
Weight of base plate.....	6.4 Kg.
Fuse cavity threads	
Length of threaded portion.....	28.5 mm.
Outside diameter.....	47.0 mm.
Threads per inch, U.S. Std.	12
Base plate threads	
Length of threaded portion.....	32.0 mm.
Outside diameter.....	181.0 mm.
Threads per inch, U.S. Std.	8
Radius of ogive in calibers	4
Rockwell	24

(11) Propellant Unit.

The unit consists of a body, propellant sticks, base plate and igniter.
The body is a straight cylinder with raised forward and after bearing surfaces. The forward end threads on to the base of the projectile while the propellant unit base plate threads in to the after end.
A closing plate is threaded inside the forward end of the unit to separate the combustion chamber from the projectile base plate.
A grid is attached to the inside of the base plate by three screws and a perforated cup fits against the closing plate at the forward end of the propellant unit. These two pieces thus reduce the space in the chamber to the length of the propellant sticks so that they fit closely in position. No connection is present on either of the pieces to keep the sticks in position.
The seven sticks of propellant each have a single axial perforation and have the following composition:-

Nitroglycerine	30%
Nitrocellulose	65%
Sodium Chloride	2%
Centralite	3%

The sticks are placed so that six sticks form a circle around an identical central stick.
The propellant unit base plate is constructed of hardened steel with six offset nozzles and a central threaded opening for the primer, all being sealed on the inside with waxed paper.
The forward opening of each nozzle flares out towards the leading edge of the opening as the rocket spins. The exterior opening is straight.
Ignition of the propellant is mechanical and from the forward end. A silk black powder bag lashed to the perforated cup forms the ignition charge and a percussion primer threads into the base plate. Although the primer only extends through the plate, the perforation in the central propellant stick, forms a flash

lead. Actual tests showed that the primer flash will ignite the black powder charge.

General characteristics of the propellant unit are as follows:-

Overall length	460 mm.
Weight with propellant.....	40.0 Kg.
Weight of propellant.....	8.3 Kg.
Weight of black powder ignition charge.....	50.6 grams
Weight of closing plate.....	1.98 Kg.
Weight of base plate.....	9.1 Kg.
Diameter of bearing surfaces.....	210.5 mm.
Width of yellow band.....	9.0 mm.
Wall thickness.....	10.0 mm.
Threads of cavity for projectile base plug	
Length of threaded portion.....	30.0 mm.
Outside diameter.....	181.0 mm.
Threads per inch, U.S. Std.	8
Threads of base plate	
Length of threaded portion.....	35.0 mm.
Outside diameter.....	181.0 mm.
Threads per inch, U.S. Std.	8
Threads of primer pocket	
Length of threaded portion.....	13.0 mm.
Outside diameter.....	12.0 mm.
Threads per inch, U.S. Std.	32
Rockwell:	
Body.....	11
Base plate.....	85
Nozzles:	
Minimum diameter of orifice.....	15.0 mm.
Angular offset from longitudinal axis of rocket.....	25°
Individual propellant stick:	
Length.....	290.0 mm.
Diameter.....	58.0 mm.
Diameter of perforation.....	11.0 mm.
Weight (varies slightly).....	1.162 Kg.
Perforated cup:	
Diameter.....	175.0 mm.
Diameter of perforation (19).....	25.0 mm.
Weight.....	452.1 grams
Grid:	
Diameter of outer ring.....	130.0 mm.
Diameter of inner ring.....	45.0 mm.
Forward projection from base plate	35.0 mm.
Weight.....	526.0 grams

A label attached to the forward end of the base plate gave the following information:-

"Common Propelling charge

Type	240 DT2
Lot	39 Grade (Illegible)
Powder Weight	8.5 Kg.
Powder manufactured	March 1944
Loaded	24th June 1944 at Kure "A".

It is believed that the last line also constitutes the lot number of the assembled propellant unit.
The black powder ignition bag had no marking except a Kure anchor.

(111) Fuse.

The fuse is a centrifugally armed point detonating type consisting of an upper body, lower body and gaine.
The upper body contains a copper closing disc and threads on to the lower body to form the head of the fuse.
The lower body houses the striker and centrifugal detents and is threaded to take the gaine. The lower portion of the striker has a smaller diameter forming a shoulder to bear against the detents.
The upper end is hollowed to receive the striker head. This head has a disc on the upper end to form the striking head and a flange to prevent it being seated too deeply in the hollowed end of the striker. The centrifugal detents are pivoted on a mounting which threads into the base of the lower body above the gaine. A spring band holds them under the striker shoulder. The detents are so arranged that they can only move out in sequence to release the striker.
The gaine contains a cup and a paper-wrapped picric booster. The cup threads into the top and has a tetryl sub-booster in its lower portion.
A smaller primer carrier threads into the top of the cup and houses a primer mixture over a small amount of pressed tetryl.
All parts are steel except the centrifugal detents, detent spring, gaine cup and primer carrier, which are of brass.

Further characteristics of the fuse are as follows:-

Weight complete.....	807.2 grams
Weight of gaine complete.....	221.6 grams
Weight of picric booster.....	28.5 grams
Overall length with gaine.....	132.0 mm.
Length of gaine.....	70.0 mm.
Maximum diameter of fuse.....	58.0 mm.
Fuse threads	
Length of threaded portion.....	16.0 mm.
Outside diameter.....	147.0 mm.
Threads per inch, U.S. Std.	12
Gaine threads	
Length of threaded portion.....	12.0 mm.
Outside diameter.....	35.0 mm.
Threads per inch, U.S. Std.	16

The markings on the fuse consist of an anchor, a manufacturer's symbol, inspection mark and initials.

A label on the fuse can gives the following information:-

Fuse for 20 cm. Rocket Projectile		
Loading Number	-	Kure AAA
Lot	-	M 66
Powder manufactured	-	February 1941
Fuse "	-	June 1944 at Kure Arsenal
Instructions	-	Do not open (can) except for actual use or testing.

The rotation of the rocket in flight causes the centrifugal detents to move out against the detent spring to clear the shoulder of the striker. Impact crushes the fuse head and drives the striker down into the primer mixture in the gaine. This starts a train of straight detonation through the tetryl and picric to the main charge. Should the fuse strike before it is completely armed, it is possible that the force of impact could be absorbed by shearing the flange on the striker head rather than shearing the centrifugal detents.

(b) Launcher.

The following information was obtained from field personnel.

The launcher consists of a trough-like device, rounded at the bottom, has stops at the after end to retain the rocket and is approximately 7 ft. long. It is made of 3/16 in. iron in three sections with welded joints where the supports are attached. Two bipod supports made of 1 in. piping are located, one forward and one near the after end and can be adjusted to vary the elevation. The legs can be folded parallel to the trough and the whole launcher may be shifted to give different angles of train. A lanyard-operated percussion striker is mounted at the aft end of the trough. The total weight of the launcher is approximately 175 lbs.

Figures on the trough gave the following ranges for different angles of elevation:-

10 degrees	450 metres
20 "	1000 "
30 "	1450 "
40 "	1650 "
50 "	1800 "
60 "	1600 "

On Leyte Island, the launcher was mounted in a pit covered with logs and sod leaving only a small aperture for the rocket to be fired through. Elevation and train was thus practically fixed, the elevation being approximately 30 degrees. The crew operated the lanyard from a separate foxhole to the rear of the firing pit.

3. PERFORMANCE.

The following characteristics for this weapon have been calculated:-

Nozzle constant (ratio of area of propellant to nozzle throat area)	448.7
If primer blows out, the additional nozzle of 1 cm. diameter is added. This nozzle constant is then	418.0
On the basis of firing two primers in the base plate, it appears highly unlikely that the primer would blow out.	
Velocity at end of burning (calculated for vacuum trajectory and on basis of Japanese range table).	440.1 ft/sec
Effective Gas Velocity.	5071.0 ft/sec.

4. REMARKS.

The discovery of this rocket is important evidence that the Japanese are working on the rocket principle of propulsion for combat weapons. Its size and apparent use suggest study of the Russian and German field rockets. Although it appears to use relatively crude solutions for several problems, the round itself appears to be a more practicable piece of ordnance than the launcher.

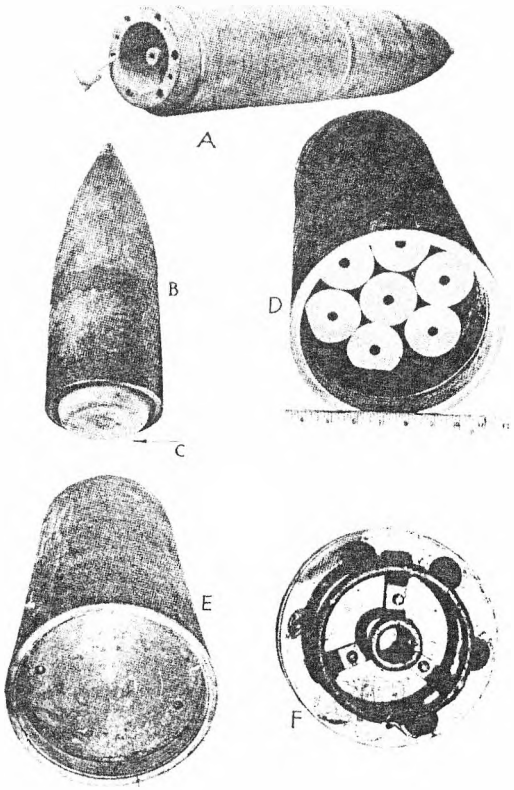
In addition to the fuse designated for the rocket, the Type 91 time and Type 100 combination fuses, and Type 88 point detonating fuses will fit the fuse pocket.

It is not known whether the rocket would produce sufficient setback to arm these fuses.

Source:- M.E.I.U.

20 CM SPIN STABILISED ROCKET

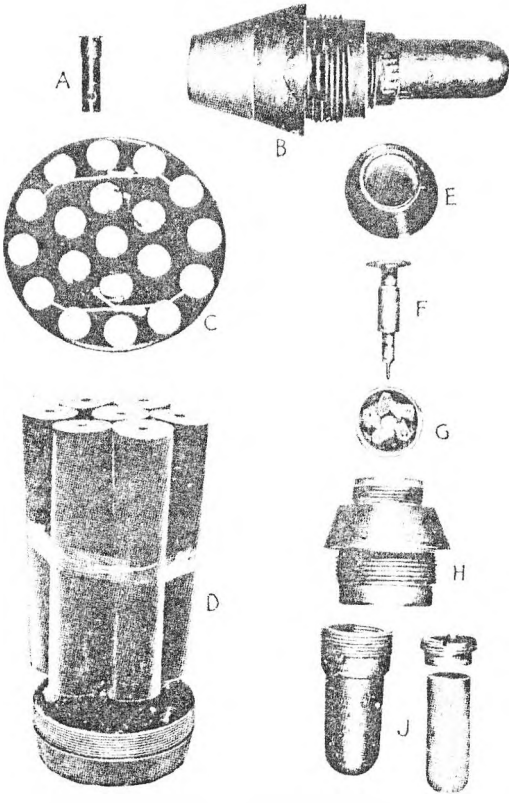
FIG 1



(A) Complete Round.
(B) Projectile with Base Plate Off.
(C) Filling.
(D) After view of Propellant Unit.
(E) Forward view of Propellant Unit.
(F) Forward view of Base Plate with Grid.

20 CM SPIN STABILISED ROCKET

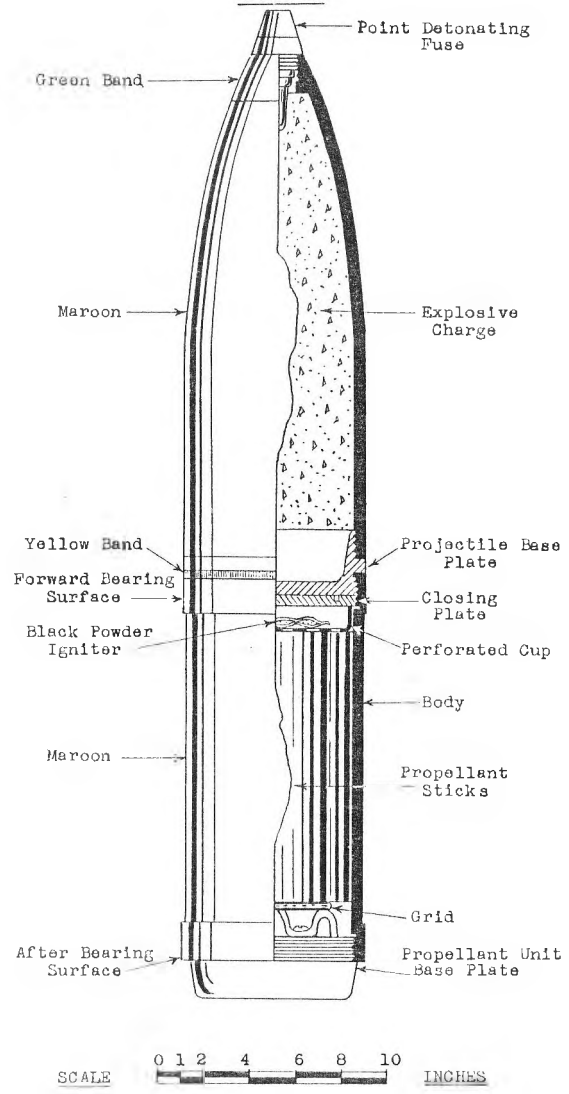
FIG 2



(A) Percussion Primer. (B) Complete Fuse.
(C) After View of Perforated Cup and Ignitor.
(D) Propellant Resting on Grid. (E) Upper Fuse Body.
(F) Striker and Striker Head. (G) Detents.
(H) Lower Fuse Body. (J) Gaine.

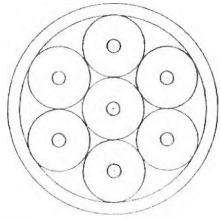
20 CM SPIN STABILISED ROCKET

FIG 3

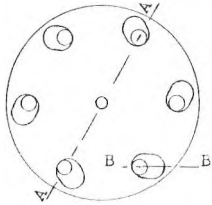


20 CM SPIN STABILISED ROCKET

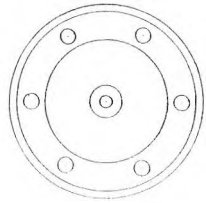
FIG 4



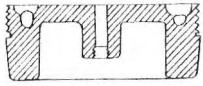
AFTER VIEW OF PROPELLANT UNIT
SHOWING
PROPELLANT STICKS IN POSITION



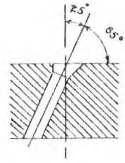
FORWARD VIEW OF
PROPELLANT UNIT
BASE PLATE



AFTER VIEW OF
PROPELLANT UNIT
BASE PLATE



SECTION A-A

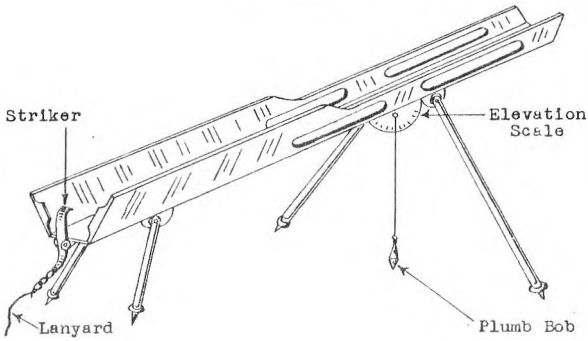


SECTION B-B

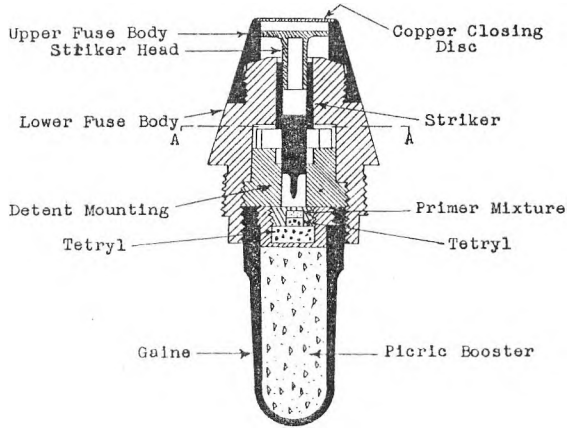
SCALE 0 1 2 4 6 8 10 12 INCHES

20 CM SPIN STABILISED ROCKET

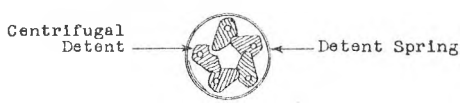
FIG 5



SKETCH OF LAUNCHER



POINT DETONATING FUSE



SECTION A-A

Not to Scale

37 MM HE/INCENDIARY SHELL

1. GENERAL

It is suggested that this ammunition may be intended for use in a 37 mm aircraft cannon because of the short length of the rounds as compared with the HE round for the 37 mm Tk A Gun Type 94, together with the use of a more powerful explosive in the shell. The complete round is 178 mm long (defused) and weighs 741 gms.

2. DESCRIPTION (Figs 1 - 2)

(a) Cartridge Case: The drawn brass cartridge case is of the flanged type. Inside the head is formed a deep boss drilled and threaded (13.25 mm major diameter 1.4 mm pitch, right hand) to take the percussion primer.
The primer is of the same type as that used in 105 mm Howitzer shell and described in AMF Tech Int Sum No.17.
The cartridge case is necked at the mouth and is secured to the base of the projectile by a deep continuous crimp.
The case is coated internally and externally with a clear lacquer and has the following dimensions:-

Length	111 mm
Diameter of flange	47 mm
Thickness " "	2.25 mm
Diameter above flange ..	44 mm
" at shoulder ..	42.5 mm
" " mouth	37.75 mm
Length of neck	32 mm

(b) Propellant: The cartridge case contains 60.1 gms of a nitrocellulose powder in the form of rectangular flakes measuring approximately 4.5 by 4 by 0.5 mm and having an uneven graphited surface.
The composition of the dried propellant is:-

Nitrocellulose (graphite coated)..	98.5%
Diphenylamine	1.6%
	100.1%

(Moisture and volatile matter represented 2% of the propellant).
The propellant also contains a green dye. In the charged cartridge case, the propellant is covered by a cardboard lid to which is attached a length of tin-lead decoppering foil weighing 1.32 gms. A strip of cardboard 10 mm wide acts as a spacer between the lid and the base of the shell.

(c) Shell: (1) Construction: The shell has a separate head screwed on to the body. The cylindrical steel body is not streamlined at its base and its diameter increases near the mouth to form a front band. A copper driving band is attached to a knurled groove near the base and a 1 mm deep cannelure is provided for the attachment of the cartridge case. The mouth of the body is internally threaded to take the external thread of the steel head (27.75 mm major diameter, 1.0 mm pitch, right hand). The head is internally threaded

at the nose to receive the nose fuse (16 mm major diameter, 0.9 mm pitch). Two spanner flats are formed on the head to facilitate assembly.
The dimensions and weighs of the shell and of its components are given below:-

Length of shell (defused)	88 mm
Length of shell (fused)	107.5 mm
Diameter of body	36.5 mm
Diameter of front band	36.75 mm
Diameter of driving band	37.75 mm
Width of driving band	10.5 mm
Distance of driving band from shell base	23 mm
Thickness of shell wall in front of driving band	5 mm
Thickness of shell base	10.5 mm
Radius of ogive (approximate)	1¼ c.r.h.
Weight of complete shell (plugged) ..	429 gms
Weight of complete shell (fused).. ..	462.25 gms
Weight of explosive charge	29.0 gms
Weight of incendiary charge	8.0 gms

(ii) Filling: A 12 mm increment of an incendiary composition is pressed into the base of the shell body. This increment weighs 8 gms and has the following composition:-

Barium Nitrate	46.8%
Magnesium Metal	32.4%
Aluminium Metal	16.5%
Wax Covering	4.3%
	100.0%

Above the incendiary composition is pressed a 22.4 gms increment of RDX, the top of this increment being level with the base of the screwed head. The head is filled separately with 6.6 gms of pressed RDX. A paper liner covers the top of the filling and lines a cylindrical recess 8 mm diameter and 13 mm deep which is formed in the filling to accommodate the fuse magazine. The base of the filled head is covered by a 26 mm diameter paper disc.

(d) Fuse: The percussion nose fuse used is of the same type as that used on some Japanese 20 mm HE/T AA Shells and weighs approximately 36.25 gms. The transit plug is made of black moulded synthetic resin and has a transverse screw-driver slot in its head. A character moulded on the head and translated as "M1" is probably an abbreviation for "Migi" meaning "right" and indicating a right hand thread.

3. MARKINGS

(a) Shell: The shell is painted black internally and externally and has a 5 mm red band at the nose and an 8 mm yellow band 6mm in front of the driving band. White markings were partially translated as "tree 203" (literal) August 1943. Stamped markings on the six shells examined are as follows:-

Round No.	Head	Body	Above Driving Band
1	6943	3333	"to" - crossed cannons-June 1943
2	700	700	"Osaka" " " -May 1943
3	728	728	(?) " " " "

Round No.	Head	Body	Above driving band
4	331	331	"Osaka"-crossed cannons-May 1943
5	7082	7082	"to" - " " -June 1943
6	9912	9912	"to" - " " -July 1943

Note:- "to" may indicate manufacture at Tokyo.

(b) Cartridge Case: Green stencilled markings on the wall of one of the cases examined were translated "treo 203 (literal) Sept 1943 Lot A".
Markings on the heads of the cases are as follows:-

Round No.	1	F	Osaka	"ya"	- crossed cannons		-June 1943
" "	2	"	"	"	"	"	July 1943
" "	3	"	"	"	"	"	May 1943
" "	4	"	"	"	"	"	June 1943
" "	5	"	"	"	"	"	July 1943
" "	6	"	"	"	"	"	July 1943

c) Primers & Fuses:

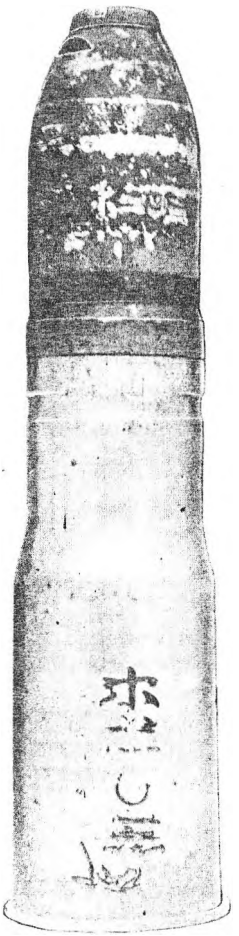
Round No.	Primer Head	Fuse
1	Tokyo "yo" February 1943	
2	" ☆ "e1" February 1943	
3	" " " February 1943	
4	" " "yo" April 1943	Tokyo ☆ Apr 43 "e1"
5	" " "e1" February 1943	"Osaka" -cross cannons Apr 43
6	" " " April "	"Osaka" -cross cannons Apr 43

The character for "Osaka" also appears on the cardboard lid covering the propellant.

(SOURCE:- MUNITIONS SUPPLY LABORATORIES through MGO BRANCH)

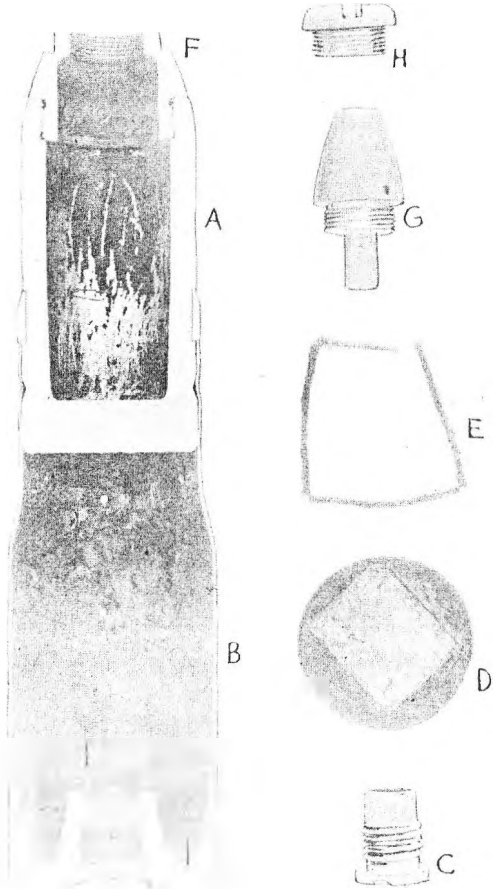
37 MM HE/INCENDIARY SHELL

FIG 1 ROUND WITH TRANSIT PLUG



37 MM HE / INCENDIARY SHELL

FIG 2 SECTIONAL VIEW



(A) Shell. (B) Cartridge Case. (C) Percussion Primer. (D) Cardboard Lid with Decoppering Foil. (E) Cardboard Spacer. (F) Head. (G) Fuse. (H) Transit Plug.

CONICAL TK/A HAND GRENADE

1. GENERAL.

This grenade which was recovered on Leyte Is Philippine Group represents a new type of anti-tank grenade and embodies the hollow charge principle. Two sizes of this grenade were recovered, the smaller of which is believed to be an experimental model.

2. DESCRIPTION.(figs 1 - 3.)

The component parts of the grenade consist of (a) explosive charge.(b) cone (c) wooden base. (d) silk bag and (e) tail unit and fuse.

(a) Explosive Charge. This charge is cast in the form of a truncated cone with a metal cone in the lower end. In the upper end is a well to receive the gaine of the fuse. Surrounding the gaine is a cast ring pellet. In the large size grenade, the explosive is Type 94 and in the small grenade, it is pentalite (50/50 TNT and PETN). A thin layer of waxed paper surrounds the charge.

(b) Metal Cone. This component is 3mm thick. In the large size grenade, the cone is made of steel and in the small size, aluminium is used.

(c) Wooden Base. At the bottom of the explosive charge is a wooden base which is flat on top and rounded at the bottom. There is a hole in the base of slightly smaller diameter than the diameter of the cone.

(d) Silk Bag. A white or olive drab silk bag covers the charge and base of the grenade. A draw string is fitted into the bottom of the bag when the grenade is assembled and pulled together and tied to form a cover at the bottom. A metal ring is placed over the top of the bag and the bag is then folded over the ring.

(e) Tail Unit and Fuse. A fuse adapter ring is fitted inside the top of the explosive charge. Four screws are threaded through the metal ring and bag, and into the adapter, thus holding the parts together.
Tied around the top of the grenade is a tail made of hemp to provide stability in flight and to direct the grenade to strike the tank base first.

The fuse is constructed in two parts which are threaded together. The lower body has external threads for screwing into the adapter ring and internal threads for receiving the gaine. The striker is held in position by a safety pin and creep spring. The underside of the upper body and the top of the striker are curved so that if the

grenade strikes at a slight angle, the striker will be cammed down. The safety pin is pulled before the grenade is thrown and on impact the firing pin overcomes the spring and moves down on to the primer. The fuse is not an "all-ways" action type, but will probably function on a slight angle of impact. Further general characteristics are listed as follows:-

	Large Grenade	Small Grenade
Length of grenade	$6\frac{3}{4}$ ins	$5\frac{7}{8}$ ins
" " tail	14 ins	-
" " fuse	$1\frac{7}{8}$ ins	$1\frac{7}{8}$ ins
" " cone	$3\frac{1}{4}$ ins	$2\frac{5}{8}$ ins
Diameter of base	$4\frac{3}{8}$ ins	4 ins
" " cone	$2\frac{3}{8}$ ins	2 ins
Cone angle, apex	30 degrees	36 degrees
Weight complete	1.25 Kg	.84 Kg
" of grenade	1.14 Kg	.76 Kg
" " fuse	42.3 gms	42.3 gms
" " explosive	.87 Kg	.60 Kg
" " cone	141.7 gms	42.5 gms
" " base	56.7 gms	50.0 gms
" " gaine	5.1 gms	5.1 gms

3. MARKINGS.

A naval arsenal mark is located on the bag. A label on the explosive charge of the large grenade gives the following information - "Bursting charge for large model hand - thrown conical grenade Type 94 Explosive, Lot 1, manufactured July 1944, cast July 1944, manufactured at 3rd Naval Powder Factory".

The label on the small grenade reads: "Bursting charge for temporary designation hand - thrown conical grenade".

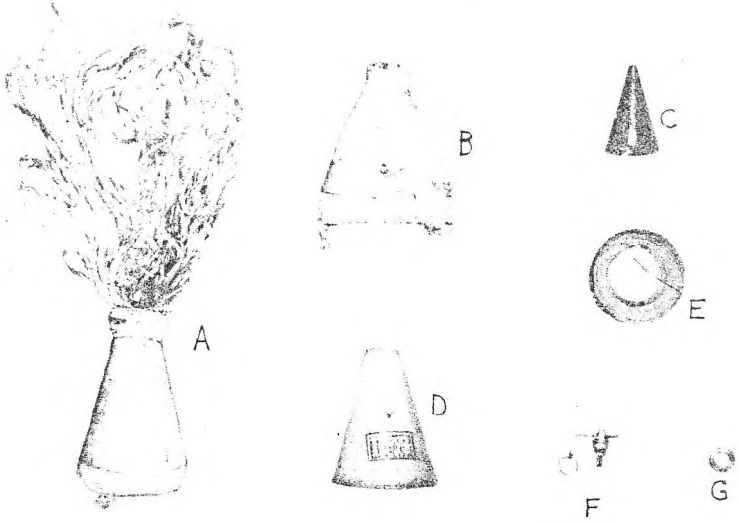
4. PERFORMANCE.

The following performance detail is extracted from captured documents. The grenade should be thrown from a distance of 10 metres (33 ft) and will penetrate 70 mm of armour plate. The fuse will not function unless the mine has attained a velocity of 10 metres per second and strikes a hard surface.

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

CONICAL TK/A HAND GRENADE

FIG 1

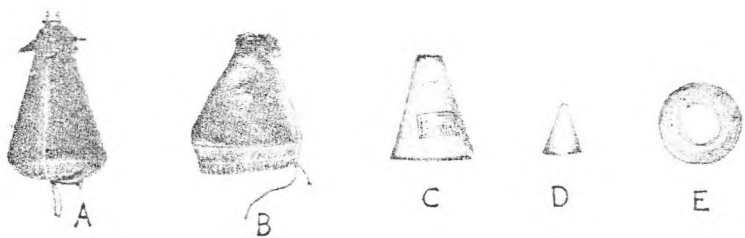


LARGE SIZE GRENADE

(A) Assembled Grenade.
(B) Cloth Bag.
(C) Cone.
(D) Explosive Charge.
(E) Wooden Base.
(F) Fuse.
(G) Adapter Ring.

CONICAL TK/A HAND GRENADE

FIG 2

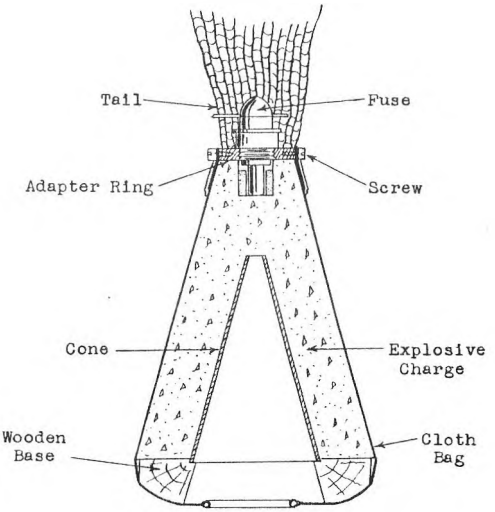


SMALL SIZE GRENADE

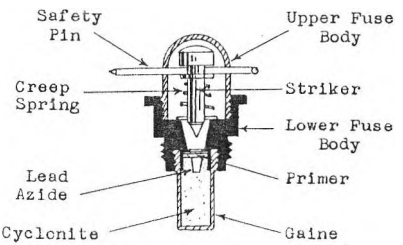
(A) Assembled Grenade Without Tail. (B) Cloth Bag. (C) Explosive Charge. (D) Cone. (E) Wooden Base

CONICAL TK/A HAND GRENADE

FIG 3



LARGE SIZE GRENADE



FUSE

3. TESTS.

The range of this set would be limited to line of sight, and the maximum usable range would probably be ½ mile to 1 mile, depending upon atmospheric conditions. Since only one unit has been recovered to date, a check of the operating range has not been possible. An estimate of the capabilities of the set was made by setting up a mirror approximately 80 feet from the lamp unit, and reflecting the beam from the lamp unit back to it. The signal received was loud and clear. The width of the transmitted light beam is extremely narrow; at 250 yards the beam width was only 24 inches, which would be a beam width of approximately 0.14 degree. Use of the instrument would therefore necessarily be restricted to installations where two units can be set up firmly, facing each other. If it were to be used in a shipboard installation, gyroscopic or other stabilization would probably be necessary for the mounting of the lamp unit. The inclusion of accurate azimuth and elevation calibrations make it possible for the equipment to be set up and adjusted according to map readings.

4. COMMENTS.

The design of the lamp is very good and the workmanship excellent. In most cases the parts are far more elaborate than their use would warrant and the lens and sighting telescope appear to be far better than it is necessary for their purposes. The construction of the amplifier unit is very good, although the design is not modern. All resistors are of the clip-in type, and may be very easily replaced when necessary. Circuit layout is rather poor, and in many cases it is necessary to follow a circuit all over the chassis to trace it.

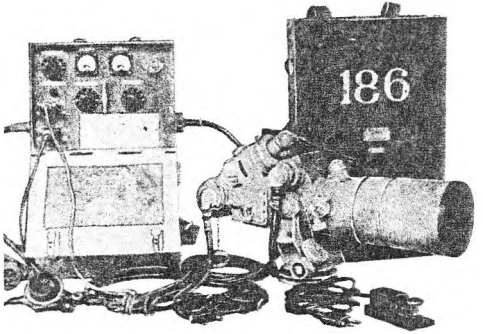
The possibility of the equipment having been designed for shipboard installation would account for the use of grey rather than the usual brown paint found on most Japanese field communication equipment. The amplifier unit and the lamp carrying case, however, feature the usual brown paint. The lamp unit chassis is made of cast white metal, with nicely machined brass fittings. All calibrations are made against a background of plating, apparently chromium. The sighting telescope is similarly built, but the focusing calibration features white numbering on the grey paint background.

Source - USASOS

.....

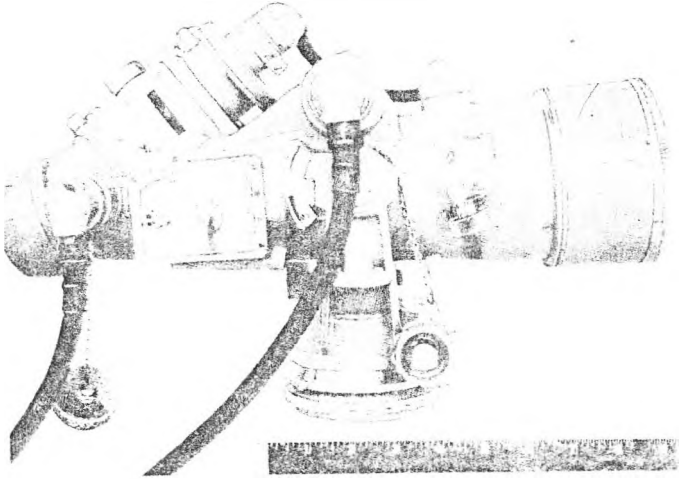
LIGHT BEAM TELEPHONE

FIG 1 COMPONENTS



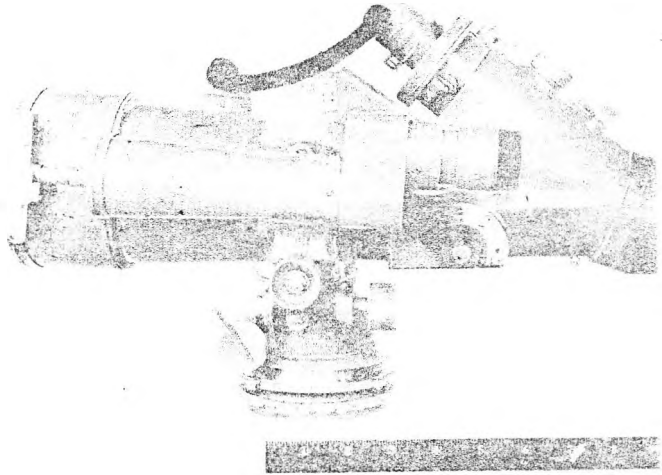
LIGHT BEAM TELEPHONE

FIG 2 LAMP UNIT, RIGHT SIDE



LIGHT BEAM TELEPHONE

FIG 3 LAMP UNIT. LEFT SIDE, WITH TELESCOPE IN PLACE



LIGHT BEAM TELEPHONE

FIG 4 LAMP UNIT. Base Level.

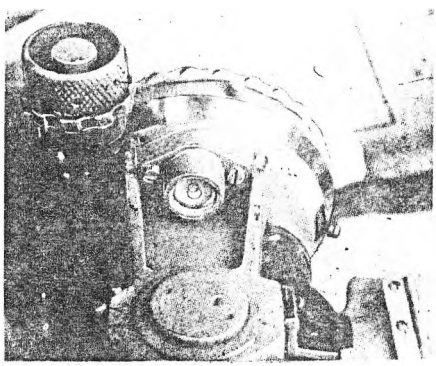


FIG 5 LAMP UNIT. Elevation Correction Level.

LIGHT BEAM TELEPHONE

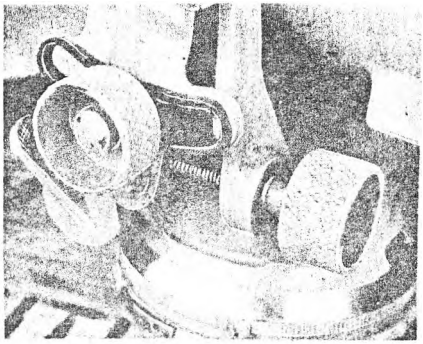


FIG 6 LAMP UNIT Elevation Adjustment

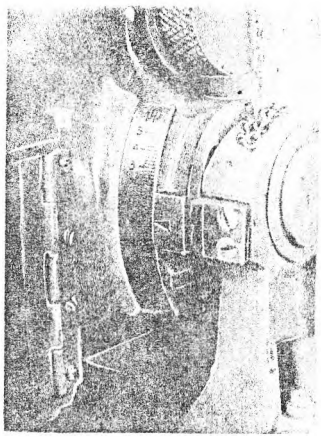


FIG 7 LAMP UNIT Elevation Scale.

LIGHT BEAM TELEPHONE

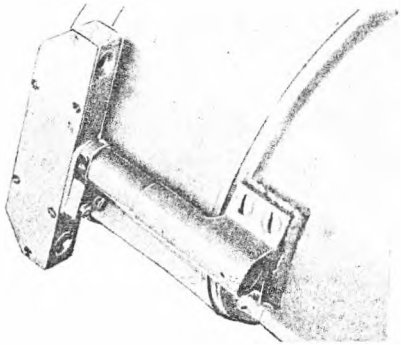


FIG 8 LAMP UNIT Monitoring Prism Arm.

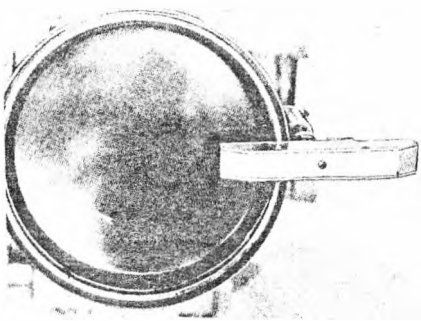


FIG 9 LAMP UNIT Monitoring Prism Arm in place.

LIGHT BEAM TELEPHONE

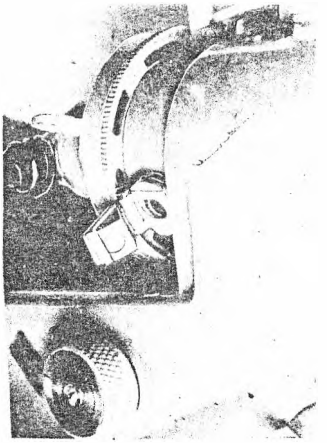


FIG 10 LAMP UNIT Cross-Hair Illuminating Prism.

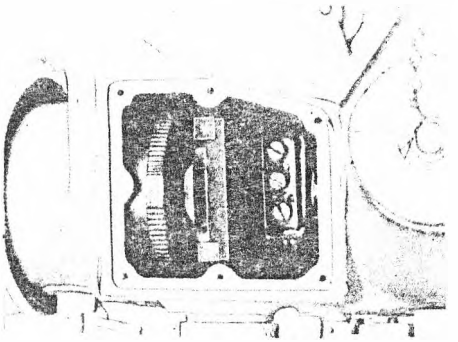


FIG 11 LAMP UNIT Filter Selector Disc.

LIGHT BEAM TELEPHONE

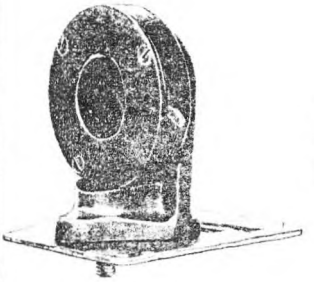


FIG 12 LAMP UNIT
Shutter.

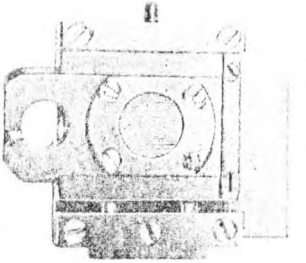


FIG 13 LAMP UNIT
Grid No. 1.

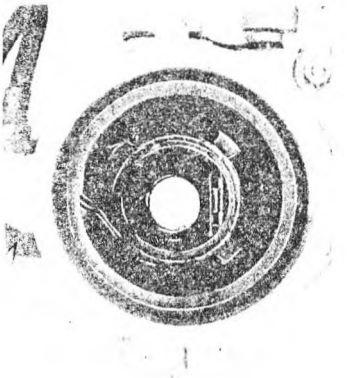
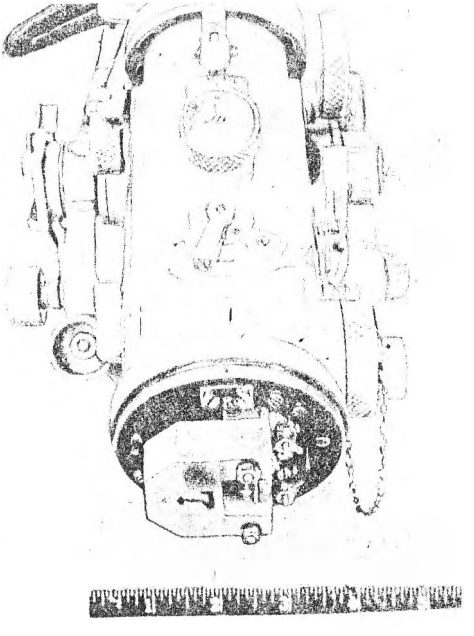


FIG 14 LAMP UNIT Grid No. 2.

LIGHT BEAM TELEPHONE

FIG 15 LAMP UNIT Top Rear View with Mirror Element Cover removed, and showing Shutter Control and Grid No. 1. Adjustment Knob.



LIGHT BEAM TELEPHONE

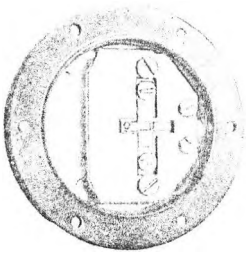


FIG 16 LAMP UNIT
Front View of Mirror Element.

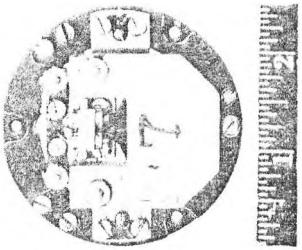


FIG 17 LAMP UNIT
Rear View of Mirror Element.

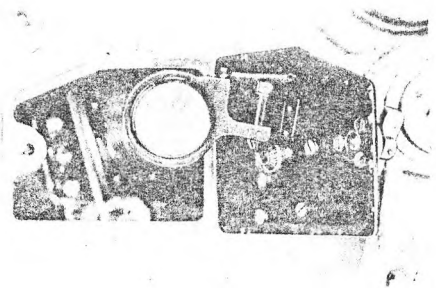


FIG 18 LAMP UNIT Diffuser.

LIGHT BEAM TELEPHONE

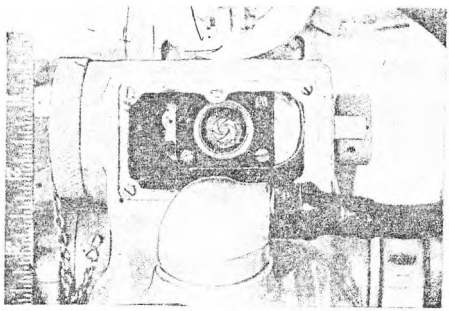


FIG 19 LAMP UNIT Iris Diaphragm.

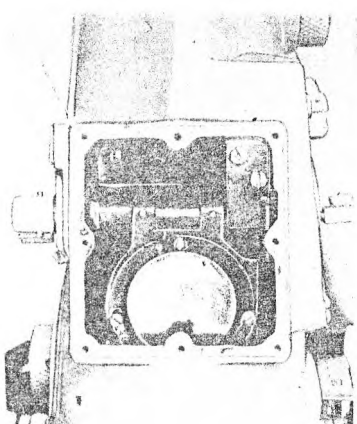


FIG 20 LAMP UNIT Auxiliary Receiving Mirror.

LIGHT BEAM TELEPHONE

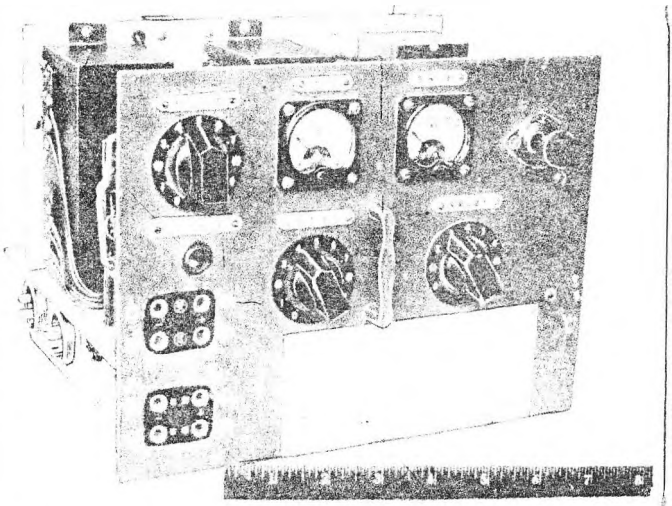


FIG 21 LAMP UNIT Bulb Socket Assembly.

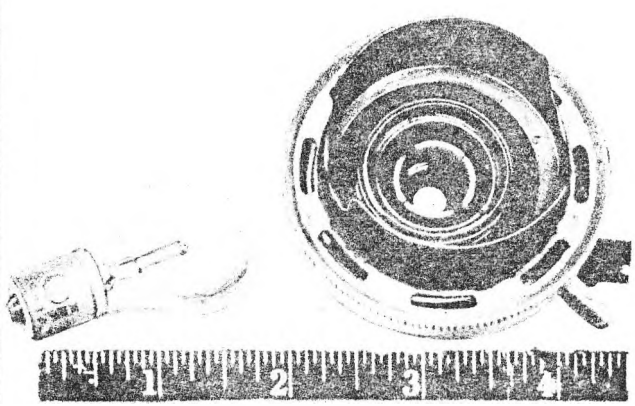
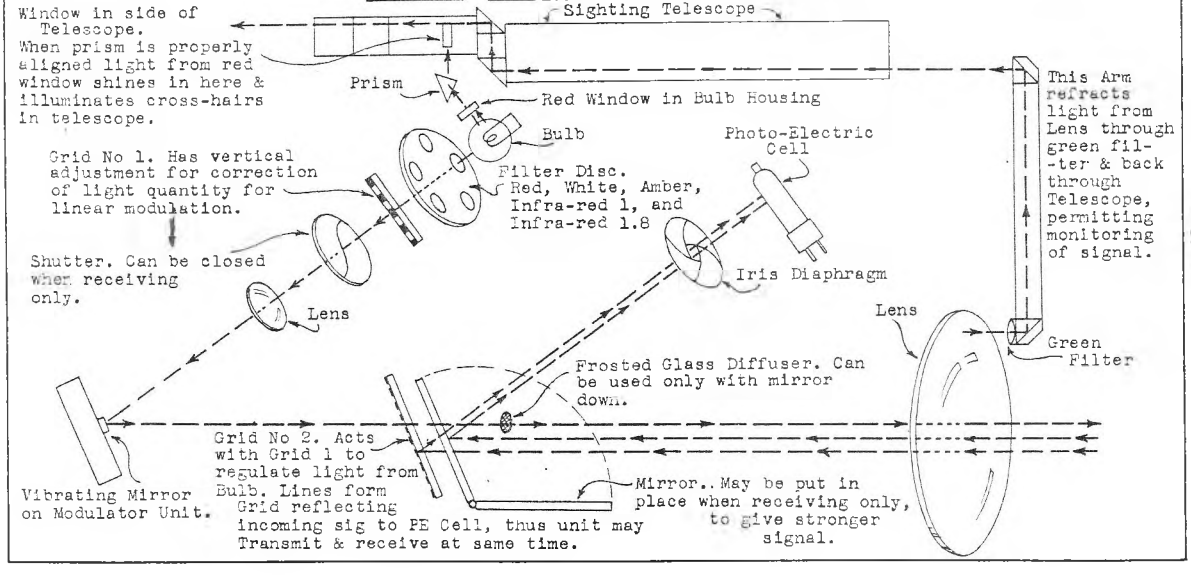
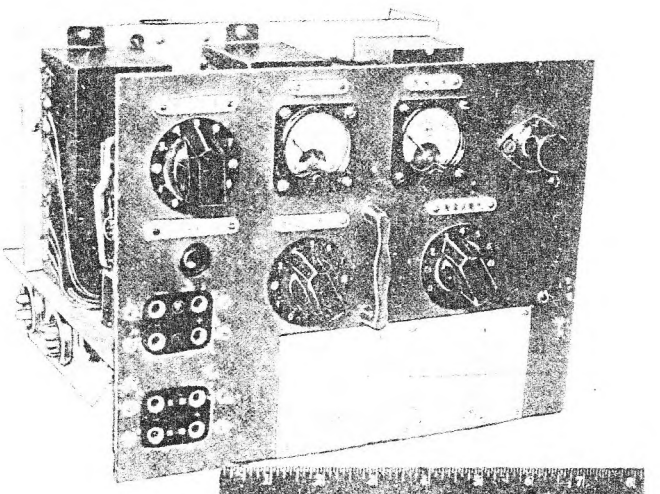


FIG 22 LAMP UNIT Photo-electric Cell Assembly.

LIGHT BEAM TELEPHONE

FIG 23 LAMP UNIT Sketch of Optical Path.





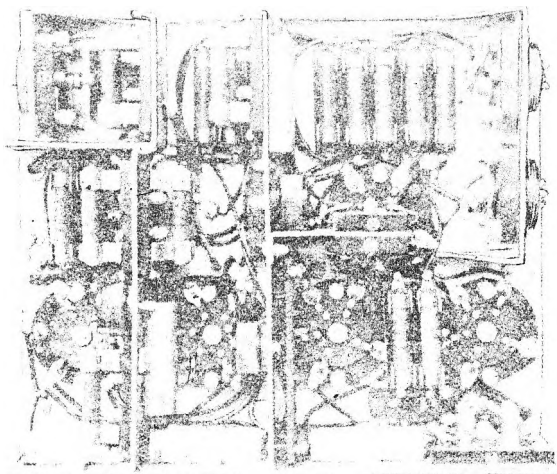
LIGHT BEAM
TELEPHONE

FIG 24

Amplifier Chassis,
Front View.

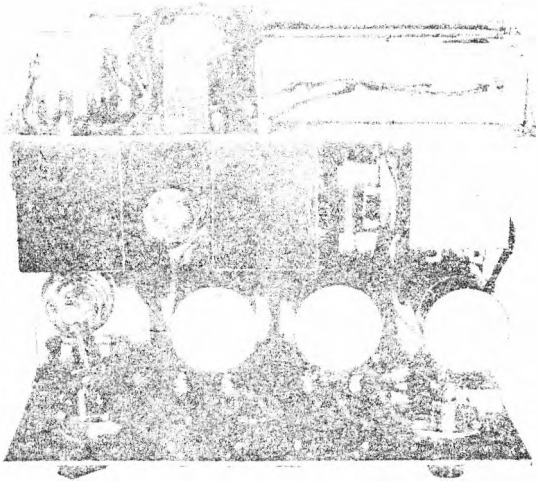
LIGHT BEAM TELEPHONE

FIG 25 Amplifier Chassis
Bottom View.



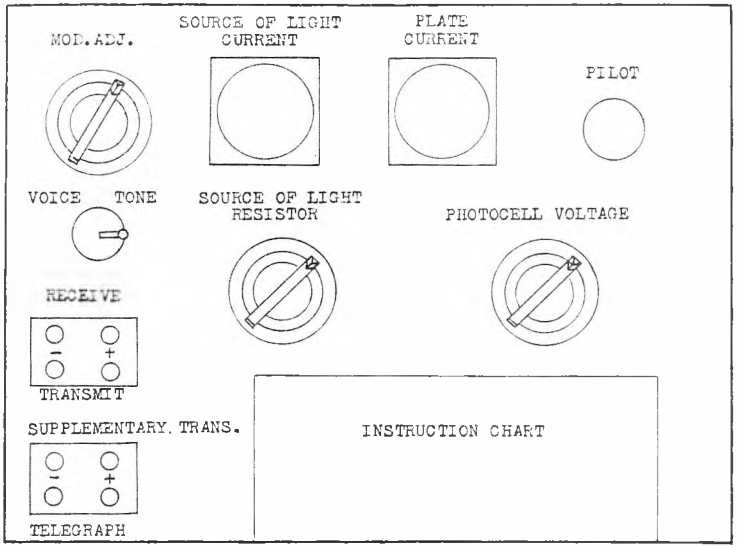
LIGHT BEAM TELEPHONE

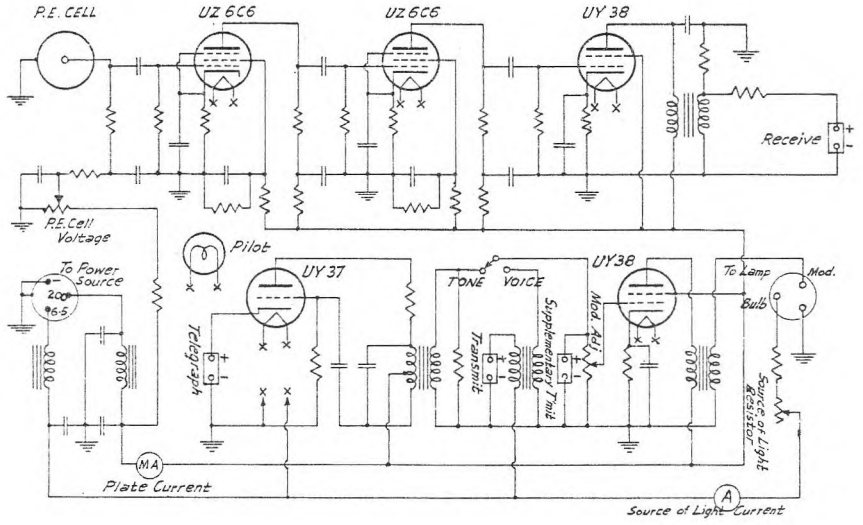
FIG 26 Amplifier Chassis
Top View.



LIGHT BEAM TELEPHONE

FIG 27 AMPLIFIER UNIT.
Translation of Panel Markings.





LIGHT BEAM TELEPHONE

FIG 28

AMPLIFIER UNIT

Circuit Diagram.

LIGHT ANTI GAS TROUSERS

1. GENERAL.

This clothing was recovered in New Guinea and is believed to be part of a Type 96 complete Protective Equipment.

2. DESCRIPTION (figs 1 & 2)

The trousers are made of two main pieces of light rubberised fabric. A seam runs up the inside of each leg to the crutch, while from the crutch one seam continues up the front and the other up the back of the trousers to the waist. A pocket made of lighter material is 16.5 cms wide and 19 cms deep and is located on the right hand side of the garment. The pocket is stitched to the main fabric, the stitching being sealed with a length of tape 1 cm wide cut from the same material as the pocket.

At the waist, the material of the trousers has been turned in to form a hem 1.5 cms deep sealed with this tape. There is a hem on each cuff 1 cm deep, sealed in the same manner.

The trousers are secured around the waist by a length of rubberised herringbone weave cloth tape, 2 cms wide and 141 cms long. The centre of the tape is stitched to a pad of rubberised fabric stuck to the main fabric with rubber solution and situated at the middle of the back, 5 cms below the waist.

The waist band passes through six loops of the same material, 5 cms long and 2 cms wide. These are stitched to the rubberised fabric pads stuck to the main fabric of the garment and placed at regular intervals around the waist.

Two straps of the herringbone weave material are provided on each leg for drawing the trousers tightly around the legs. One strap is at the ankle the other just below the knee on each leg. The ankle straps are 65 and 67 cms long respectively and are stitched to rubberised fabric pads, 3 cms by 5 cms stuck across the seam on the inside of each leg about 6 cms from the cuff. The straps below the knees are stitched to corresponding pads 32 cms from the cuffs. Both sets of straps are tied on the outside of the legs. The trousers have been reinforced around the crutch and the knees by three pieces of thin rubber stuck to the main fabric.

The main fabric consists of two layers of silk rubberised on both sides with a layer of cellophane between them. There is no indication of a casein layer. The weight of the fabric is 0.082 lbs/sq ft (0.040 gms/sq cm) and its bursting strength as determined by a machine based on the Mullens Principle is 120 lbs/sq in. The material used for the pocket

and seams consists of one layer of silk rubberised on both sides.

The main weights and dimensions are as follows :-

Total weight	750 gms
Overall length	110 cms
Crutch length	72 cms
Circumference at waist	125 cms
Circumference at cuffs	53 cms

A high resistance to penetration by liquid mustard was observed.

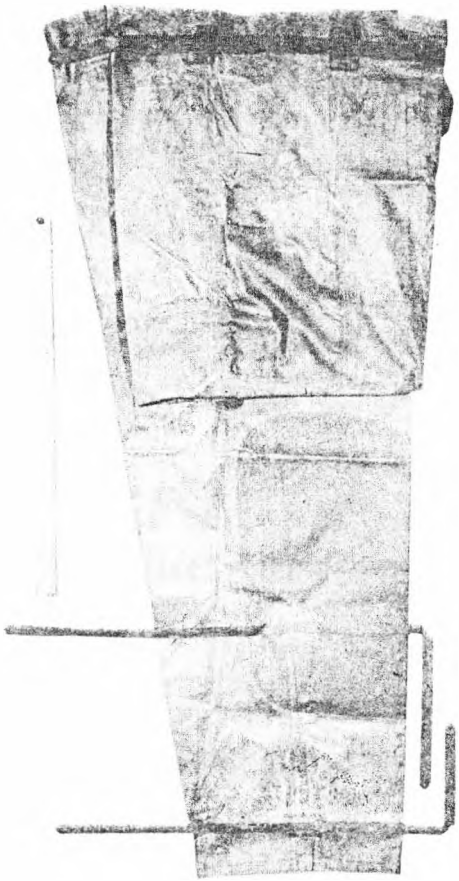
Source - 2/1 Aust Cw. Lab. RAE

LIGHT ANTI GAS TROUSERS

FIG 1

LIGHT ANTI GAS TROUSERS

FIG 2



LIGHT ANTI GAS JACKET

1. GENERAL.

This garment consists of a hooded jacket and it is thought that it may be part Type 96 complete Protective Equipment - The specimen examined was recovered in New Guinea.

2. DESCRIPTION (Fig 1)

The material consists of light rubberised fabric. The garment weighs 812 gms and is 110 cms long. It is made with a hood which completely covers the head, leaving a triangular opening for the face. The sides of this triangle are approximately 15 cms, 13 cms and 13 cms.

(a) Jacket. Five pieces of fabric are used in the construction of the jacket, excluding the material used for covering the seams and for reinforcement. The five pieces comprise the back and front of the garment, the two sleeves and the pocket. A seam runs from either side of the waist to the top of the hood. Pieces removed from the front and back parts, allow the shaping of the hood, so that three seams meet at one point at the crown of the head.

The circumference at the waist is 126 cms. A waist band of herringbone weave cloth covered with rubber 2 cms wide and 140 cms long, is stitched to a rubberised fabric pad situated on the back of the jacket about 22 cms above the lower extremity of the garment. The material has been turned in at the waist to form a hem 2 cms deep which is sealed by a length of light rubberised fabric tape 1 cm wide.

A strip of the same material as the jacket, 4 cms wide runs around the periphery of the opening for the face as a reinforcement. It is attached to the inner surface of the garment with rubber solution, the two edges of the strip being sealed with the light rubberised fabric tape.

(b) Pocket. A pocket, 17 cms by 18 cms, made of lighter rubberised fabric than the main material of the garment, is sewn to the left hand side of the jacket. The stitching is covered by light rubberised fabric tape 1 cm wide.

(c) Sleeves. The sleeves are about 60 cms in length, the circumference at the cuffs being 34 cms. Provision has been made for tightening the cuffs around the wrists by a tape, 2 cms wide and 42 cms long, on each sleeve, made of the same material as the waist band. One end of each tape is joined to

a painted brass buckle and stitched to a small rubberised fabric pad. The other end passes round the arm through a loop, of the same material as the tape, stitched to a rubberised fabric pad and back to the buckle. These tapes are situated 4 cms from the extremity of each sleeve. There is a hem 2 cms deep on each sleeve sealed in the same way as the hem at the waist.

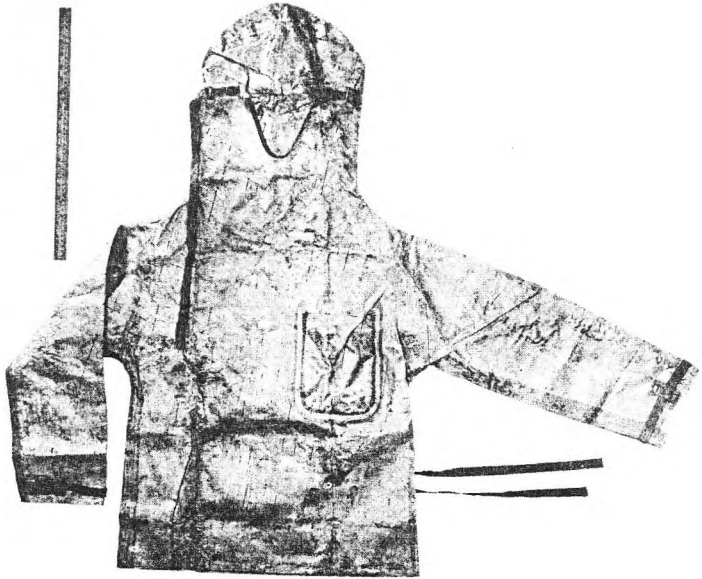
(d) Hood. On each side of the portion of the hood which fits over the forehead is stitched a rubberised fabric pad which is reinforced on the inside by a similar pad. Each pad is fitted with a female portion of a press stud. The forehead portion of the hood is shaped to form a flap and the two female portions of the press studs engage with corresponding male portions set in the fabric below them when the flap is turned down. The male portions are held in small circular rubberised fabric backings on the inner surface of the jacket. The hood is readily adjusted with the press studs undone and once adjusted the press studs can be done up to ensure a snug fit around the face or respirator facepiece.

One of the pads on the forehead is also fitted with a painted brass loop to which is stitched a length of the rubberised herringbone weave cloth tape about 53 cms long, which is adjusted around the back of the head and secured to a painted brass buckle sewn to a short length of tape, stitched to the second pad on the forehead.

(e) Details of fabric. The main fabric of the jacket consists of two layers of silk rubberised on both sides with a layer of cellophane between them. There is no indication of a casein layer. The weight of the fabric is 0.082 lbs/sq ft (0.040 gms/sq cm) and its bursting strength, as determined by a machine based on the Mullens principle, is 100 lbs/sq in. In the jacket examined, considerable deterioration of the fabric marked by the separation of the layers of the fabric giving it a blistered appearance, was evident. Resistance to penetration by mustard liquid was greater than 24 hrs, even on parts of the fabric that had apparently undergone some deterioration. Resistance to Lewisite liquid was of the same order, although the Lewisite appears to have a deteriorous action on the surface of the fabric with which it is in contact. Immersion of samples of the fabric in water at 100°C for 1 hour has no appreciable effect on the resistance to penetration by mustard liquid. The fabric used for the pocket and for the tape covering the seams and hems consists of one layer of silk rubberised on both sides.

(f) Markings. On the inside of the jacket are printed the Japanese characters for "Tokyo (KO) 1938" and what were apparently inspection marks.

(SOURCE - 2/1 Aust CW Lab - RAE)



LIGHT
ANTI GAS
JACKET

FIG 1

OZ MODEL AA CALCULATING MACHINE

1. GENERAL.

This instrument is used with Type 88 75 mm Mobile AA Gun - It was manufactured in March 1943 by The Optical Industry of Japan Pty Ltd.

2. DESCRIPTION (Figs 1 - 15)

The predictor is mounted on an adjustable tripod in the centre of a four wheeled trailer 12 ft 6 ins long 6 ft wide and 7 ft 9 ins wheel base - The trailer is 5 ft 6 ins high and has two side panels 4 ft 10 ins long by 2 ft 6 ins which are lowered in line with the floor when in action. Four jacks on the trailer are used for levelling the whole equipment. The predictor was not in operating condition when received and consequently its characteristics could not be determined.

The machine is built in a series of layers, the main electrical layout being on the top - Access to five test points is obtained by means of a removable plate mounted on the top cover. Three transmitters are provided for elevation, fuse and direction and are located in different layers in the machine.

Access is provided for all electrical contact rings and points by means of removable plates set into the outside panels of the machine. Stops are provided on electrical slider movement, these stops being similar to those used by Vickers. Illumination of all dials and pointers is by means of luminous paint, only two globes being provided for illumination of the telescopes.

All gears, spindles, taper pins and dowels appear to be manufactured from mild steel. Great use has been made of ball races probably in an endeavour to avoid the use of manganese bronze or gunmetal.

All castings appear to be aluminium alloy. The telescope shaft is supported at each end by ball races mounted in brackets. All windows are of shatterproof glass set in rubber.

The timing of the constant speed motor is made possible by a mirror swinging across a window in the panel. The winding handle for the constant speed motor is detachable. All slider movements are obtained by means of rollers running in "Vee" shaped grooves and the majority of the pointers are spring loaded. All panels and covers are fitted with gaskets. Correction adjustment knobs are of the push in and turn type. Height adjustment between the different layers in the machine has been obtained by the use of shims.

3. CHARACTERISTICS.

(a) Predictor Details

Height 22" Width 21" Length 23"	
Stand 39" high	
Angle of Sight	- 10° to +90°
Present Bearing	No Limit
Height	5,000 metres
Time of Flight	0 to 30 seconds
Gun Bearing	No Limit
Quadrant Elevation	0° to + 90°
Gun Fuze	0 to 40 numbers
Muzzle Velocity	Unknown
Wind Direction	Unlimited
Wind Velocity	Unknown
Present Bearing	0 to 6400 mils.
Gun Bearing	0 to 6400 mils.
Course	0 to 6400 mils.
Fine (Left and Right)	0 to 100
Present Elevation	-10° to +90°
Course	-10° to +90° Graduated in 10°
Fine	0° to 10° Graduated in degs
Ratio	36 to 1
Quadrant Elevation	0° to 90°
Course	0° to 90° Graduated in 10°
Fine	0° to 10° Graduated in degs
Ratio	36 to 1
Gun Fuze	Graduated every .1 of number
	VERNIER CORRECTION

(b) Dial Engravings.

Vertical Speed Dial	100 Graduations, no numerals
Horizontal Speed Dial	100 Graduations, no numerals
Altitude Adjustment Knob	50 metres, increase and decrease numerals in stages of 10.
Height Measurement Matching	0 to 100, numerals in stages of 5.
Dial Lower Trajectory Fire	0 to 80, increase and decrease numerals in stages of 20.
Elevation Dial	-10° to + 90°
Constant Speed Motor, Timing Plate and Indicator	84 R.P.M.
Horizontal Speed Dial	0 to 150 Left and Right metres per sec.
Vertical Speed Dial	0 to 150 Left and Right, metres per sec.
Altitude Vernier Correction	Slow -5 to +5, Fast -8 to +8
Height Matching Dial Outer	-10° to +90°
Height Matching Dial Inner	0° to 10° Fine
Angle of Elevation Matching Dial	0° to 90°

Angle of Elevation Dial Outer	0° to 90°
Angle of Elevation Dial Inner	0° to 10° Fine
Future Matching Dial Vert	Zero marking only
Future Matching Dial Lat	Zero marking only
Direction Adjustment	0 to 50 mils, increase and decrease.
Fuze Graduation	0 to 6 seconds, increase and decrease.
Elevation Adjustment	0 to 50 mils, increase and decrease.
Future Distance Adjustment Dial	0 to 5000 metres
Future Direction Adjustment Dial	-8 to +8 metres
Time of Flight Dial	0 to 30 seconds
Fuze Dial	0 to 40 numbers
Direction Matching Dial Outer	0 to 64 mils
Direction Matching Dial Inner	0 to 100 mils

All handwheels rotated clockwise to increase indicated quantities.

(c) Power Supply

(i) Generator

Output	110.V.
Voltage AC	110.V.
Voltage DC	60/90.V.
R.P.M.	3000
Frequency	50 cycles
D.C Current	2.2 amps
AC Current	1.23 amps
Phase	Single
Power Rate	0.18

(ii) Distributor

Volts	50
Amps	24

(iii) Synchronous Motors

Volts	34

4. REMARKS.

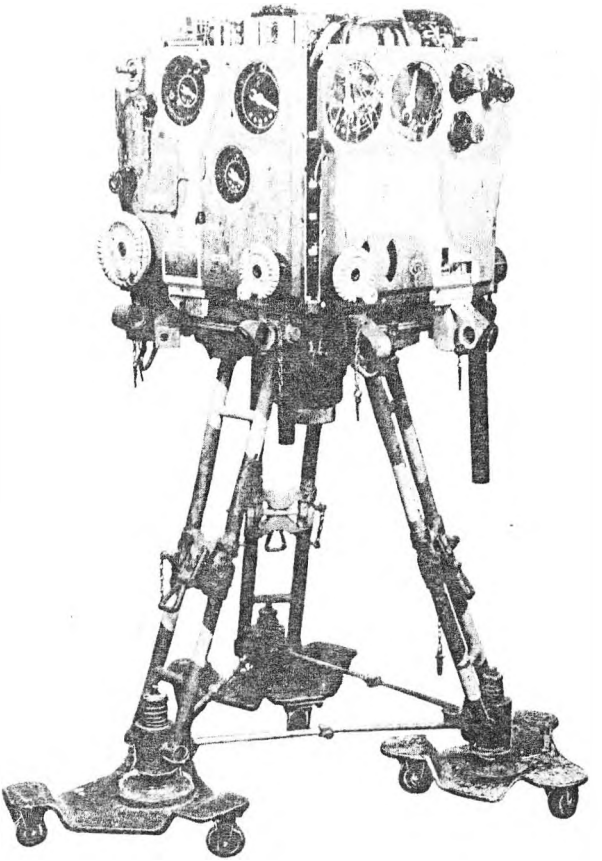
No provision is made for traversing the machine quickly and some time may be lost in initial setting. Owing to the inaccessability of all portions of the machine, with the exception of the electrical layout, it is considered that extreme difficulty would be encountered in servicing this machine in the field. It is also considered unlikely that this machine could be converted for use with different types of guns as the cams could not be changed without dismantling a major portion of the mechanism. Also dials connected with the cam mechanism are of composite type and would call for equipment beyond normal field requirements for a machine of this type.

(SOURCE - Ordnance Factory, Maribyrnong through MGO Branch).

OZ MODEL

AA CALCULATING MACHINE

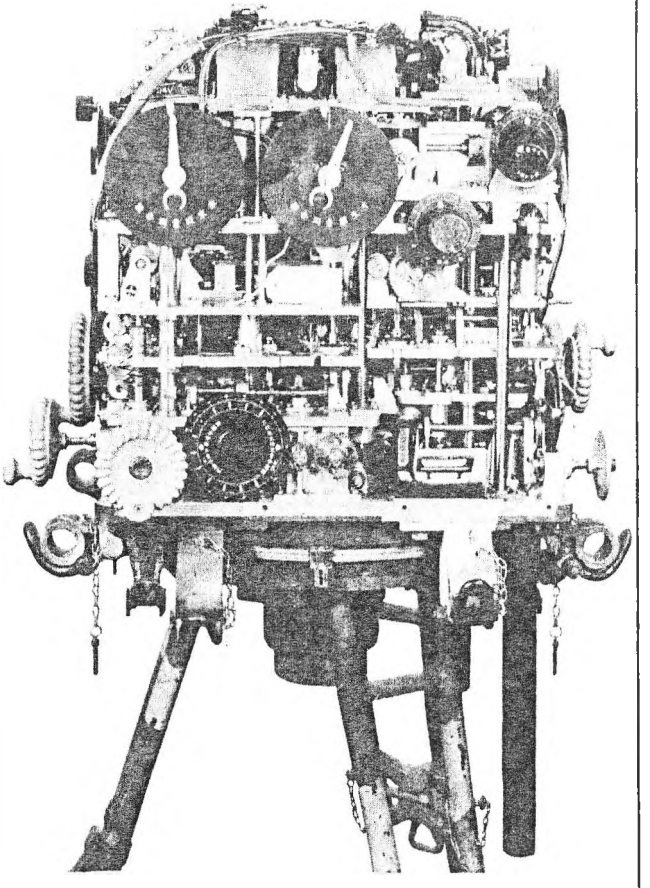
FIG 1 PREDICTOR AND STAND



OZ MODEL

AA CALCULATING MACHINE

FIG 2 FRONT VIEW.



OZ MODEL

AA CALCULATING MACHINE

FIG 3

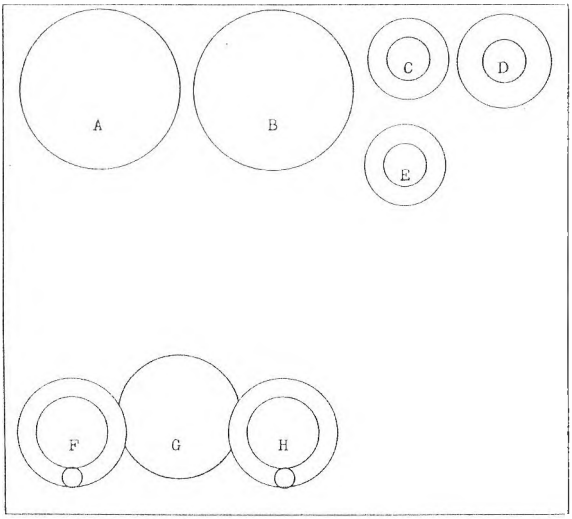


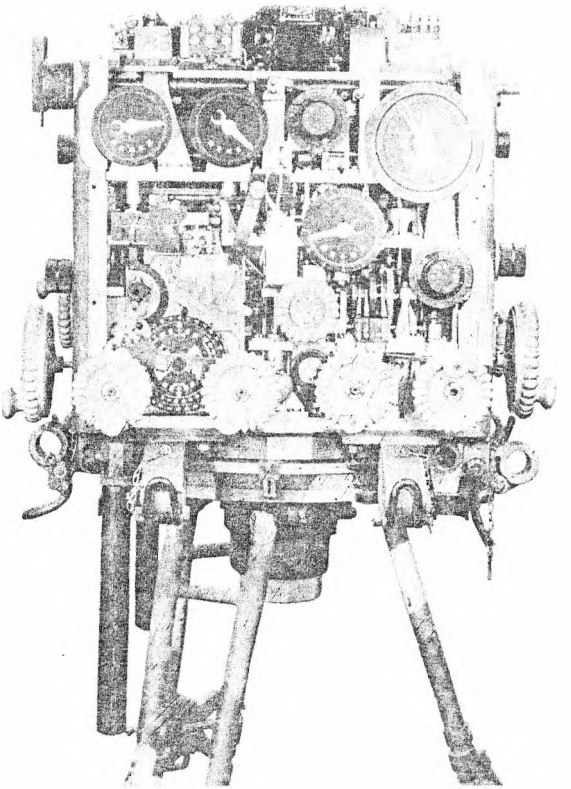
CHART OF FRONT
(See Fig 2)

(A) Future Matching Dial - Vertical.
(B) Future Matching Dial - Lateral.
(C) Direction Adjustment - Diminish, Increase, Mils, - Push in and Turn.
(D) Fuse Graduation Adjustment - Seconds - Push in and Turn.
(E) Elevation Adjustment - Mils - Push in and Turn.
(F) Handwheel.
(G) Future Distance Adjustment Dial - Metres.
(H) Handwheel.

OZ MODEL

AA CALCULATING MACHINE

FIG 4 REAR VIEW.



OZ MODEL
AA CALCULATING MACHINE

FIG 5

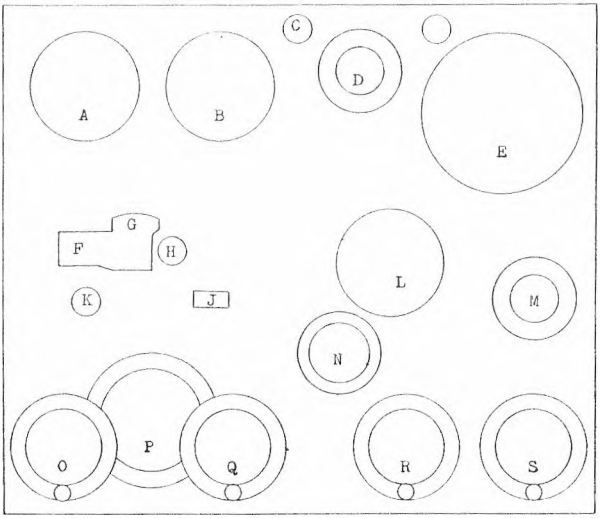


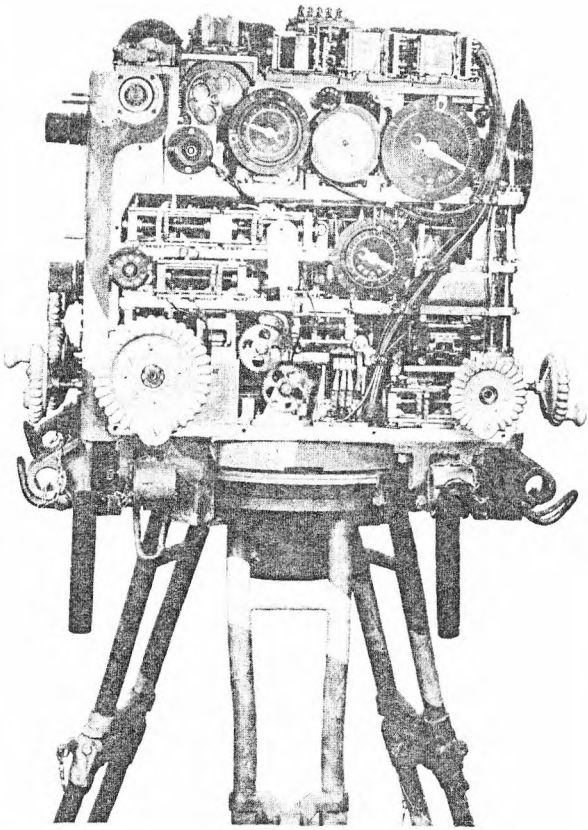
CHART OF REAR SIDE
(See Fig 4)

(A) Vertical Speed Measurement Dial.
(B) Lateral Speed Measurement Dial.
(C) Altitude Adjustment - Push in and Turn - 50 Metres.
(D) Height Measurement Matching Dial.
(E) Low Trajectory Fire.
(F) Rewind Indicator - Wind - Stop.
(G) Clock Timing - Slow 5 - 0 - 5 Fast.
(H) Regulating Knob for Clockwork Motor.
(J) Nameplate Clock Motor - 84 Revs per Min.
(K) Winding Handle for Clock Motor.
(L) Elevation Dial - Graduated in Degrees.
(M) Adjustment of Difference Elevation - Push and Turn.
(N) Handwheel.
(O) Handwheel - Vertical Speed - Increase - Decrease.
(P) Horizontal Speed Dial - Vertical Speed Dial - Metres per Second.
(Q) Handwheel - Horizontal Speed - Increase - Decrease.
(R) Handwheel - Ground Range - Increase - Decrease.
(S) Handwheel - Height - Increase - Decrease.

OZ MODEL

AA CALCULATING MACHINE

FIG 6 RIGHT HAND SIDE



OZ MODEL

AA CALCULATING MACHINE

FIG 7

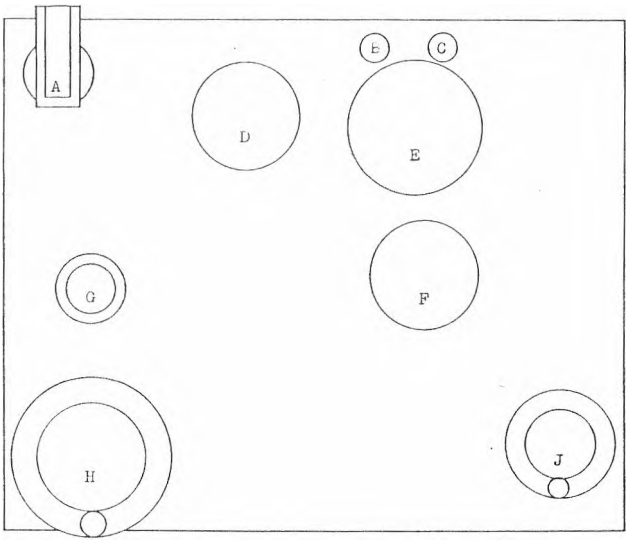


CHART OF RIGHT-HAND SIDE

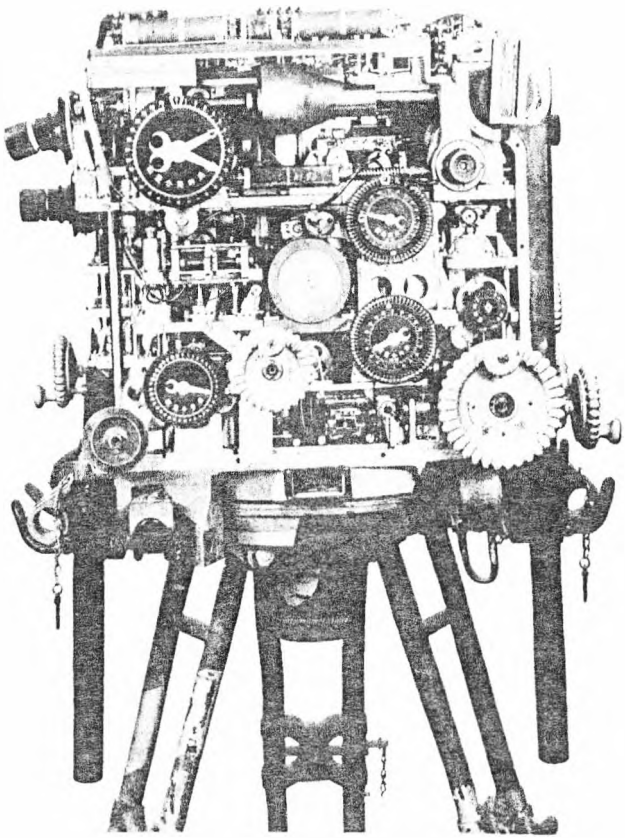
(See Fig 6)

(A) Telescope Flange.
(B) Altitude Vernier Adjustment.
(C) Elevation Correction - Push in and Turn.
(D) Height Matching Dial.
(E) Angle of Elevation Matching Dial.
(F) Angle of Elevation Dial.
(G) Height Speed - Change of Speed of Elevation - Pull out and Turn.
(H) Elevation Handwheel - Down - Up.
(J) Angle of Elevation Handwheel - Decrease - Increase.

OZ MODEL

AA CALCULATING MACHINE

FIG 8 LEFT HAND SIDE.



OZ MODEL
AA CALCULATING MACHINE

FIG 9

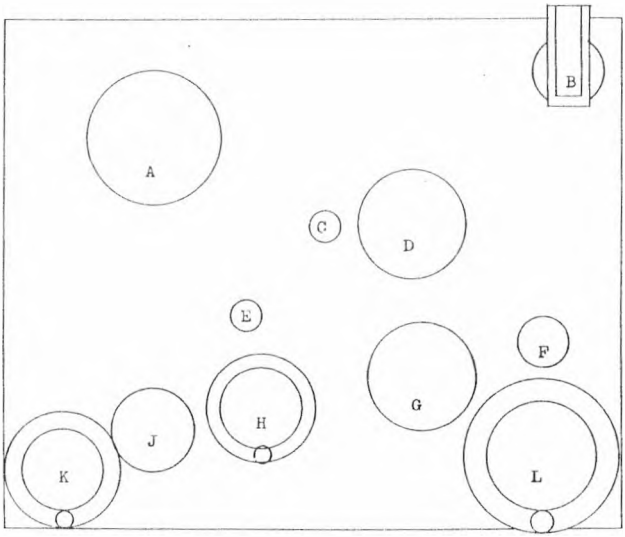
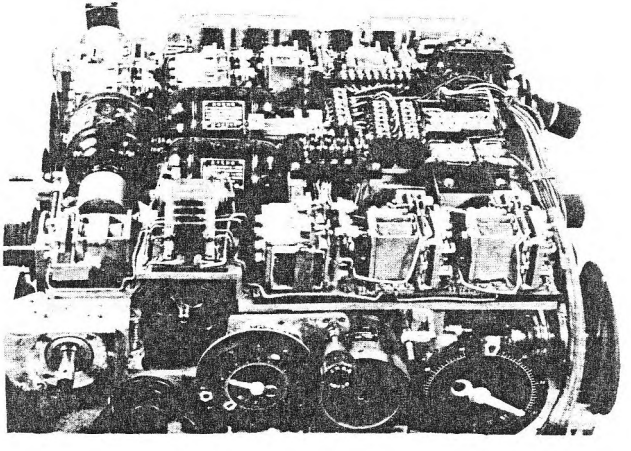


CHART OF LEFT HAND SIDE
(See Fig 8)

(A) Time of Flight Dial.
(B) Telescope Flange.
(C) Direction Vernier Adjustment - Direction Correction - Push and Turn.
(D) Direction Matching Dial - Mils.
(E) Fuse Measurement.
(F) Rate of Change of Direction.
(G) Direction Dial - Mils.
(H) Handwheel.
(J) Fuse Dial.
(K) Time of Flight - Increase - Decrease.
(L) Direction Left - Right.



OZ. MODEL

A A CALCULATING MACHINE

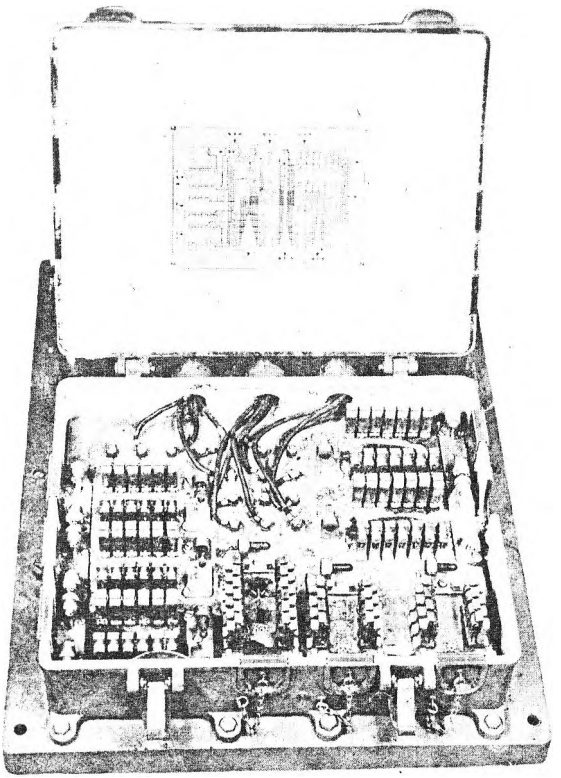
FIG 10

TOP VIEW.

OZ MODEL

AA CALCULATING MACHINE

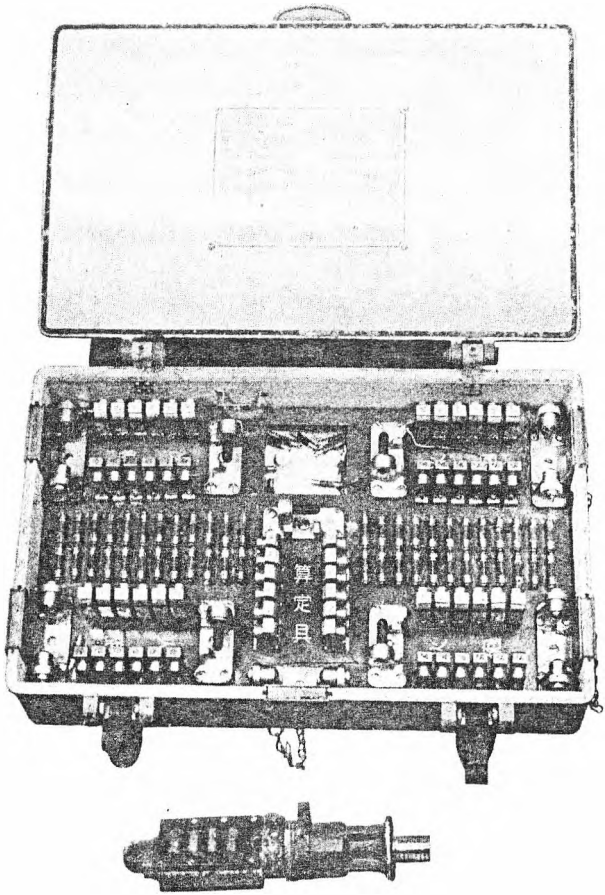
FIG 11 Junction Box.

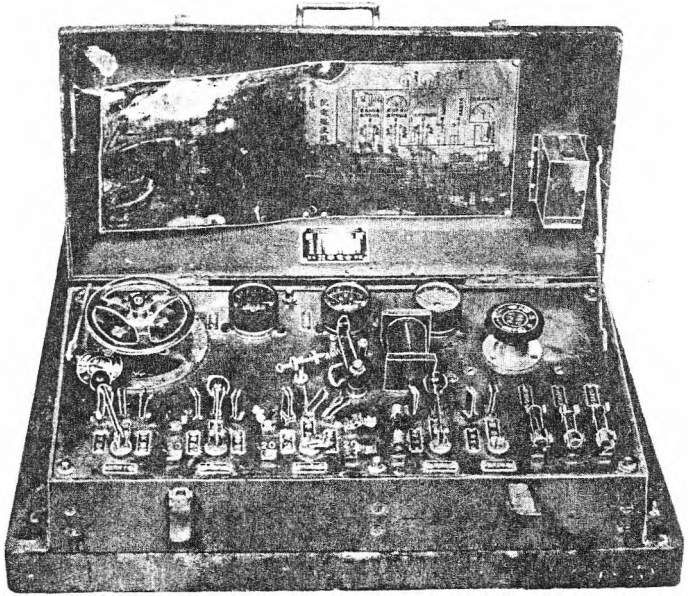


OZ MODEL

AA CALCULATING MACHINE

FIG 12 Junction Box.





OZ MODEL

AA CALCULATING MACHINE

FIG 13

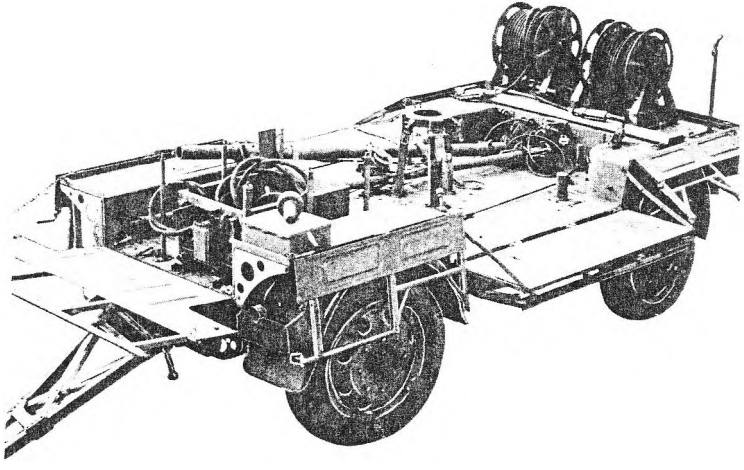
Control Panel.

OZ MODEL

AA CALCULATING MACHINE

FIG 14

Trailer.



OZ MODEL

AA CALCULATING MACHINE

FIG 15

Trailer with Top removed and Sides collapsed.

AA DIRECTOR MODEL 2

1. GENERAL

This instrument appears to be the latest model of mechanical directors manufactured by the Japanese and it is assumed that these receivers are for use with radar equipment.

2. DESCRIPTION (Figs 1 - 6)

The instrument has data receivers (selsyns) for azimuth, angle of site and slant range. The primary input data (azimuth, angle of site, slant range or altitude) may also be obtained by optical tracking by means of telescopes attached to the director and a height finder. Computation is based on angular rates. The transmitted data is future azimuth, quadrant elevation and fuse. The data is transmitted to each weapon by means of selsyn motors and applied to the weapon by means of a match-pointer system in a manner similar to the method used with the American 90 mm M1 AA fire control equipment. Three gun-director couplings located in the base of the shipping crate indicates that this director is capable of furnishing data for three weapons.

3. Characteristics:

Height	41½ ins
Length	34½ ins
Date of Manufacture	1943

Limits as indicated by drums and dials are as follows:-

Slant range (dial calibration)	40,000 metres
Slant range (limit of movement w/alt. converter)	19,000 metres
Horizontal range	12,500 metres
Altitude	9,000 metres
Quadrant elevation	Minus 10° to plus 90°
Fuse	35 seconds
Dead fuse time	10 seconds
Wind velocity	20 metres/sec.
Azimuth	no limit
Angular rate	undetermined
Electrical data	
Volts	50 or 60
Cycles	50 or 60
Weapon with which used	120 mm., 45 cals. AA gun and 80 mm., 40 cals. AA gun.

Weapon data obtained from drums is set out hereunder:-

The super elevation drum and time of flight drum list the following data for the 120 mm 40 calibres, AA gun -

Fuse types	M 88 (1928),M89 (1929) M 91 (1931)
Muzzle velocity	825 metres/second

The fuse correction drum lists the following data for the 80 mm 40 calibres, AA gun -

Fuse types	M 89 (1929),5th Year type (1930)
Muzzle velocity	670 metres/second

An indicator on the right side of the director located immediately to the right of the main azimuth dial indicates the number of complete turns made with the director while tracking. This indicator which is graduated for three complete turns right and left, the slip ring electric couplings on the base of the director, the lack of azimuth stops in the director, and the type of junction box on the weapon indicate that the weapons are limited to a 3 x 360° traverse in either direction.

4. OPERATION

(a) Converting slant range, to altitude: Operation of the Eo handwheel causes the drum of the altitude converter to be rotated through an angle equal to the angle of site. Operation of the slant range knob causes a pointer to be translated along the axis of the altitude drum. The altitude curve in agreement with the pointer represents present altitude.

(b) Super elevation and present quadrant elevation: The super elevation drum is rotated through an angle equal to Eo by the Eo handwheel. The operator of the super-elevation pointer follows the ordered altitude curve by translating a pointer along the axis of the super-elevation drum.

The results of this operation are mechanically combined with Eo through a differential and transmitted mechanically to the Q.E. selsyn transmitter. The combined results of the movement of the Eo mechanism and super-elevation mechanism is also indicated on the Q.E. dial.

(c) Rate: Both the Eo and Ao handwheels are connected to a disc of a variable speed drive; one for Eo and one for Ao. Since both mechanisms operate in the same manner only the Eo multiplier will be discussed in detail.
Operation of the Eo handwheel causes the disc of a variable speed drive to be rotated and the ball carriage to be translated across the face of the disc so that the speed of the out-put shaft is proportional to the angular rate. The rotational speed of the out-put shaft is shown by the indicator of the small Eo rate dial located in the rear of the instrument. The movement of the Eo rate indicator is balanced out by turning the handwheel below the rate dial. Operation of this handwheel causes the ball carriage of a second variable speed drive to be moved by means of a lever arm across the face of a constant speed disc. The output of this second variable speed drive is combined through a differential to cancel the output

of the variable speed drive driven by the Eo mechanism and cause the indicator to remain stationary.
The amount of movement necessary to balance the Eo mechanism rate is mechanically combined through a differential with Eo and super-elevation and transferred to the QE selsyn. The amount of movement imparted to the Eo rate handwheel is indicated by the large dial on the lower-right of the Eo rate handwheel.

Note: Due to backlash in the gear train and improper action of the multiplier it was not possible to determine the maximum angular rate capable of being computed by the instrument.

(d) Time of flight: Time of flight is introduced into the instrument by following the ordered altitude curve on the time of flight drum. The drum is rotated by the Eo mechanism and the pointer is moved parallel to the axis of the drum by turning the handwheel located below the drum.
The results of this movement are transmitted mechanically to the multipliers where it lengthens or shortens the arm of the ball carriage operated by the angular rate handwheel. It is by this method, (using time as a function of range, and angular rate as the second factor, that future data is computed.
In addition to the foregoing use the results of turning the handwheel is transferred through a differential to the fuse selsyn transmitter.
The fuse dial indicator is also positioned by the time of flight handwheel.

(e) Dead fuse time: Dead fuse time is introduced into the instrument by turning the fuse spot knob in the front of the instrument. The results of this operation are added to the fuse transmitter and fuse dial. Operation of this knob also positions the contact of an electrical transmitter but the final disposition has not been determined.

(f) Fuse Correction: The fuse correction drum is rotated by the Eo mechanism. The exact meaning of curves drawn on this drum is unknown but following the curve with the translating index causes an additional movement of the same mechanism operated by the fuse spot.

(g) Wind: Rotation of the wind-rate knob slides a positioning pin from the centre of the wind-direction gear. Turning the wind direction knob causes the now eccentrically located pin to move two sets of slides connected to the range wind mechanism and the cross wind mechanism. The positions of these slides determines the amount of correction that will be added to the Ao and super-elevation mechanisms when the index of each correction dial is placed in agreement with the ordered altitude curve.
The cross wind and range wind dials are rotated by the Eo mechanism. Positioning the cross wind indicator causes a direct correction to be made to the azimuth transmitter.
Positioning the range-wind indicator causes the super-elevation drum to be raised and thus causes the super-elevation operator to introduce the correction into the QE transmitter by changing the position of the drum.

(h) Spot corrections: These are made as straight angle additions or subtraction. The results of moving these mechanisms are transmitted to the Ao or QE selsyn transmitter.

(i) Constant Speed Motor: The constant speed motor is located in the top of the instrument. A knob, located to the lower left of the motor speed indicator, is connected to the mechanical governor of the motor in a manner to provide manual setting of the spring tension of the centrifugal weights provided to control the motor speed.

5. AZIMUTH RECEIVER

It is not known from what calibre weapon the azimuth receiver was taken, but it is assumed it will work with both the 8 cm and 12 cm AA guns. The two selsyn units are connected to the main receiver gear and position the large pointer for the fine scale and the small pointer for the coarse scale. The white pointers are the match-pointers.

6. JUNCTION BOX

This unit is equipped with three receptacles and six trunk-cable leads. It is assumed that three of these trunk leads are input and the remaining three are output, one each for azimuth, angle of site, and fuse.

7. SWITCH BOX

This is a simple single throw, five pole switch placed between the data receiver and junction box and furnishes a means of opening the circuit of any one unit without affecting the others.

8. REMARKS

The subject director and associated instruments appear to be of the latest Japanese design as evidenced by the model number of the director and "modern" selsyn units. The director is considered deficient in both design and construction for the following reasons:

(a) An angular rate computor is generally considered too inaccurate for anything other than small or medium calibre automatic, tracer controlled anti-aircraft fire.

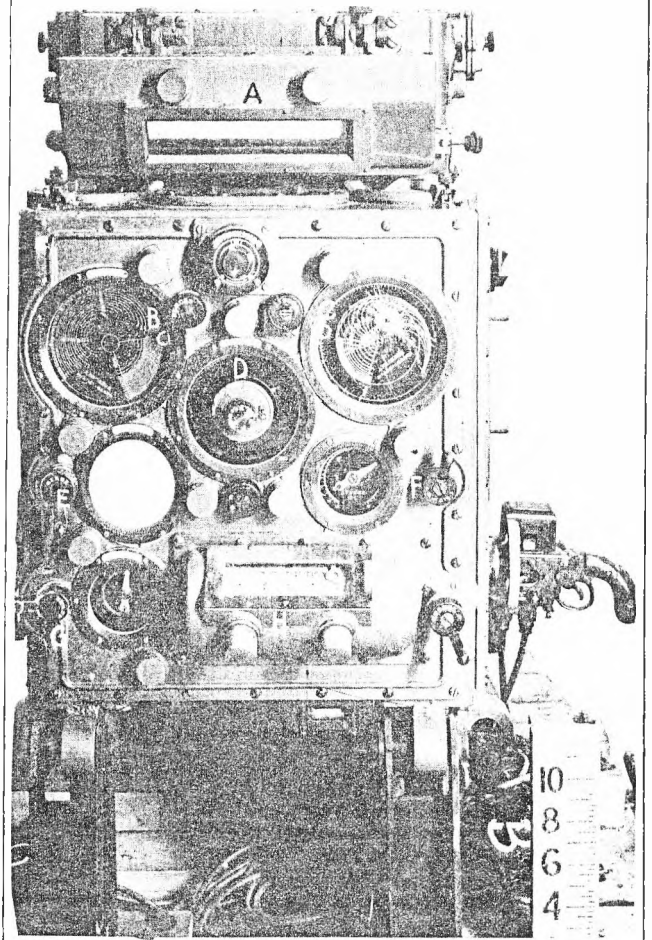
(b) The method, i.e. curve following, of introducing time of flight, super-elevation, and converting slant-range into altitude will permit a relatively large human error to be introduced.

(c) The back-lash existing in various gear trains and the mechanical linkage of the multipliers is considerable and will cause a large error.

(SOURCE:- ABERDEEN PROVING GROUND, MARYLAND)

A A DIRECTOR MODEL 2

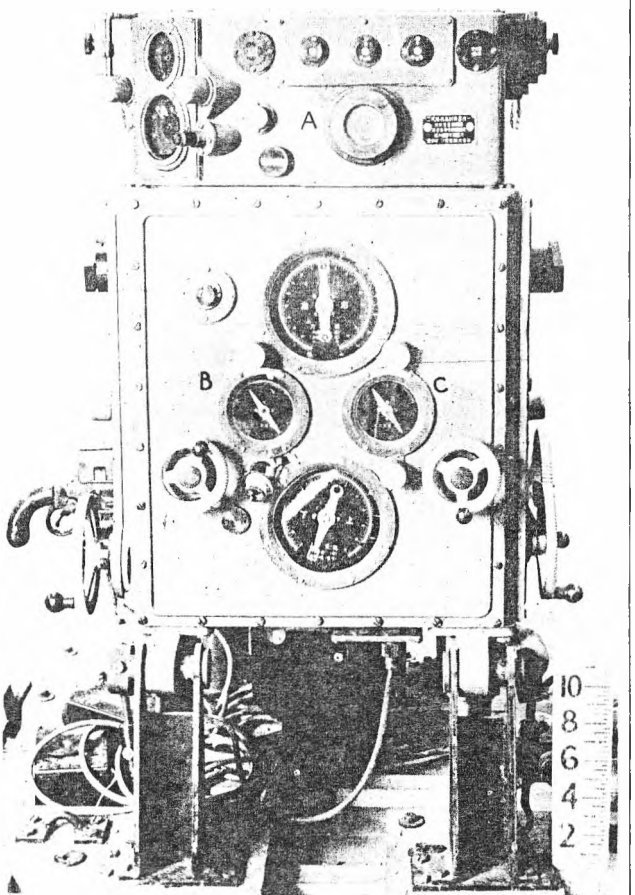
FIG 1 FRONT VIEW.



(A) Altitude Converter. (B) Cross Wind.
(C) Range Wind. (D) Wind Direction and Speed.
(E) A. Spot. (F) E. Spot. (G) Fuse Spot.
(H) Fuse Correction Drum.

AA DIRECTOR MODEL 2

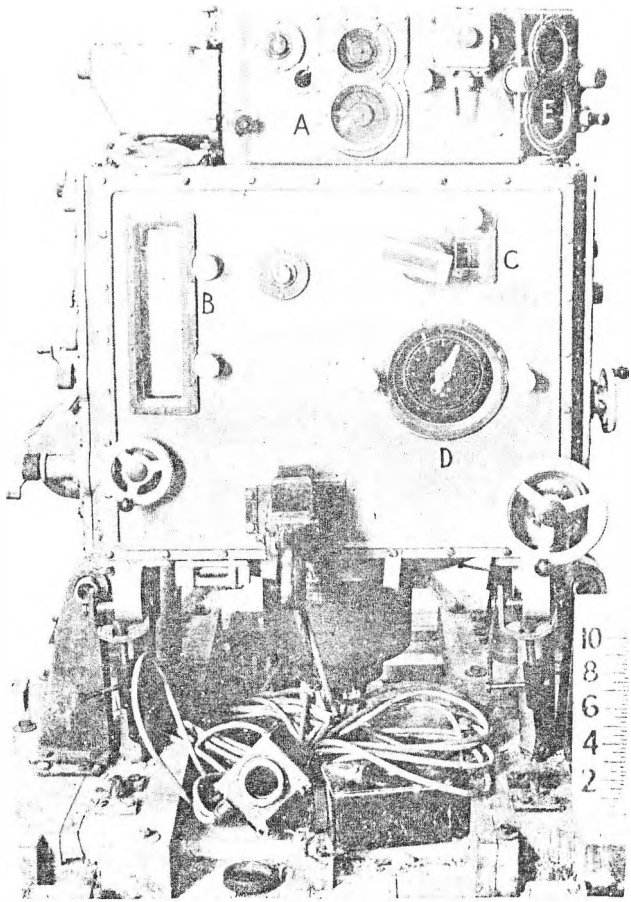
FIG 2 REAR VIEW.



(A) C.S. Motor Rate Indicator. (B) E. Rate.
(C) A. Rate.

AA DIRECTOR MODEL 2

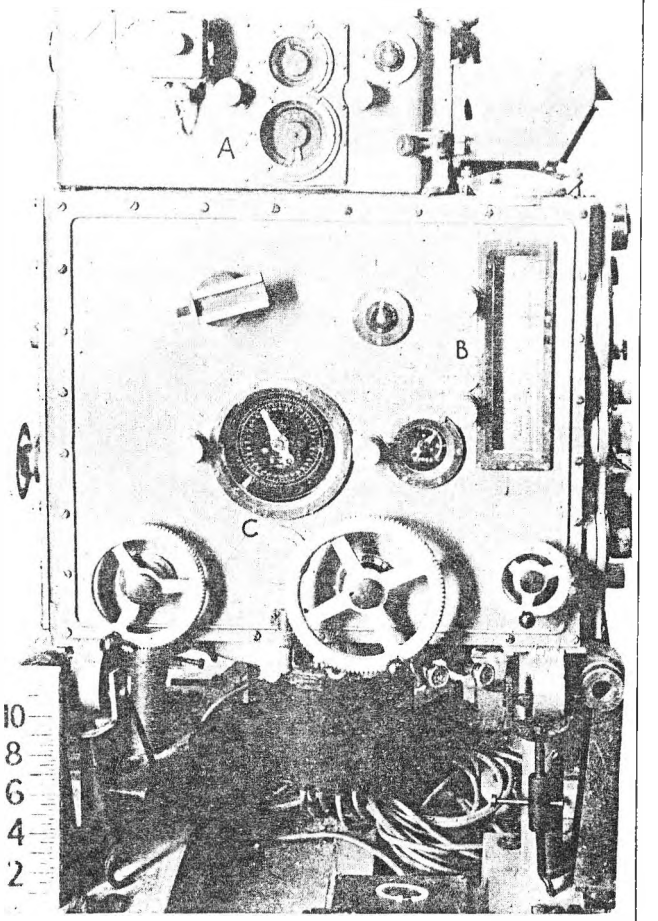
FIG 3 LEFT HAND SIDE.



(A) E. Receiver. (B) Super Elevation.
(C) Angle of Site (E). (D) Quadrant Elevation.
(E) Slant Range Receiver.

AA DIRECTOR MODEL 2

FIG 4 RIGHT HAND SIDE



(A) Azimuth Receiver. (B) Time of Flight.
(C) Azimuth.

AA DIRECTOR MODEL 2

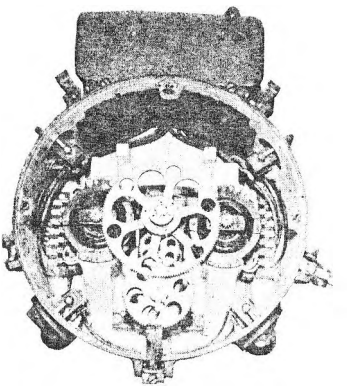


FIG 5 Receiver Azimuth. Glass Window Removed.

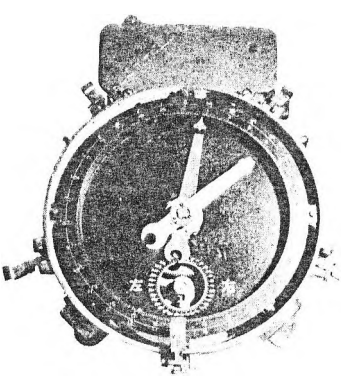


FIG 6 Receiver Azimuth. Cover and Dials Removed.

ISHII TYPE
SECTION USE WATER FILTER

1. GENERAL

This item of equipment was recovered from a Japanese hospital in NEW GUINEA. It is apparently intended to be carried for use by a section or equivalent unit. Data obtained by trial indicates that, at a moderate pumping rate and using clean water, the performance was approximately eight times that of the Ishii type Individual Water Filter; namely 8 litres (1.76 gals) and 1 litre (0.22 gals) per minute respectively. It is understood that larger models functioning on similar principles are in use by Japanese forces.

2. DESCRIPTION (Figs 1 - 6)

The outfit consists of a cylindrical filter unit with an accompanying hand pump and two hoses. It is clamped on to a rimmed and beaded bed plate of press construction. A removable case, that fits on to the bed plate to house the outfit, has a clamp at either end and two brackets for fastening straps on either side. Adjacent carrying handles are provided on the bed plate and case. All parts are painted olive green except the plates, hoses and white painted internal surface of the case. The metal components are of various aluminium alloys except the pressure gauge and brass elbow and four steel washers on studs attached to the filter chamber.

(a) Pump: This is of the single acting force type and is connected to the filter tank by the high pressure connecting hose which leads from the top of the pump valve unit. The suction hose, which has a metal strainer attached at its inlet, is wire - bound to the lower connection of the valve unit. The latter contains two spherical balls that operate between machined seatings and wire guards. The cavity between the seatings extends into the base of the pump cylinder to which the valve unit is screwed. The piston with an attached wooden handle is a hollow cylinder, closed at inner end, of 2.9 cms diameter and almost the full length of the pump cylinder. Means of effecting a water seal is provided by packing and a screw gland at the top of the cylinder. A foot pedestal screws into the base of the cylinder.

(b) Hoses: The suction hose is 151 cms long and the length of high pressure connecting hose 56 cms. Each length is of the same construction namely a rubber tube 1.5 cms internal diameter and 1.9 cms external diameter contained within a spiral wire which is covered with a canvas material. Hose connections are wire-bound. Each end of the high pressure hose has a coupling of the cap and lining type. The filtered water hose was not received.

(c) Filter Chamber: This is a cylinder approximately 37 cms long and 11.6 cms diameter. To the delivery end is welded a slightly conical section with an eccentric spindle bearing with packing gland and gland nut. To the other end is welded a rim which has four hinged studs to attach the cover plate. It also has a rounded rim projecting from its end surface which, by embedding in a rubber gasket in the cover plate, seals the chamber. The cover plate is formed with a corresponding eccentric bearing fitted with packing, a gland and gland nut. It receives a cleaning shaft which is shanked with a square head. Seated below the plate and attached by two screws to the rim of the chamber is a cast support bracket which functions as a support for the screwed head of the spindle. On top of the filter chamber, which operates in a horizontal position are:-

(i) an inlet consisting of a hexagonal nipple screwed into the body of the chamber to receive the high pressure connecting hose, and

(ii) a screw thread in the body of the chamber to receive a 3 way elbow, to which is attached a pressure gauge and an air cock.

A connection similar to that in (i) is located on the bottom of the filter chamber for a drain cap. On assembly this corresponds with a hole in the bed plate.

(d) Pipe Clay Filter: This is in the form of a tube 33 cms long, 8.7 cms diameter and approximately 2 cms thick. Each end has a pressed metal cover flanged to fit the outside of the filter tube and having a central hole 3 cms in diameter flanged inwardly over a short internal sleeve; a raised beading is formed around the edge of the central hole to match the gaskets on the spindle. A riveted tube with 15 holes spaced throughout is assembled on and between the two sleeves.

(e) Wire Brush: This consists of a plate 34 cms long and 4.6 cms wide curved across its width. A central portion 2 cms by 28 cms is mounted with brass brush wire 0.13 mm in diameter (39 SWG) that projects 3 cms. One hole at each end of the plate provides a means of extracting the brush from the filter chamber in which it is held by four guides welded to the inside of the filter chamber.

(f) Spindle: Two rubber gaskets, one recessed in the screwed head of the spindle and another in a bearing flange towards the other end of the spindle, provide a means of sealing the filtered water from the unfiltered water. The spindle itself is formed as a perforated tube with its outlet as the filtered water hose connection. The spindle is formed with a square section near the outlet to receive the bearing. This connection is sealed by packing, compressed by a screw-threaded gland.

(g) Case: The case is of 15.4 litres (3.4 gall) capacity. According to a photographic reproduction on the label bearing instructions for use it may be used as a tank for the reception of filtered water.

(h) Weights of Components:

Filter chamber and pressure gauge	1670	gms
Pipe clay filter	1198	gms
Filter spindle, cover plate, support bracket, bearings and gland fittings	1140	gms
Brush	416	gms
Bed plate	1807	gms
Case	1914	gms
Pump and two attached hoses	1739	gms
	9884	gms (21.5 lbs)

3. ASSEMBLY

The pipe clay filter is positioned over the spindle and is held between two gaskets by the spindle head which can be tightened by using the cleaning shaft and handle. The delivery end of the spindle receives the spindle bearing. This assembly can then be placed in the filter chamber, the support bracket located, the cleaning shaft positioned, the brush inserted and the cover plate fastened. The packing glands can then be tightened and the cleaning handle attached.

4. OPERATION

On the upward stroke of the pump water enters the suction hose, passes the lower ball valve and enters the pump cylinder. On the downward stroke of the pump the lower ball valve is closed and water is forced out of the pump cylinder, past the upper ball and into the filter chamber. Air present in the filter chamber is allowed to escape through the air cock provided. By closing the air cock, further pumping will force all the water through the pipe clay filter from the outside and out through the spindle to the filtered water hose. The pressure gauge indicates the water pressure developed by the pump.

5. TRANSLATION OF CHARACTERS ON PLATES

(a) Instruction Plate on Case:

"Instructions for handling ISHII Type Section Use Water Filter.

Filtering Preparations

Place the filter on an improvised stand slightly higher than the ground in a horizontal position. Connect the suction hose (having attached strainer) and the high pressure connecting hose to the pump. Connect the other end of the high-pressure connecting hose to the filter inlet. Connect the filtered water hose (white) to the filtered water outlet. Attach the drain cap. Open the air cock.

Filtering Operation

Operate the pump after the preparations have been completed. Expel the air from the air cock. Close the air cock after water flow is noticed. Operate the pump continuously to filter the water. Operate the pump up and down, and slowly and smoothly. Precautions

must be taken so that the water pressure will not exceed 3.5 kg/cm^2. Sterilize the filtered water by adding the HODOGAYA fluid (3.5 cc of dilute fluid to 10 times the volume of the water tank) to make the water safe for drinking purposes."

"Washing Operation

When the filtering capacity has been reduced, suspend the filtering operation. Open the air cock and remove the drain cap. Drain out the remaining water. Attach the cleaning handle to the cleaning shaft, and rotate about 5 times in a clockwise direction. Operate the pump and wash out the dirty water. When the discharge water comes out equally dirty as the water being filtered, the filter requires cleaning. Always wash the filter after completing the filtering operation. Thoroughly drain out the water.

Sterilization

If sterilization is necessary, mix the disinfectant (1 part of HODOGAYA fluid to 15,000 parts of water or 1 part of carbolic acid to 33 parts of water) in the water tank. Place the suction and the filtered water hoses into the water tank. Pump the water through the filter for approximately 10 minutes. If necessary, immerse the water hoses and other parts of the equipment into the disinfectant. After the parts have been sterilized, wash them well with clean water until no odor of the disinfectant remains.

Storage and Preservation

If the water filter is not to be used for some time, thoroughly sterilize and wash. Remove the filter tube and the brush. Store the equipment after drying. When drying, the filter tube will not be placed in the direct sunlight".

(b) Name Plate on Bed Plate: "Ishii Type Water Filter - Section Use, Manufacture No 62 - 4087
April 1942
Army Medical College"

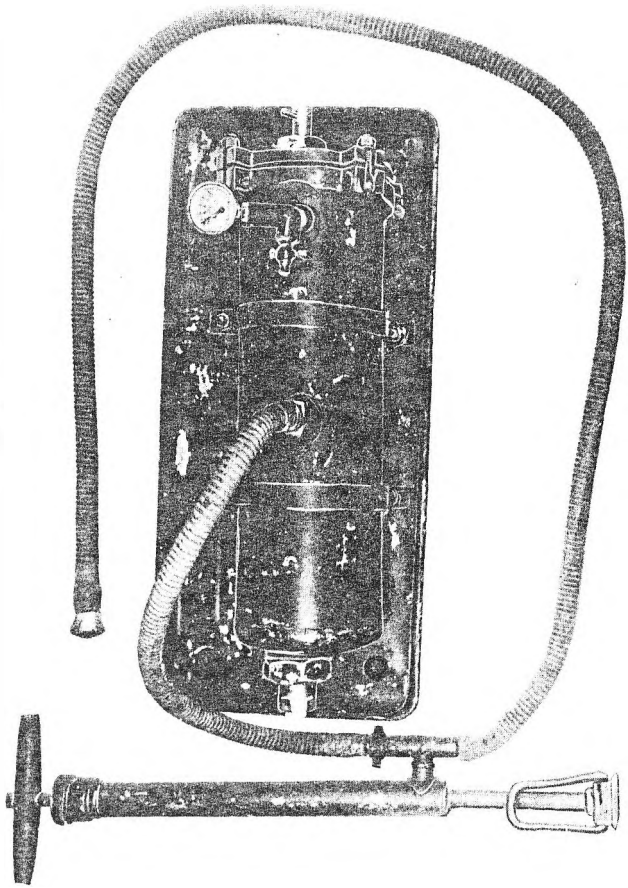
(c) Filter Chamber Gauge: "Nikkin Pressure Gauge - Kg/cm^2".

(SOURCE:- 2/1 AUST CW LAB - RAE)

ISHII TYPE

SECTION USE WATER FILTER

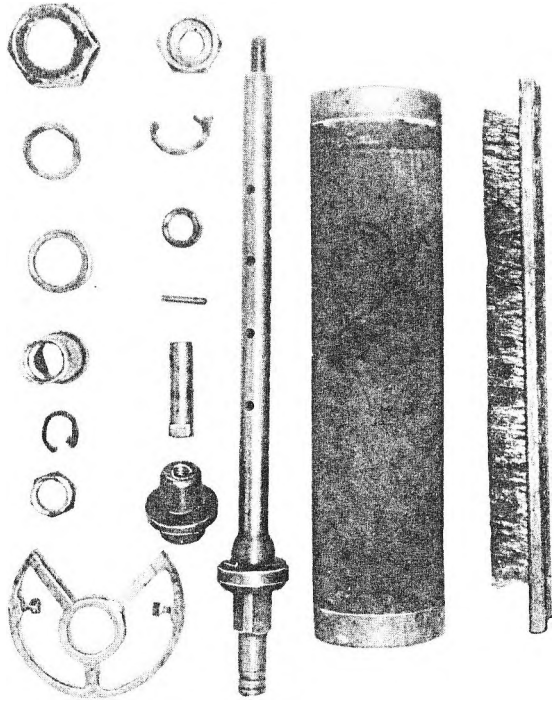
FIG I



ISHII TYPE

SECTION USE WATER FILTER

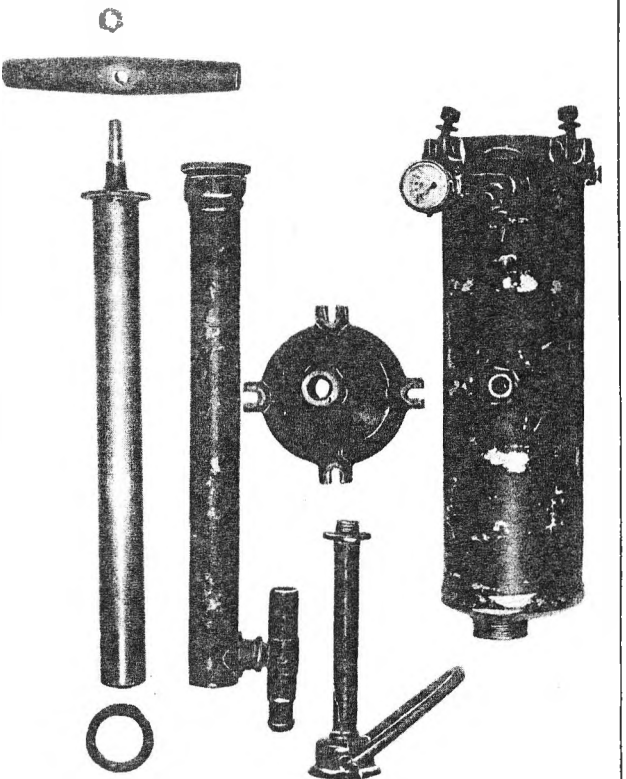
FIG 2 Components of Filter Chamber.



ISHII TYPE

SECTION USE WATER FILTER

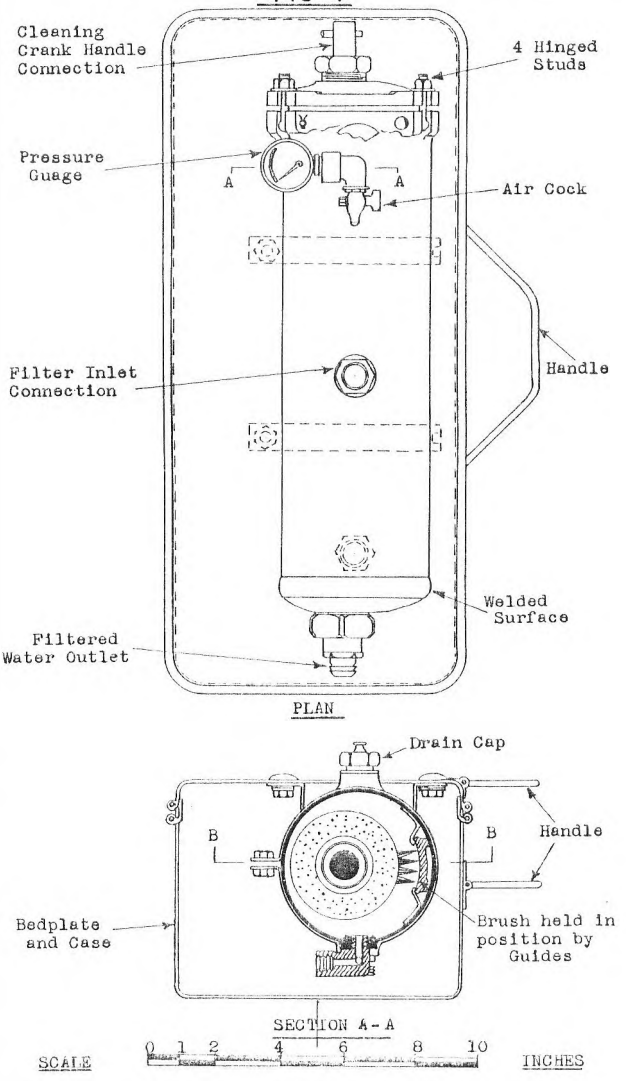
FIG 3 Hand Pump and Filter Chamber.



ISHII TYPE

SECTION USE WATER FILTER

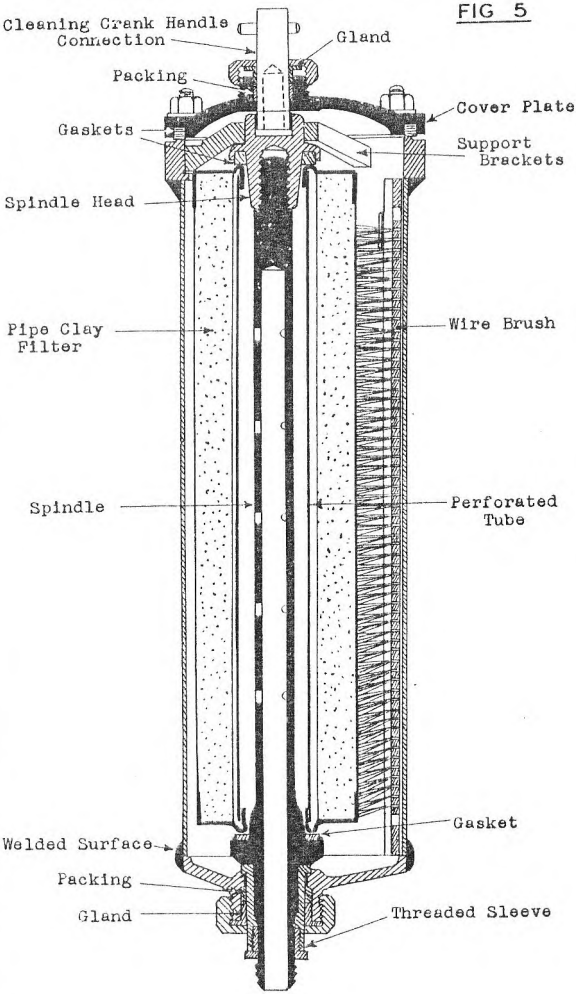
FIG 4



ISHII TYPE

SECTION USE WATER FILTER

FIG 5



SECTION B-B

SCALE 0 1 2 3 4 5 6 INCHES

ISHII TYPE

SECTION USE WATER FILTER

FIG 6