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AUSTRALIAN MILITARY FORCES

TECHNICAL INTELLIGENCE SUMMARY

No. 23

Compiled March, 1945

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

C.11208/45 J. J. GOURLEY, Government Printer, Melbourne.

AUSTRALIAN MILITARY FORCES
TECHNICAL INTELLIGENCE SUMMARY
NO 23
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JAPANESE EQUIPMENT

IMPROVISED 105 MM ARTILLERY MORTAR

1. GENERAL

This improvised weapon, which was captured in New Britain, consists of little more than a short spigot sealed to form a charge chamber, and fitted with a cocking handle and lanyard for firing. The projectile is a 105 mm HE shell as used in the Type 91 howitzer, to the base of which is riveted an empty brass cartridge case fitted with fins.

2. DESCRIPTION (Figs 1 - 5)

(a) Mortar (or projector): This weighs 114 lbs and consists of a base (64½ lbs), spigot (39½ lbs) and ground peg (10½ lbs).
The spigot is composed of a tube 17 ins long with an external diameter of 4 ins, welded to a 4 ins by 4 ins angle which is secured at an angle of 45 degrees to the base by two bolts and wing nuts. The tube is sealed by a metal disc welded 3½ ins from the forward end to form a charge chamber. Threaded through the disc is the primer holder which appears to be shaped to accommodate a rimmed cartridge type primer.
The primer is fired by a firing pin which is set into the cocked position by a cocking handle operating against a spring. The cocking handle is held in the cocked position by a latch to which is attached a 20 ft lanyard. On releasing the cocking handle the firing pin fires the primer, which in turn ignites the propellant charge, thus discharging the projectile.
The ground peg prevents the backward movement of the mortar during firing, and possibly is also used as a pivot enabling the mortar to be directed on to previously ranged target areas.
There is no provision for elevating or traversing the weapon, and the only sighting device is a white line painted on the spigot. Internal dimensions of the charge chamber are: Depth, 3 21/32 ins; diameter, 3 9/16 ins.

(b) Projectile: This weighs 38½ lbs, and consists of a 105 mm artillery shell as used in the Type 91 howitzer (Vide AMF Tech Int Sum No. 17), to the base of which is riveted portion of a cartridge case used in the 105 mm Type 88 gun.
A 15 inch length of the cartridge case has been fitted over the base of the shell, from which the driving band has been removed, with the thicker walled end frontwards. The front end of the cartridge case terminates at the rear end of the driving band groove (i.e. 1¼ ins of the shell is inside the cartridge case). Four equally spaced flat-headed studs are hammered into the cartridge case 7/16 in. from the front end. To the rear end of the case are riveted four stabilizing fins 3 ins long by 1 in. wide. Approximately ¼ in. of the forward corner of each fin is cut off at an angle of 45 degrees. The fins are made from pieces of cartridge

case 1½ ins wide, with ½ in. turned at right angles and riveted to the cartridge case. The width across opposite fins is approximately 6½ ins. The projectile contains approximately 5 lbs of trinitrophenetole and has a standard RDX exploder. The usual HE markings are present on the shell.

(c) Fuse: This is a modified, instantaneous action, type 88 DA percussion fuse for field and mountain guns. The normal fuse is modified in the following manner:

The diameter of the aluminium striker holder is reduced 3/64 in. by grinding. A 21 SWG 1¼ in. diameter perforated brass disc is then fitted over the ground portion of the striker holder, the projecting portion of which is riveted over the disc. Immediately above the nose body a 9/64 in. diameter safety pin hole is drilled laterally through the striker holder. The safety clip and wire are removed from the fuse and the clip is flattened to form a staple-shaped safety pin which is pushed into the safety pin hole. The wire is bound around the safety pin and the striker holder. A 1/16 in. diameter hole is drilled laterally through the nose body and striker holder. Through this is fitted an 18 SWG brass shear wire which projects on each side of the nose body, the projecting pieces being bent at right angles. The brass arming segments and arming ferrules have been removed.
The only markings are the usual ones for Type 88 field mountain gun fuses. Two fuses were originally made at Osaka in July 43 and the other two were made at Tokyo - one in January and one in August 1943.
Contained in a lightweight silk bag were 4 - 4½ ozs of propellant which appear to be used with the mortar, although this is not definitely known. Composition was as follows:

Standard N.C. propellant	80%
Gunpowder	20%

The standard N.C. propellant is the type used in 75 mm ammunition and has the following approximate analysis:

N.C. (coated with 0.2% graphite)	99%
Diphenylamine	1%

The primer used appears to be the standard QF primer, described in AMF Tech Int Sum No. 17. It fits neatly into the primer holder of the spigot and the maximum number of propellant bags that can be fitted into the charge cavity is two. Of 13 primers submitted all were made at Osaka, two in 1940 and the remainder in 1942.

(SOURCE: MUNITIONS SUPPLY LABORATORIES through MGO Branch)

IMPROVISED 105 MM ARTILLERY MORTAR

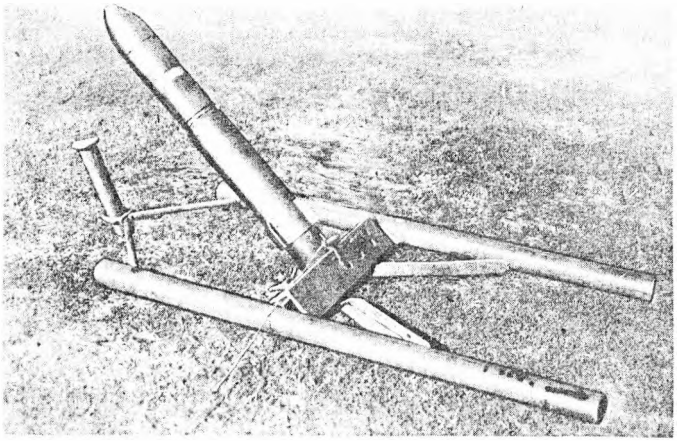


Fig 1 - Mortar with projectile attached ready for firing.

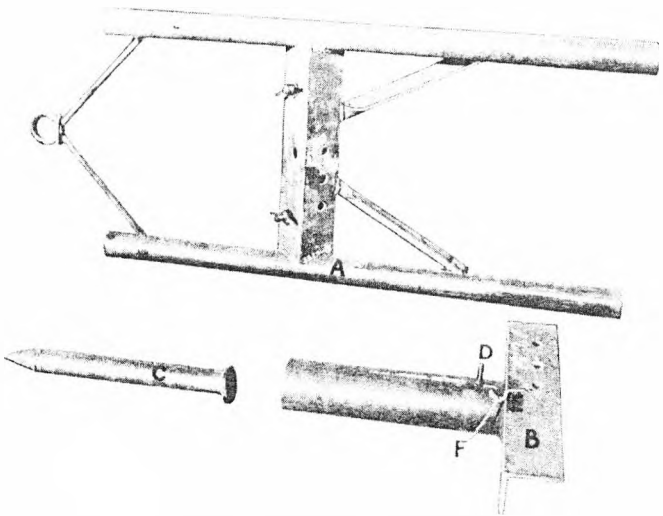
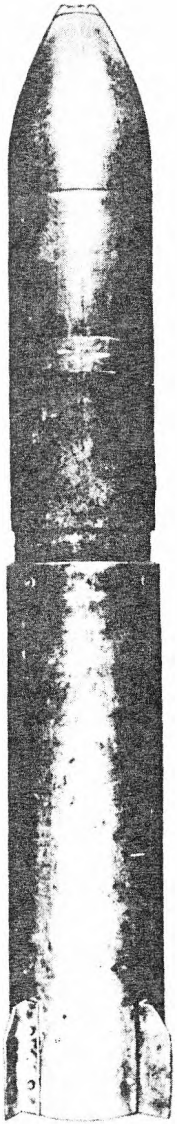


Fig 2 - Mortar disassembled

A	Base	D	Cocking handle
B	Spigot	E	Cocking latch
C	Ground Peg	F	Firing lanyard

IMPROVISED 105 MM ARTILLERY MORTAR

FIG 3 Projectile



IMPROVISED 105 MM ARTILLERY MORTAR

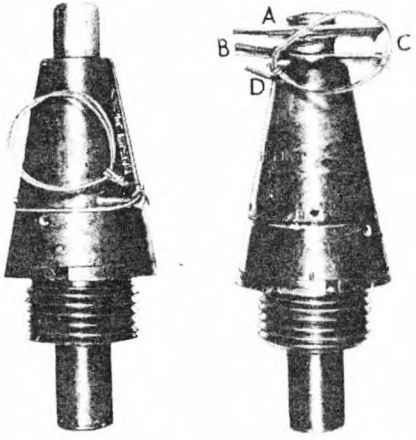


Fig 4 - Comparison of normal type 88 gun fuse (at left) with modified fuse for improvised mortar (at right).

A Brass disc
B Safety pin
C Safety wire
D Shear wire

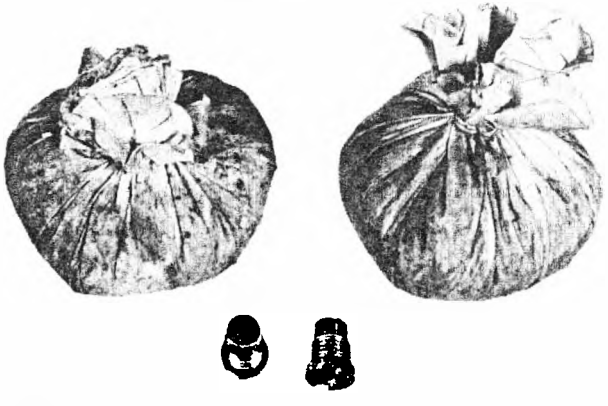


Fig 5 - Two propellant bags and primers.

20 CM TUBE TYPE ROCKET & LAUNCHER PRELIMINARY REPORT

1. GENERAL

This launcher, the first of the tube type to be captured from the Japanese, consists basically of a barrel or tube from which the projectile is launched, and a light two-wheeled carriage with a fixed trail. It is used for launching the 20 cm naval, spin-stabilized rocket and was captured on Iwo Jima.

2. DESCRIPTION (Figs 1 - 4)

(i) Barrel: This is an open, smooth bore tube about 6½ ft long and fitted with a reinforcing band at the breech end. It is trunnioned to the saddle about 18 ins from the breech end. Elevation and depression are effected by means of a lever and quadrant arm attached to the left of the barrel and riding in an elevating arc on the saddle. A securing clamp is used to lock the barrel at the required elevation. There is no traversing mechanism and the trails must be raised and reset for every change in line.
Inside the breech end of the barrel and on the underside is a spring-loaded, projectile retaining plunger which is depressed as the projectile is loaded into the breech. When the rocket is fully home, the plunger rises and prevents it from sliding to the rear.
The firing mechanism consists of a hammer pivoted about a short horizontal arm mounted on the top of the breech end of the barrel. A short arm to which a firing lanyard is secured, is attached to the end of the shaft. When the lanyard is pulled the hammer rotates in a vertical plane and strikes the percussion cap in the base of the rocket. The rocket is loaded into the tube by use of a two-man, two-handled loading tong.

(ii) Carriage: This is of simple construction and consists of a saddle mounted on a cross member and a light trail. Arms on each side of the cross member carry the axle and wheels. The latter appear to be fitted with heavy, solid rubber tyres and apparently have no brake drums or spring suspension. The trail consists of two tubular metal arms joined by two cross members and fitted with heavy spades. No sighting mechanism appears to be fitted to the carriage.

3. REMARKS

The recovery of this launcher is evidence of the extent to which Japanese rocket weapons are being influenced by German principles of design. The launcher represents a great improvement upon the original launcher for this projectile, which consists merely of a trough supported at the forward end by a bipod.
This tube type launcher can not only be handled and laid more quickly and simply, but also imparts a greater degree of steadiness to the initial flight of the rocket than was the case with the trough type of

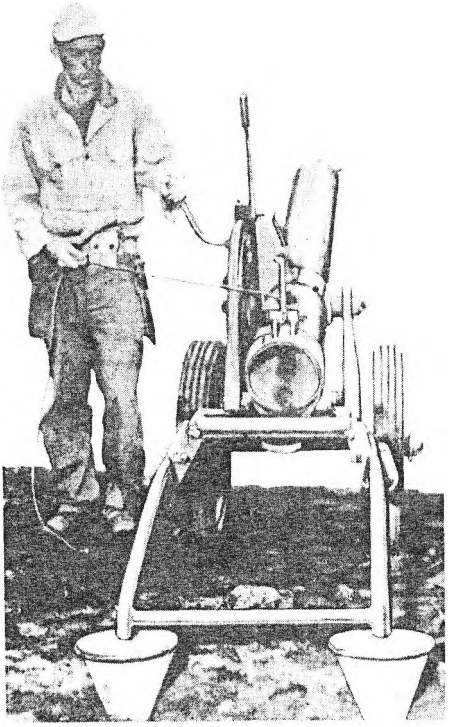
launcher. Since this rocket depends upon spin for stabilization and the nose fuse is centrifugally armed, this initial control is important, both to obtain steady flight and ensure complete arming of the fuse. The launcher's main disadvantage appears to be that the barrel becomes overheated, as according to one source, two to three rounds fired in five minutes would require a 50 mins. wait for the barrel to cool. This would demand either a large number of spare barrels or a whole battery of launchers to maintain sufficient fire power.

(SOURCE:- U.S. Pacific Fleet Intelligence Report)

20 CM TUBE TYPE ROCKET & LAUNCHER

PRELIMINARY REPORT

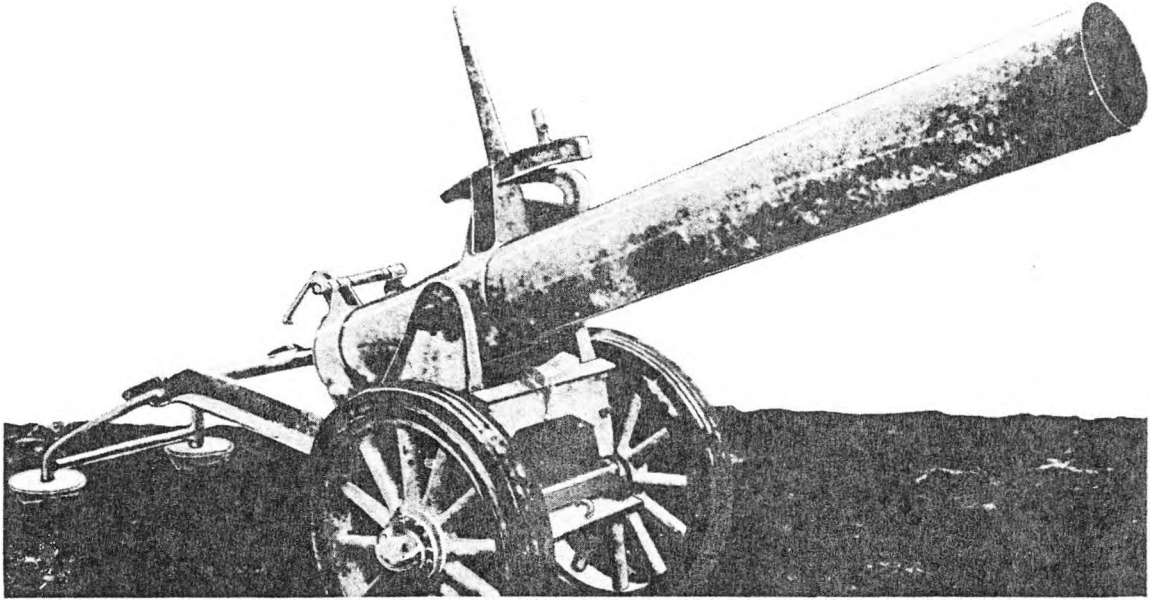
FIG 1 End view of launcher.



20 CM TUBE TYPE ROCKET & LAUNCHER

PRELIMINARY REPORT

FIG 2



20 CM TUBE TYPE ROCKET & LAUNCHER

PRELIMINARY REPORT

Fig 3 Showing maximum angle of elevation

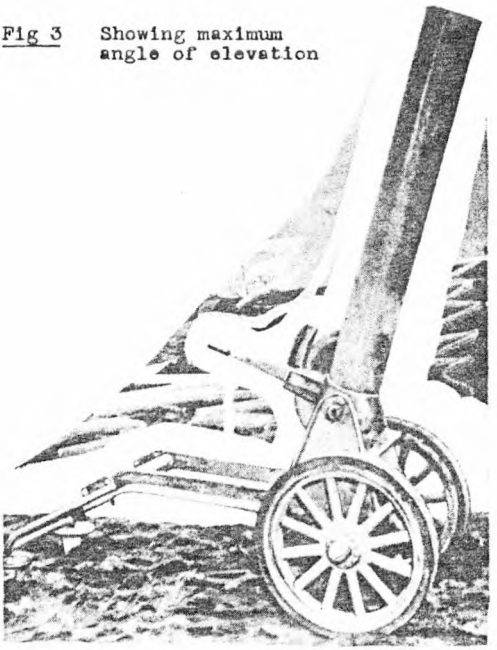
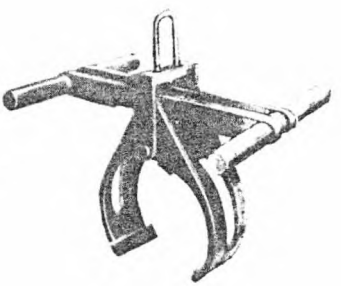


Fig 4 Rocket loading tongs



NAVAL 45 CM ROCKET & LAUNCHER

PRELIMINARY REPORT

1. GENERAL

A number of these large, spin stabilized rockets have been captured on Luzon. Their correct nomenclature is unknown, but they are approximately 45 cms in diameter. The crude launching device and the general inaccuracy of the rocket indicates it is intended primarily for area bombardment. The rockets are crudely made in a manner that suggests that the intention has been to secure large scale production at the expense of accuracy. However, the rockets found have carried individual serial numbers, which would indicate they are not, as yet, mass production items. Range is believed to be approximately 1900 yds.

2. DESCRIPTION (Figs 1-9)

(a) Rocket: (i) Body: This is cylindrical in shape and consists of the motor, explosive case and nose cone, and base plate. The motor and explosive case are each constructed of one piece of $\frac{6}{8}$ in. steel which has not been machined, and the conical nose cap is made of two pieces of the same metal, welded together. The three sections are welded together to form the entire rocket body.
In addition to the weld, the rocket motor is fastened to the explosive head by being fitted over a machined steel bushing, approximately 8 ins long, which is welded to the inner surface of the explosive head at the front of the bushing. The motor is fastened to the bushing by two countersunk screws which are threaded through the outside case of the rocket motor into the bushing.

(ii) Explosive Case and Nose Cone: The nose is a 14 in. long cone and is threaded for a point detonating fuse. The fuse recess will fit the Japanese army type 88 artillery fuses or the type 93 and type 100 mortar fuses. However, it has not been determined what fuse is actually used with the rocket. There is a threaded recess in the base of the bushing previously described, which receives a machined steel closing plug $15\frac{1}{4}$ ins in diameter. This plug closes the base of the explosive head and separates the bursting and propelling charges. Copper caulking is used around the outside of this closing plug to prevent the hot gases from the combustion of the propellant from entering the explosive head.
The combustion chamber contains 40 sticks of mono-perforated propelling powder. The sticks are $15\frac{1}{2}$ ins long by $2\frac{1}{4}$ ins in diameter, with a $\frac{3}{8}$ in. central perforation. One of these sticks is centred so that the gases from the primer pass through the stick and ignite the black powder propelling charge at the front of the motor. Several of the rocket motors examined were marked with the symbols for 59 kilograms, 300 grams. This is probably the weight of the propellant.

A 14¼ in. square steel plate, perforated with nineteen 2 in. punchings prevents the sticks of propellant from coming into direct contact with the closing plug of the explosive head. The corners of this plate have been cut back and bent so as to fit into the forward part of the rocket motor. To the centre of this plate is tied the black powder igniter in a quilted bag, 7 ins in diameter.

(iii) Base Plate: This is of machined steel, threaded with right hand threads into the base of the rocket motor. The six equally spaced nozzles are offset at approximately a 15 degree angle. The nozzles are flush with the inner surface of the base plate and extend through and three inches beyond the outer surface of the plate. The nozzles are machined inside and out and are welded to the outer surface of the base plate. The inside diameter of the nozzles ranges from 1⅝ ins at the combustion chamber to a maximum of 2⅝ ins at the outlet. The nozzle ends are covered with metal foil to prevent the entrance of foreign substances. Six strips of strap iron, 1⅛ ins wide by ¼ in. thick are fastened to the inner surface of the base plate by six ½ in. screws, forming a raised framework. This framework supports a circular grill approximately 2 ins above the inner surface of the base plate. The grill is constructed of three steel rings, 14¼ ins, 10¾ ins, and 7⅜ ins in diameter. This grill keeps the propellant from direct contact with the base plate. A primer vent bushing 3¾ ins long with an outside diameter of 1⅝ ins is threaded into the outside centre of the base plate. The primer vent is 12 mm in diameter. A base cover of 1/32 in. sheet steel is loosely fitted into the base of the rocket to keep out foreign substance.

Further physical data on the rocket is as follows:-

Diameter of rocket	447 mm(17⅝ ins)
Length, overall	68¼ ins
Length of motor	27 ins
Length of explosive head	41¼ ins
Weight (one round tested by M.E.I.U. No.1)	151¼ lbs
Length of combustion chamber	18⅜ ins
Diameter of combustion chamber ..	16 ins
Diameter of base plate	16⅞ ins
Thickness of base plate	2¼ ins
Outside diameter of nozzles	3 ins
Length propellant sticks	15½ ins
Diameter propellant sticks	2¼ ins
Diameter centre perforation, propellant)	⅜ in.
Colour of rocket	Orange

(b) Launcher: This is a crude, wooden rail structure. The spaced rails are of 3 ins by 4 ins bevelled timbers, about twelve feet long. The end of the launcher is supported by solid wooden disc wheels, about three feet in diameter. Wooden brakes of a very unsatisfactory nature are provided for the wheels. The whole structure has the appearance of a small oxcart from a distance, and might be mistaken for such a vehicle from the air. The legs are not adjustable. Adjustable wooden extensions of the rails are provided to prevent rearward movement. A crude "plumb bob" quadrant is provided.

There is no provision for laying in azimuth. It is believed that the launcher is used for firing only one round. A percussion firing hammer is fastened to the rear of the left rail of the launcher.

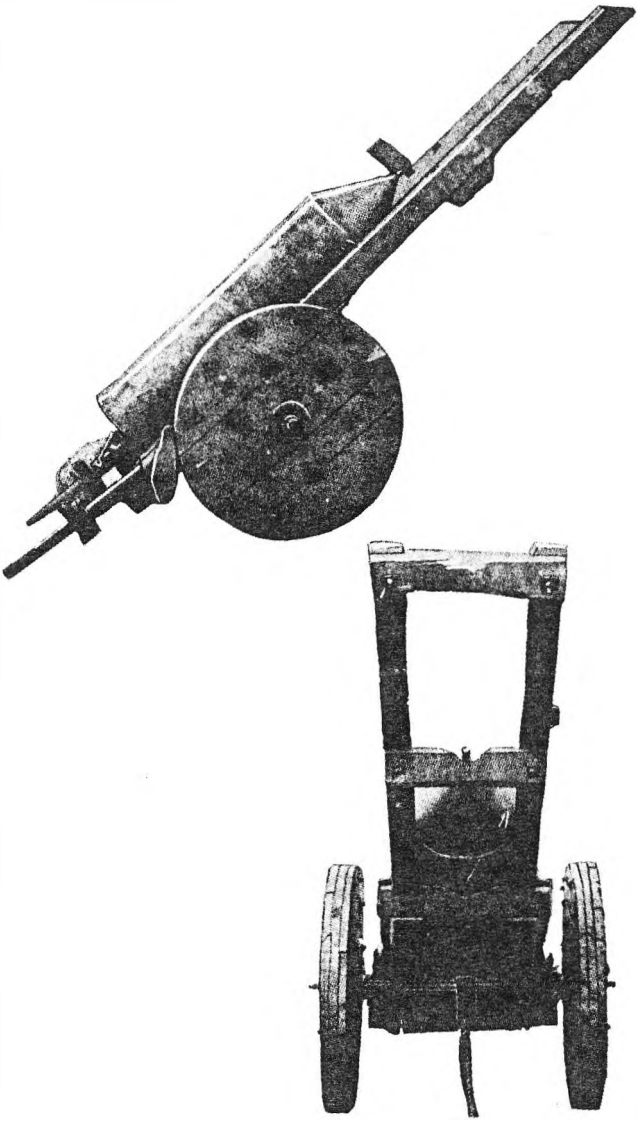
3. FIRING TESTS

One rocket was fired on Luzon in cooperation with M.E. I.U. No. 1 personnel. The elevation was set as close to 45 degrees as was possible by the crude quadrant provided. The launcher was warped, causing the right rail to be higher than the left at the top of the launcher. The rocket used in this test was not fused for safety reasons. It was fired electrically by using a squib from a U.S. 2.36 in. rocket (bazooka projectile). The flight of the rocket could be easily observed from near the firing position. It appeared to develop excessive spin, as the nose of the rocket failed to follow the arc of the trajectory satisfactorily, tending to remain stabilized at the same angle to the earth as it had initially. This was overcome sufficiently to give a nose impact, but the rocket yawed badly just prior to impact. The range was obtained by making a map plot from observation from a Cub liaison plane, and was found to be approximately 1900 yds. It is believed the probable error of this range does not exceed 100 yds. The light launcher was demolished by the firing of this one round, and was badly burnt in addition to being broken.

(SOURCE:- USASOS - SWPA)

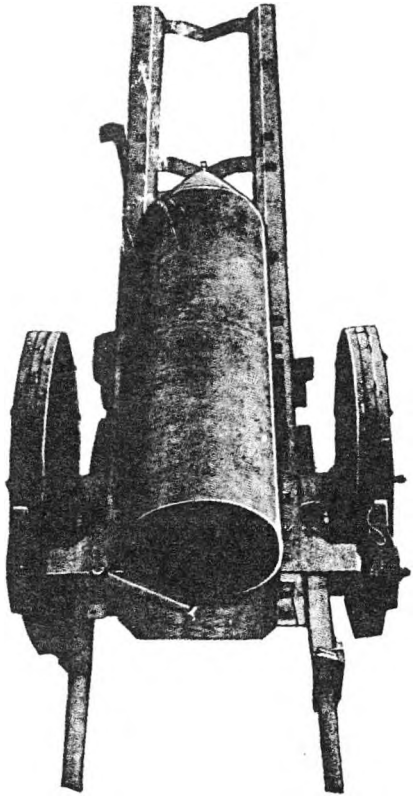
NAVAL 45 CM ROCKET & LAUNCHER

FIG 1 Side and forward views of launcher



NAVAL 45 CM ROCKET & LAUNCHER

FIG 2 Aft view of launcher



NAVAL 45 CM ROCKET & LAUNCHER

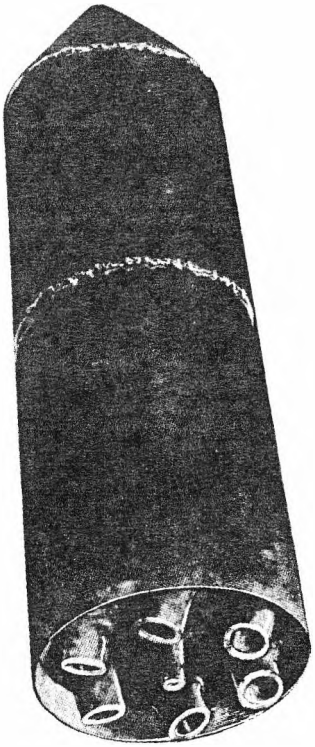


Fig 3 - Rocket with Base Plate removed.

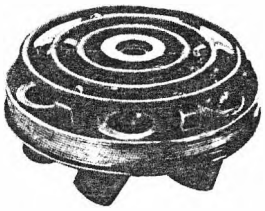
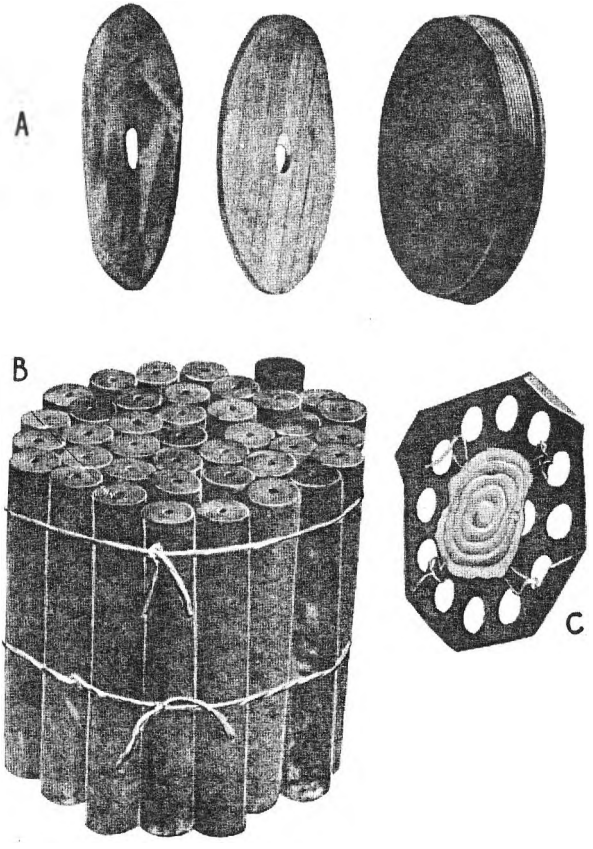


Fig 4 - Base Plate

NAVAL 45 CM ROCKET & LAUNCHER

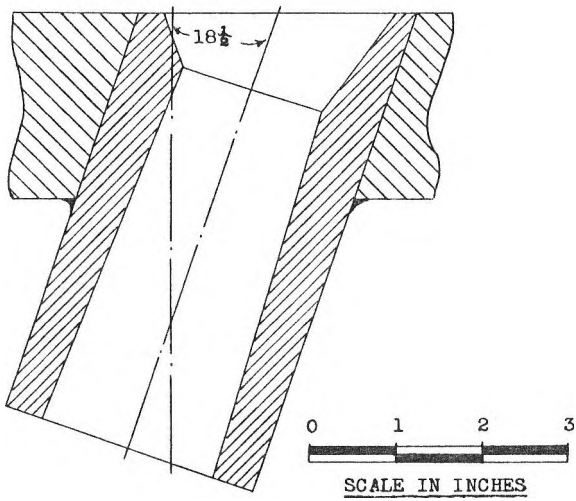
FIG 5



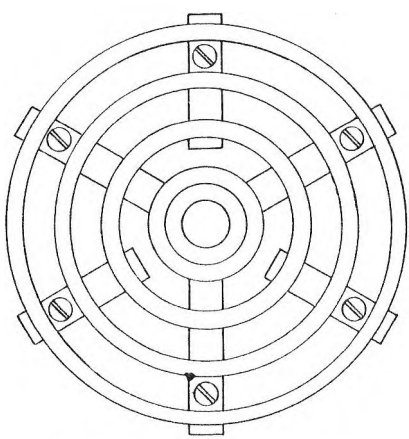
A Packing and Base Plate for Projectile
B Rocket Propellant
C Ignition Charge tied to forward grid

NAVAL 45 CM ROCKET & LAUNCHER

FIG 6



CROSS SECTION OF NOZZLE

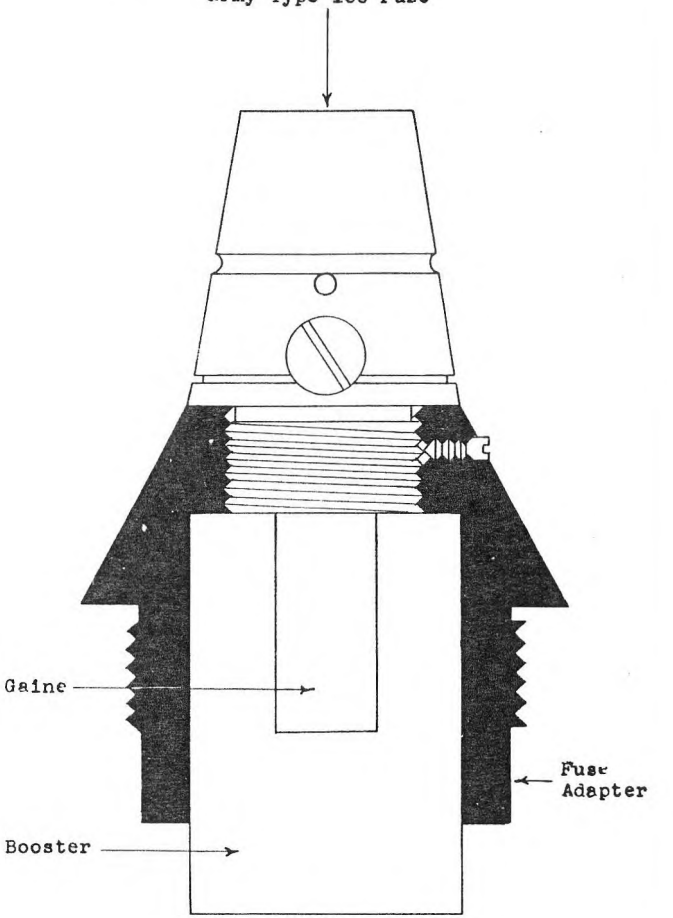


FORWARD VIEW OF AFTER GRID

SCALE 0 1 2 3 INCHES

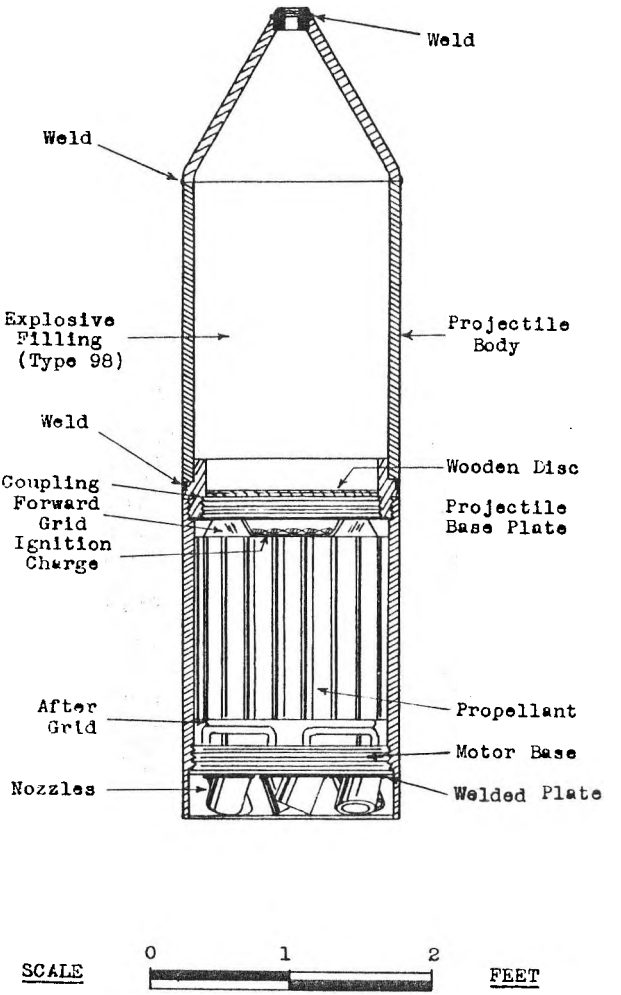
NAVAL 45 CM ROCKET & LAUNCHER

FIG 7 Fuse and Adapter
Army Type 100 Fuze



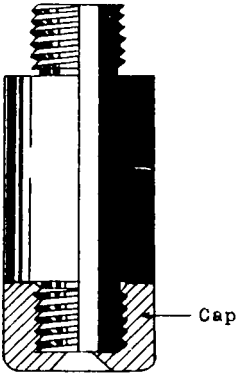
NAVAL 45 CM ROCKET & LAUNCHER

FIG 8



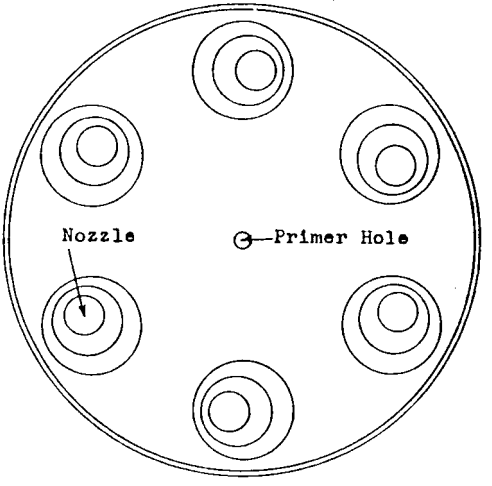
NAVAL 45 CM ROCKET & LAUNCHER

FIG 9



PRIMER CARRIER

SCALE 0 1 2 3 INCHES



FORWARD VIEW OF MOTOR BASE PLATE

SCALE 0 $\frac{1}{2}$ 1 INCHES

TYPE 4 20 CM ROCKETS & LAUNCHERS
PRELIMINARY REPORT

1. GENERAL

This is the most important type of rocket and launcher yet encountered in the Japanese forces, and has been used fairly extensively against U.S. forces in the Philippines. The launcher appears to be a lightweight substitute for an 8 in. mortar, and is apparently intended for the same tactical use. It is a simple sturdy piece of equipment capable of fine adjustment for accurate fire. Preliminary firing tests and examination of areas bombarded by the Japanese indicates that the rocket is accurate and probably has less dispersion than most types of mortars.

2. DESCRIPTION (Figs 1 - 3)

(a) Rockets: All those examined have been made at Osaka Army Arsenal in 1944. All are basically the same, but four modifications of the motors have been encountered to date. These rockets have apparently been developed from naval 20 cm types, but use army markings. They are black overall with a red band at the tip and a yellow one at the rear of the explosive head. The relative size of the motor has also been increased in the army rocket, giving a greater maximum range.

(1) Motors: There are two main modifications of explosive heads and motors, and the two are not interchangeable. In what is believed to be the older type rocket, the assembly threads are about $\frac{1}{2}$in. long, but in the newer type they are about 2 ins long. Each type motor must be used with the appropriate explosive head. Each rocket and motor is marked with its weight. Presumably, either correction tables are provided to allow for adjustment to compensate for variation in weight, or the motors and projectiles are selectively assembled to give the most uniform possible performance. The motors contain seven mono-perforated cylindrical sticks of propellant, with a $\frac{3}{8}$in. longitudinal single perforation. In one modification, two central sticks, each 6 11/16 ins long, replace the central stick of propellant. In another less common modification, all seven propellant sticks are divided in two in the same manner.
The motor base plate is threaded into the rear of the rocket motor. A solid ring in the base plate contains six $\frac{5}{8}$in. nozzles, equally spaced, and offset at an approximate angle of 25 degrees.
For shipping, a heavy metal plate is screwed over the section of the base plate which contains the nozzles. A threaded machined plate closes the forward end of the motor.
This rocket is unusual in that the igniters are placed in the rear of the propelling charge. The black powder igniting charge is placed in two shellacked blue silk bags, $2\frac{1}{4}$ ins in diameter and $\frac{1}{4}$in. thick. A secondary

base plate, $3\frac{3}{4}$ ins in diameter, is threaded into the outside centre of the main base plate. The igniters are placed in a perforated cup which is screwed into the front part of the secondary base plate. The primer seat and vent section is machined, with a threaded section, into the centre of the secondary base plate. The primer is a brass, friction pull type. It is 2 ins long by $\frac{3}{8}$ in. in diameter, with a 1/32 in. brass pull wire with loop extending $1\frac{3}{4}$ ins from the primer base. The primer is screwed into the secondary base plate.

In the older type of motor, the grill separating the propellant from the base plate consists simply of a single circle of round stock, supported on three legs screwed into the base plate. In the new type, the grill is a perforated steel plate which is threaded into place against the sticks of propellant in such a manner as to focus the greater portion of the flash of the igniting charge into the centre of the propellant charge. This is the only apparent internal difference between the two motors. Firing tests have shown that in all cases the old type motor will hang fire for several seconds after ignition, smoking vigorously until proper ignition finally takes place. In the new motor, no hangfires have occured in any tests.

Two other exterior differences have been observed in the motors. In the older type, the ring containing the nozzles had straight sides, while in the newer type the side of the ring is bevelled. The outer wall of the old type motor was of a uniform diameter throughout its length. In the newer motor, the main central portion of the rocket motor is machined to a diameter approximately 7 mm. less than the ends. This gives the effect of a bourrelet at each end of the motor, and accounts for the generally lighter weight.

(ii) Assembly: The explosive heads and motors are shipped separately in simple, unfinished wooden packing boxes with no attempt made to waterproof the box or protect the contents from the weather. Assembly is carried out at the launching site, two strap wrenches being provided in the tool kit for this purpose. Spare parts and a firing lanyard are also carried in the tool kit.

General Data:

Overall length of rocket ..	$38\frac{5}{4}$ ins
Diameter of rocket	202 mm
Length of head	$18\frac{7}{8}$ ins
Length of motor	$19\frac{7}{8}$ ins
Length of propellant sticks..	$13\frac{3}{8}$ ins
Diameter of propellant	$2\frac{1}{4}$ ins
Total weight	91 - 93 Kgs
Weight of motor	42 - 45 Kgs
Diameter of motor base plate	8 ins
Thickness of motor base plate	$2\frac{3}{4}$ ins

(b) Launcher: This has the general appearance of a large trench mortar. It consists of: (i) Barrel, (ii) Bi-pod, (iii) Base plate, and (iv) Firing mechanism. The fire control is also of the mortar type, as a collimator type sight, indistinguishable from the sights used with the Type 97, 81 mm and 90 mm mortars, is used, and a quadrant rest is located near the breech of the barrel.

The overall workmanship in welding, machining and fitting is good. The launchers were manufactured at Osaka Army Arsenal in 1944.

(i) Barrel: The barrel is machined steel with a ¼ in. wall thickness throughout, and is constructed of two main segments, an upper and a lower section. The barrel is open at both ends. The upper half of the lower section is hinged to open upward so that the rocket may be placed into the breech. After the rocket is placed in the barrel, the hinged section is lowered and secured in place by four locking clamps, two on each side. Loading is done by the use of a two man, two handled loading tong. There are two hinged loading tong shutters in the lower part of the rear section of the barrel, one on each side. These swing down to accommodate the tongs when the rocket is loaded. The shutters are grooved at the top, and are locked into the closed position by the hinged top piece. The hinge of the top piece is constructed of ⅜ in. steel stock, and the machined steel hinge bolt is 7⅜ ins long by 11/16 in. in diameter. To the top of the lower part of the barrel is riveted and welded a machined steel hoop, 4 ins wide by ⅜ in. thick. To this hoop is fastened by welding, the upper half of the hinge for the upper half of the lower section of the barrel. Three 5/8 in. toggle bolts which fasten the upper and lower sections of the tube together are also welded to this hoop. A wooden buffer is fastened to the middle of the hinged section to protect the barrel when the segment is raised to the open position.
Two wedge shaped steel studs are inserted into drilled holes located 5/8 in. from the open breech end of the lower barrel section. These studs are spaced 4½ ins apart, and extend 1 in. into the barrel. They are secured to the outer surface of the breech by a 3/8 in. bolt. The base of the rocket rests against these studs when it is loaded into the barrel. A heavy steel stud is riveted and welded 4 ins up from the breech end of the lower segment of the barrel. To this is welded the ball rest which fits into the socket of the base plate.
Provision is made for rapidly carrying the entire barrel assembly. One carrying pole adapter is placed on the top end of the upper barrel segment, and two are placed at the bottom of the lower segment. This allows the fitting of three carrying poles for rapid movement. Another pole adapter is fitted at the top of the lower barrel section, so the lower section can also be carried by three carrying poles when the barrel is disassembled.

(ii) Bipod: This contains an elevating and traversing mechanism which appears to be almost identical with that of standard Japanese trench mortars. However, the cross-levelling device is not of the standard type, but consists of a horizontal screw which, instead of lengthening one leg, tilts the elevating screw holder. This system is very similar to that used on the German 81 mm. mortar. The elevating and traversing gears are of the buttress type. The elevating crank is located on the front of the elevating gear case. The crank has a 5 inch arm, with a ball counter-balance on the other end. The traversing gear hand wheel is located

on the left side, and is equipped with a small 2 in. hinged hand crank extension. The collimator sight bracket is bolted to an extension of the saddle. The saddle, an integral part of the yoke, is, for the most part, made of 7/16 in. by 3 1/8 in. rolled steel, with welded construction. The cross levelling screw is located on the right side, as in Japanese mortars, so the launcher can be cross-levelled from the right, using the level built into the yoke, but cannot be levelled by the operator from the left side at the sight position.
The bipod legs are manufactured of two pieces of 3/8 in. by 1½ in. steel. The two parts of the leg are hinged to each side of the elevating gear box. The leg sections are fastened to extensions of the feet, and are braced at two points between the upper and lower fastenings. A 36 in. chain is fastened to the lower portion of the bipod legs. The legs end in cupped steel feet, with spiked points. The cup is 6 ins in diameter.

(iii) Base Plate: This is bolted to an open work framework constructed of four pieces of angle iron. The outside dimensions of this framework are 31½ ins long by 28¼ ins wide. Two driven spades of the standard artillery type are driven through brackets at the front corners of the outrigger. These spades can be clamped into position across the framework for transport. The base plate with the raised socket is fastened almost at the extreme rear of the framework. The main portion of the framework extends ahead of the tube end, toward the bipod. Firing tests have shown that if the driven spades are placed behind the tube, the rocket blast will dig out the spades.

(iv) Firing Mechanism: The firing mechanism is simply a lanyard consisting of a 23½ ft piece of 3/8 in. rope which is attached to a 23 in. section of doubled 1/8 in. steel cable by means of a hook. A hook is fastened to the far end of this cable for fitting into the loop of the pull igniter. There are apparently no safety features to prevent accidental discharge of the weapon once the lanyard is attached to the primer. According to a captured notebook, the crew consists of ten men, six of whom operate the launcher and four of whom prepare the ammunition for firing and maintain the launcher.

General Data:

Weight, upper section of barrel	..	31 kgs
Weight, lower section of barrel	..	86 kgs
Weight of bipod	..	20 kgs
Weight of level (probably yoke)	..	44.5 kgs
Weight of sight	..	1.8 kgs
Weight of base plate	..	44 kgs
Total weight of launcher	..	227.6 kgs
Diameter of barrel	..	7.8 ins
Length of barrel	..	75⅝ ins
Length, lower section of barrel	..	47⅜ ins
Length, upper section of barrel	..	28⅝ ins
Length of bipod legs	..	36 ins
Length of base plate	..	15 ins
Width of base plate	..	8 ins

3. FIRING TESTS

Several firing tests have been conducted. As no suitable firing range was available, the rockets were fired into Japanese held areas, which made the obtaining of exact ranges difficult. These tests give an approximate maximum range of 2600 to 2800 yds. This substantiates the data of a captured Japanese manual, a preliminary translation of which gives a maximum range of 2450 metres and a minimum range of 1300. ATIS Bulletin 1868 gives a maximum range of 1568 metres for the type 4, 20 cm. rocket gun and a maximum range of 1648 metres for the experimental HV rocket (Model 5 firing table). However, these tables must apply to other types of rockets for this launcher, since it is highly improbable that the army rockets, with a lighter explosive head and a greater propelling charge than the navy rockets, would have a range less than the 1800 metres range of the navy 20 cm rockets.

Three separate firing tests have been conducted, with ranges being obtained in two tests. In one test, the regular primers were not available, so primers were improvised by wrapping U.S. friction safety fuse igniters with sufficient adhesive tape to permit the igniter to be screwed by force into the primer seat. In other tests, the regular primers were used. The rocket gives off a blast of flame about 20 or 30 ft long upon firing, which continues for about 300 yds of travel. There is no smoke, but the blast throws up a great deal of dust. The rocket gives a fairly loud swooshing sound, but is comparatively quiet as compared to artillery fire. It is easily followed in flight, and appears to be very stable.

Combat troops have reported that these rockets sometimes start out with a loud screeching sound. It has been found that if half of the central stick of propellant is removed in those rockets in which the propellant is divided, the rocket will scream loudly in flight.

There is reason to believe that the Japanese at times remove half or all of the central stick or propellant for variations in range. The rocket is reported to be audible during the entire time of flight when listened to from the receiving end. The rockets have been found provided with type 100 selective, instantaneous-delay mortar fuses. The fuses found were made in July 1944 and had all steel black bodies with a brass gaine. One area was examined where approximately 50 rockets had been fired by the Japanese. The shells had all used the instantaneous fuse setting, and the bursts had a distinct "daisy-cutter" effect. The craters were approximately 18 ins deep and 4-6 ft in diameter. Deep grooves cut in the turf by the fragments radiated in all directions from the centre of the crater. One officer stated that a rocket which landed approximately 30 ft from a jeep riddled the jeep with numerous fragments, none of which was more than 3½ ft above the ground.

In one test, firing was conducted against a defiladed target of Japanese installations. Firing was conducted by observation from a Cub artillery liaison plane, and the mission was successfully accomplished. The following ranges were obtained, the probable error of which is believed not to exceed 100 yds.

Elevation (Mils)	Range (Yards)
700	1700
800	2600

Elevation (Mils)	Range (Yards)
900	2400
900	2500
950	2300
950	2300
950	2200
1000	2100

In another test four rounds were fired at a constant elevation of 800 mils. The range used for this firing was composed for the most part of rice paddies, and good observation of the impact area was possible. The ranges were obtained by using base end O.P.'s and were checked by a map replot made from a Cub artillery liaison plane. Data obtained was as follows:

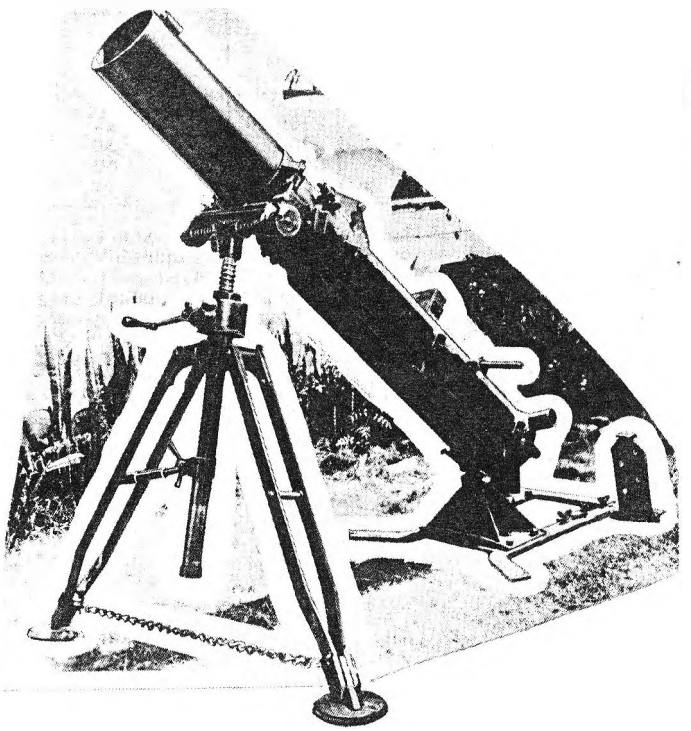
TYPE ROUND	WEIGHT MOTOR (Kgs)	WEIGHT HEAD (Kgs)	RANGE (Yards)	TIME OF FLIGHT (Seconds
Old	45.560	38.100	2400	--
Old	45.000	Illegible	2700	30
New	42.320	39.45	2800	32
New	42.630	39.250	2800	31

The launcher was quite stable in firing, the elevation changing only about one mil between rounds. The collimator type sight was left on the launcher during the first firing test, and the blast of the rocket caused the bubbles in the levels to temporarily break down into numerous small bubbles. It is therefore necessary to remove the sight between rounds.

(SOURCE:- USASOS - SWPA)

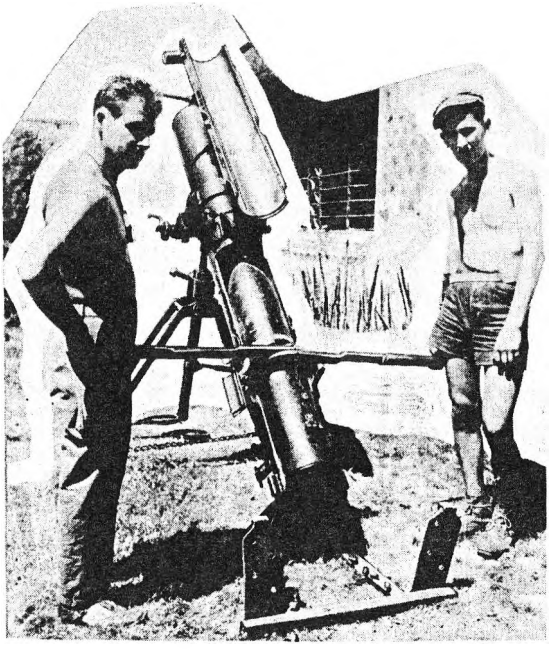
TYPE 4 20 CM ROCKETS & LAUNCHERS

FIG 1 Front view of launcher with hinged loading section closed.



TYPE 4 20 CM ROCKETS & LAUNCHERS

FIG 2 Loading old type 20cm rocket into launcher. Base plate is in reverse position.



TYPE 4 20 CM ROCKETS & LAUNCHERS

FIG 3 Side view of launcher open for loading. Base plate is reversed.

68 MM ROCKET & LAUNCHER

1. GENERAL

A number of these rockets have been captured on Luzon. Their type and use is unknown, but the launchers recovered were made in 1939, so the rocket may be an early experimental type. No stabilising fins have been recovered, although a screw fitting in the base may be an adapter for fins.

2. DESCRIPTION (Figs 1 - 2)

(a) Rocket: This consists of a tubular steel body with a hollow ogival nose cap slip-fitted over the forward end and secured in place by three screws with large heads. These screw heads project slightly out from the main body and are used to guide the rocket in the three grooved rails of the launcher. The conical base plate is screwed into the base of the projectile. The rear of the base plate is solid metal into which are drilled four equally spaced jets. The jet holes are 5/16 in. in diameter and are drilled so they are focused on the diametric centre of the propellant, which has a cone shaped recess approximately 1/2 in. in diameter at the top at that point. The jets are not angled and could not cause the rocket to be spin stabilized. There is a 3/8 in. diameter recessed threaded sector in the centre of the base plate, into which, apparently a tail fin assembly or a line adapter is screwed.
The entire main body of the rocket is filled with propellant. No initiating devices have been discovered, and the method of ignition is unknown. The rocket is coloured black, with no bands or markings. All metal parts of the rocket are machined. Physical data is as follows:

Length, overall	10.37 ins
Forward diameter	2.57 ins
After diameter	2.65 ins
Length of nose cap	3.15 ins
Length of body section	4.81 ins
Length of base section	1.95 ins

(b) Launcher: The launchers recovered were in excellent condition and showed no indication of ever having been fired. For convenience in carrying the launcher can be broken down into two parts: a tripod mount and a launching rack assembly. The launching rack assembly consists of triple rail guides mounted on a revolving carriage. One rail is on the top of the assembly, with the others spaced 120 degrees below the upper track. The rocket rides in slots in the rails and is held in firing position as it rests against stop blocks in the slot, the blocks being located 17½ ins from the forward end. At the forward end is a 240 degree spacing segment, to the rear is a second similar spacing segment, and on the after end is welded a circular reinforcing ring. Mounted on the rear spacing segment are the trunnions. The trunnions rest in trunnion

bearings on mounting brackets which are bolted to a circular base plate. In the centre of the base plate is a square hole to receive the square projection of the traversing gear. Three pin studs on the bottom of the carriage base plate aid in stabilizing the launching rail assembly when it is mounted on the tripod.

The head of the tripod consists of a circular steel plate with a built up perimeter to support the bearing surface for the launching rail assembly. The tubular steel tripod legs are unequally spaced, the rear one being equidistant from the forward ones, which are spaced 90 degrees apart. The legs are freely hinged, thus making it possible to level the tripod by means of a plumb bob hanging from the mounting bracket. The traversing handwheel is mounted in a vertical position on the left of the tripod. The handwheel turns a horizontal shaft which terminates in a worm gear. The worm gear engages a spur gear. Sweated into the spur gear is a square projection which serves to turn the launching rail assembly. The traversing indicator is mounted on the tripod head above the rear leg and points to a scale screwed on the carriage base plate. The elevating handwheel is fixed vertically on the right mounting bracket of the launching rail assembly, and turns a horizontal shaft which terminates in a worm gear. The worm gear engages a spur gear attached directly to the trunnion. An elevation indicator on the left trunnion points to the elevating scale which is screwed to the mounting brackets. Sights are of the open post type. The front sight is mounted on the forward spacing segment and the rear sight is mounted on the rear spacing segment.

Further details are:

Length of rails	31⅛ ins
Width of guide slots	5/16 in.
Depth of guide slots	1/8 in.
Height of trunnion above carriage base plate	9 1/8 ins
Diameter of carriage base plate	12 9/16 ins
Diameter of tripod head	11 1/8 ins
Length of legs	37 1/4 ins
Weight of tripod	30 lbs
Weight of launching rail assembly	60 lbs
Traverse, total	50 degrees
Maximum elevation	90 degrees
Maximum depression	NIL

3. CONCLUSION

It is believed possible that this rocket is intended as a line throwing device, and that a line adapter may be used in place of stabilizing fins. This theory is strengthened by the fact that there is no bursting charge in this round.

(SOURCE: USASOS)

68MM ROCKET & LAUNCHER

Fig 1 - Launcher

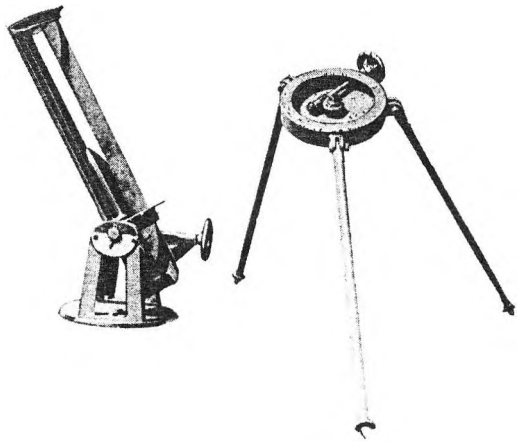


Fig 2 - Launcher disassembled to show traversing mechanism.
Rocket in place on launching rails.

NO 25 (250 KG) NAVY BOMB MODEL 2

1. GENERAL

This bomb was captured on Leyte, Philippine Islands. There were very few of these streamlined bombs in the dumps on the island, and, as with previously encountered specimens, the manufacturing dates were old. This bomb has been recovered in earlier campaigns, but has not been fully reported.

2. DESCRIPTION (Figs 1-2)

The bomb is streamlined and has a filled tail cone. It is of two piece construction, the nose and barrel being manufactured as one piece. The tail cone is threaded and screws directly into the bomb barrel. No coupling ring is used. Four steel fins are welded to the tail cone by a continuous weld and are supported by box-type struts. The bomb is suspended horizontally by a single Navy type lug.
Probable fuses are A-3(a) in the nose and B-3(a) in the tail. Both are impact fuses.
Additional details are as follows:-

Overall length	1¼ ins
Length of body (nose to junction at base)	44¾ ins
Length of tail fins	24¾ ins
Maximum diameter of body	14 ins
Width of tail diagonally	14-3/16 ins
Wall thickness	9/16 ins
Bomb weights:	
Tail section (empty)	13.5 Kg.
Body (empty)	138.28 Kg.
Total weight of bomb case..	151.78 Kg.(334 lbs)
Weight of filling (by diff)	104.00 Kg.(229 lbs)
Total weight of bomb	255.78 Kg.(563 lbs)
Loading factor	40.7%

3. FILLING

The filling is Shimose (picric acid), cast directly into the body and tail cone which are protected by lacquer. The auxiliary booster is pressed tetryl. The following information on the explosive filling is printed on the label found on the explosive at the base of the bomb body:

Bursting Charge for No. 25 Ordinary Bomb Model 2

	Bursting Charge	Booster
Type of powder	Shimose(picric acid)	Tetryl
Lot number	407	20
Date of manufacture	February 1933	December 1933
Date cast or pressed	January 1934	January 1934
Weight of explosive	109.4 Kg.	.73 Kg.
NAVAL POWDER FACTORY		

4. COLOUR AND MARKINGS

The bomb is marked according to the Navy's old colour code. It is grey overall with a green nose and green tail struts, and has two red stripes 180° apart running from the tip of the tail cone 90° from the suspension lug. At the after end of the barrel and the forward end of the cone are stencilled the manufacturer's symbol and matching serial numbers. In addition, one of the two specimens examined had a date stencilled on the barrel, presumably referring to the date of filling. This has not been observed on any other type of Navy bomb when marked with the old colour code.

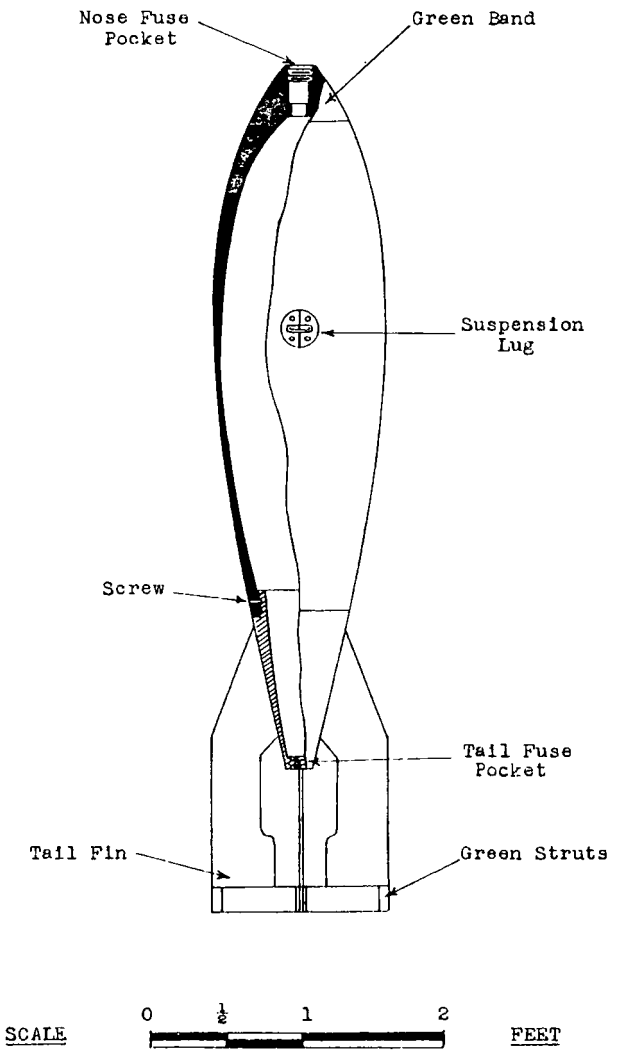
(SOURCE:- MEIU)

NO 25 (250 KG) NAVY BOMB MODEL 2

FIG 1

NO 25 (250 KG) NAVY BOMB MODEL 2

FIG 2



WOODEN LAND MINE

1. GENERAL

This is not an improvised mine, as it is manufactured in a standard form according to standard specifications. The construction of all recovered mines was identical. Ten are packaged in a wooden case for shipping. Fuses are packed separately. The mine examined was recovered on Iwo Jima.

2. DESCRIPTION (Fig 1)

The complete mine consists of a wooden box, Type 88 explosive charge contained in a rubber bag, threaded rubber fuse seat, and fuse. The box is made of 9/16 in. boards and has dove-tailed sides fastened by six nails at each corner. The bottom is secured to the sides by eight screws. The threaded rubber fuse seat is nailed to the underside of the lid with three nails, and a hole 1 5/16 ins in diameter through the lid is provided to allow insertion of the fuse into the rubber pocket. The Type 88 explosive and its rubber container, the threaded rubber fuse seat, and the fuse are the same as the ones used in the Ceramic Land Mine, Type 3.

Additional data is as follows:

External length	$7\frac{1}{8}$ ins
External width	$7\frac{1}{8}$ ins
External height	5 ins
Internal dimensions	6 x 6 x $3\frac{3}{4}$ ins
Total weight (without fuse)	6 lbs 4 ozs
Weight of explosive	4 lbs 8 ozs

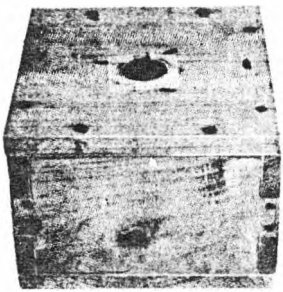
3. REMARKS

The use of thirty-seven steel nails and eight steel screws in the construction of this mine will probably allow detection by mine detectors.

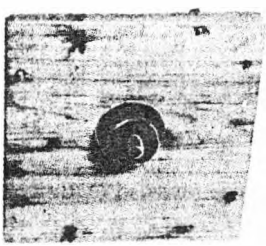
(SOURCE:- MEIU - No. 4)

WOODEN LAND MINE

FIG 1



A



B

C

A Mine
B Lid and fuse pocket
C Mine body with explosive filled rubber sack

44 SECOND TIME & IMPACT FUSE

1. GENERAL

This is a combination time and impact nose fuse which was recovered in the Marianas. As the fuses recovered were not contained in projectiles, and there is no information available in captured enemy documents, the use of the fuse is as yet undetermined. The Japanese designation, also, is not certainly known. The fuse examined was manufactured in October 1943, at Tokio No. 1 Army Arsenal.

2. DESCRIPTION (Figs 1 - 3)

The fuse consists of: (a) Fuse body (including time firing mechanism), (b) Base plug, (c) Lower time ring (movable), (d) Upper time ring (fixed), (e) Vent positioning sleeve, (f) Vent locking ring, (g) Bellevue springs, (h) Vent cap, (i) Nose piece (including impact firing mechanism, and (j) Protective cap. The fuse body, time rings, vent positioning sleeve, and vent locking ring are made of brass, while the vent cap, nose piece, and base ring are made of brass, while the vent cap, nose piece, and base plug are of aluminium. The striker extension is wood. On the fuse body is stamped "Tokyo Army Arsenal, Oct. 1943," while on the vent cap is the symbol of the Hiroshima Army Ordnance Branch Depot.

(i) Delay Train: The movable delay train has setting markings from 1 to 44 secs, in half-second intervals, with a safe setting mark midway between the 44 and 1 second marks. Opposite each other when set on safe, is the symbol  stamped on the outside of both rings. This character is one of a group which means "set to explode".

(ii) Vent Positioning Sleeve: This separates the time rings from the central fuse body. Vertical grooves in the sleeve allow the gases from the burning time rings to pass off, and the key prevents the sleeve from turning. The upper time ring is also held stationary by the key which screws into the central fuse body.

(iii) Vent Locking Ring: This screws on the central fuse body and secures the two time rings and the sleeve. It is held off the upper ring by the bellevue springs. Holes in the ring allow the escape of gases from the burning time rings. The ring is further secured by a grub screw. The vent cap screws onto the upper time ring to add to the fuse form. It also contains holes for the final escape of the time ring gases.

(iv) Nose Cap: Contained in the nose cap is the complete impact firing mechanism, consisting of the wooden striker extension, striker, centrifugal detent, detent spring, and primer cap. This whole piece is similar to the type 100 small instantaneous fuse used in 20 mm

ammunition.

(v) Fuse Body: This has two longitudinal flash channels through its central part to allow the flash from the impact primer to ignite the black powder magazine in the base. The time firing pin, safety spring, and time primer cap are also housed in the central fuse body. A transverse hole in the body between the time firing mechanism and upper time ring allows the flash of the primer cap to ignite the upper time ring. The fuse is stored with a protective cap screwed on the fuse body just below the lower time ring. It is much the same design as the cover of the Type 100 combination mechanical time and impact fuse for the Japanese 9 cm AA gun.

General Data:

Overall length	77 mm
Length visible in projectile ..	67 mm
Diameter of fuse base thread ..	46 mm
Maximum diameter	53 mm
Threads per inch (R/H) base ..	13
Weight of fuse without cover ..	19 1/8 ozs
Weight of nose piece complete ..	3/8 oz.

3. OPERATION

As the projectile is fired from the gun, set-back causes the time striker to overcome the safety spring and hit the time primer cap. The flash of this cap escapes past the striker due to the latter's four grooves and through the hole in the fuse body, igniting the upper time ring. Approximately half of the set time burns in the upper ring, at which time the lower ring is ignited. A black powder flash channel ignites the black powder magazine in the base on completion of set time.
Centrifugal force causes the detent to overcome its spring and moves out from under the striker. Upon impact, the nose is crushed, driving the striker extension and the striker into the impact primer cap. The flash from this cap passes down through the flash channels in the central fuse body to ignite the black powder magazine in the base plug.
An analysis of the time ring materials revealed their composition to be: Potassium nitrate, 52.3%; sulphur, 28.6%; and carbonaceous material, remainder.

4. SAFETY FEATURES

(i) Time: The time striker for this fuse is free to move at all times, being held from the primer only by a safety spring. Any jar great enough to cause the weight of the firing pin to overcome the resistance of the spring will cause the striker to impinge upon the primer, and if set off, the flash will ignite the upper powder train time ring. However, the striker is quite light and the spring is relatively strong, thus necessitating a great jar to cause the striker to impinge upon the primer. With the fuse on safe, the lower delay ring cannot be ignited.

(ii) Impact: The impact striker is held in the safe position by a spring-loaded detent. It will not arm

until rotation of the fuse is great enough to cause the detent to compress the spring, move out, and release the striker.

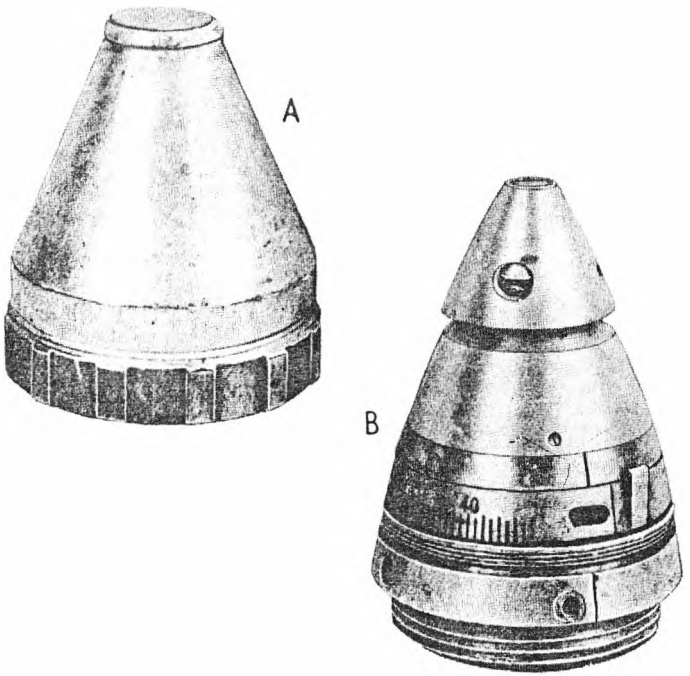
5. CONCLUSIONS

It may be assumed that this fuse can be used wherever the Type 89, 4-ring,30 second, nose time fuse can be used, since the threads of the lower fuse body are identical on both.

(SOURCE:- MEIU No. 4)

44 SECOND TIME & IMPACT FUSE

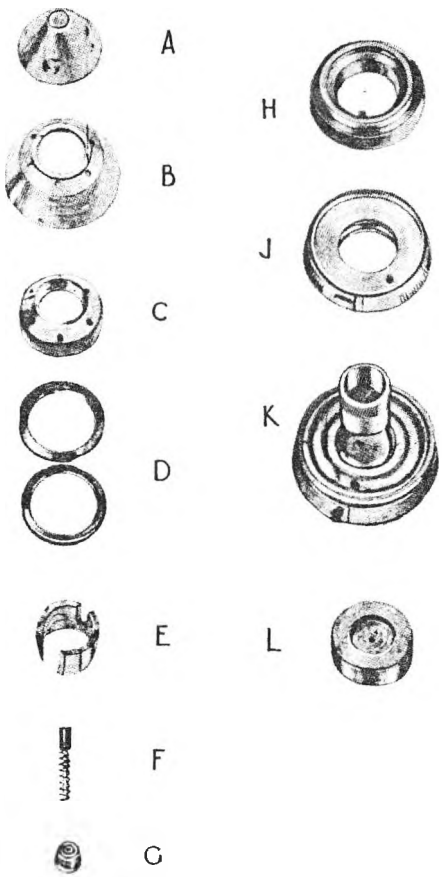
FIG 1



A. Fuse cap
B. Assembled fuse

44 SECOND TIME & IMPACT FUSE

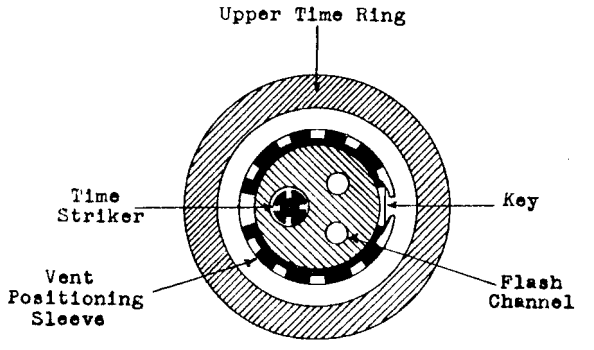
FIG 2 Components.



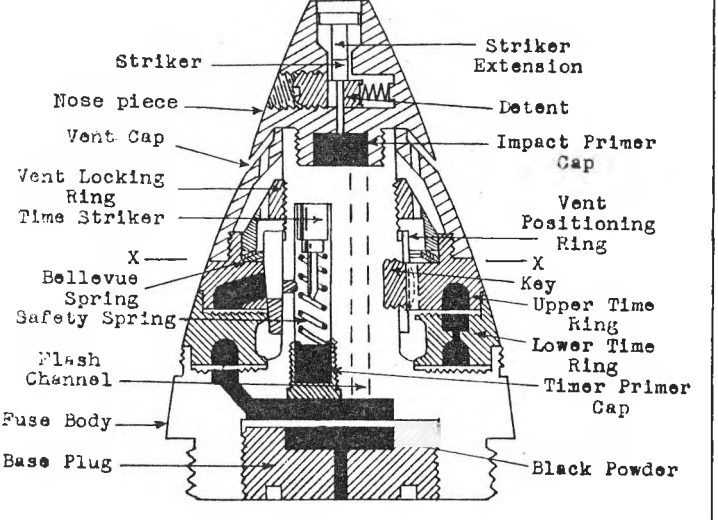
A Nose piece
B Vent cap
C Vent locking ring
D Bellevue springs
E Vent positioning sleeve
F Time striker and safety spring
G Time primer cap
H Upper stationary time ring
J Lower moveable time ring
K Fuse body
L Base plug

44 SECOND TIME & IMPACT FUSE

FIG 3



SECTION X-X



SCALE INCHES

BOMB DISPOSAL THERMITE CHARGE

1. GENERAL

This charge, which the Japanese call the "Temporarily Designated Mark I Incendiary Cylinder, 'A' Large," is used by bomb disposal squads in an attempt to obtain a low order detonation and subsequent combustion of unexploded bombs. The charge, which was found on Saipan, is simply a thin-walled, metal container filled with a mixture of commercial thermite, and having a delay igniter.

2. DESCRIPTION (Fig 1 - 2)

(a) Incendiary Charge: The cylindrical metal container is painted grey overall and has a 1 3/16 ins stripe around the body 13/16 in. below the edge of the cover. A label 11 ins by 7⅝ ins, upon which appears the diagrams and instructions for use, covers the larger part of the side of the container.
The container has a single, side carrying handle 1½ ins from its top. The cover is sealed with a white, waterproof tape, and the igniter well is covered by waterproof paper secured by wax. Surrounding the igniter well is a mixture composed of: Aluminium, 10%; iron oxide, 26%; barium nitrate, 28%; polysulphide synthetic rubber, 36%. The remainder of the container is filled with a mixture of commercial thermite (iron oxide, 65.5%, aluminium, 35.5%).

Weights and dimensions are:

Overall length	11 15/16 ins
Diameter	4 5/16 ins
Diameter of igniter well..	⅞ in.
Depth of igniter well ..	¼ in.
Total weight	13½ lbs

(b) Igniter: As an igniter was not recovered the information concerning it, which is sketchy and incomplete, was taken from the label of the thermite charge.
It is supposed to be contained in a paper box which is attached to the charge, and consists of 8.2 ft of safety fuse with the igniter at one end and a match head at the other. The igniter, which is bright red in colour, is inserted in the igniter well of the charge. The match head ignites the fuse when it is struck against an accompanying striking block. If the match head is damp or decomposed it can be cut off and the fuse lit with a match. The fuse burns at about 37 secs per foot, giving an approximate total delay of 5 mins.

3. OPERATION

Place the charge on the ground, remove the waterproof tape, and take off the cover. Tear and remove the waterproof paper covering the igniter well. Remove the fuse from the attached paper box and insert the

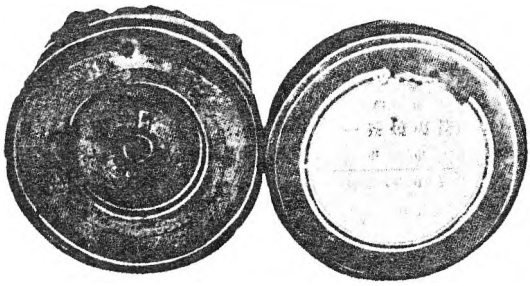
bright red end into the igniter well, seating it firmly. Place the charge on the periphery of the unexploded bomb as far from the misfired fuse as possible. Scoop the earth out around the charge so the molten slag will accumulate on the surface of the bomb casing. Strike the match head and retire to a safe distance. The thermite charge will burn violently for about 40 secs and a low order detonation should ensue. If the bomb casing is not melted, a safety period of from 20 - 30 minutes should be observed and the process repeated. The number of thermite charges to be used is determined from the following table which appears on the label of the charge:

Bomb Weight	No. of Incendiary Cylinders Used		Remarks
	Large "A"	Medium "A"	
Less than 60 Kg		1	Increase proportionately according to thickness of bomb case.
60-200 Kg	1	2	
250 Kg & above	2 to 3	3 to 4	

(SOURCE:- MEIU - No. 4)

BOMB DISPOSAL THERMITE CHARGE

FIG 1

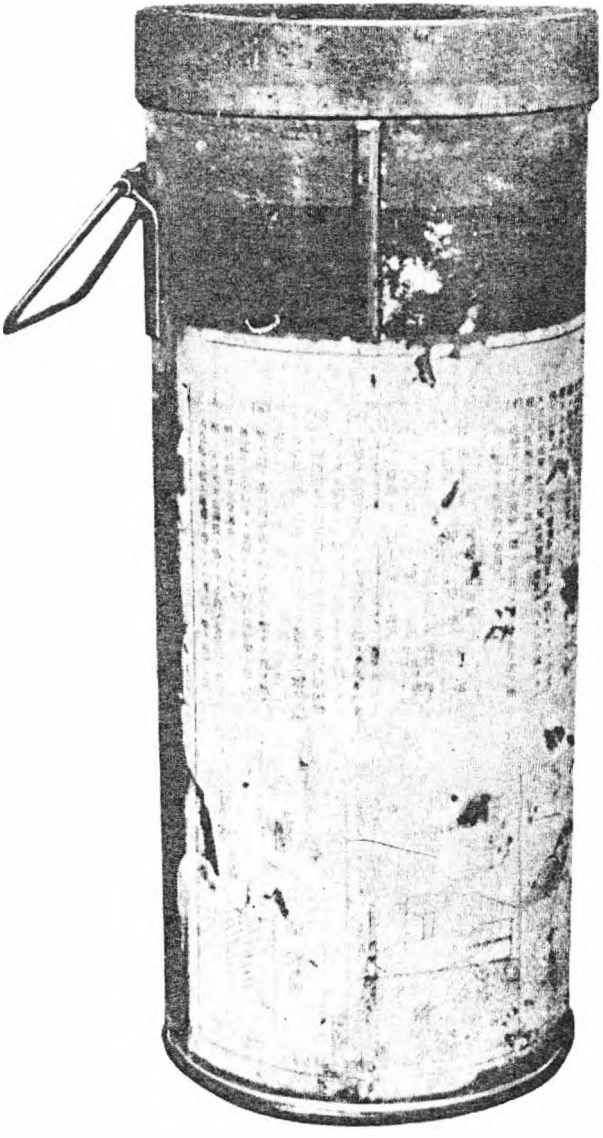


A B

A Cover off - igniter well showing
B Cover

BOMB DISPOSAL THERMITE CHARGE

FIG 2



12 CM HE MORTAR BOMB

1. GENERAL

This bomb is of the conventional streamlined, fin-stabilized type, and uses an ignition cartridge and powder-increment type of propellant. The projectile uses the standard type 100 mortar fuse and weighs 26$\frac{1}{2}$ lbs. Its construction resembles the Type 3 Navy HE mortar shell.

2. DESCRIPTION (Figs 1 - 2)

(a) Body: The body of the projectile is made of steel and is tear-drop shape. It is painted black overall, with a yellow band just above the bourrelet and a red nose tip band. The bourrelet has five bearing surfaces or gas check rings.
The nose booster-fuse adapter is externally threaded at its base to fit into the bomb, and internally threaded at its forward end to take a Type 100 mortar fuse. It is also threaded internally at its base to take the booster cup. A grub screw in the adapter is used to secure the fuse. Two transverse spanner holes in the adapter are located just above the external junction of the adapter and projectile body.
Welded to the aft end of the bomb body is a tube which takes the propellant cartridge and to which are welded the fins. This tube contains 42 small transverse perforations just above the fins. The 12 fins are made of six, small U shaped sheets of steel, the bottom of the U being welded to the steel tube. The main charge is T N T and the booster pellet R D X and wax.
The date and place of manufacture (November 1943 - Osaka) are stamped into the projectile just aft of the bourrelet, while the date and place of loading (1944 - Okayama) are painted in white on the side of the bomb.

General data:

Overall length (unfused)	22.5 ins
Diameter of bourrelet .. .. ..(120mm)	4.7 ins
Length of bomb body	15.6 ins
Length of propellant tube	6.2 ins
Diameter of fins	4.7 ins
Diameter of propellant tube	1.5 ins
Diameter of perforation holes	.2 in
Width of one fin	1.6 ins
Length of fins	3.9 ins
Length of fuse adapter	1.9 ins
External threads of adapter	
Per inch (L/H)	13
Outside diameter	2.6 ins
Length of threaded portion ..	.6 in.
Diameter of booster cup	1.2 ins
Length of booster cup	2.8 ins

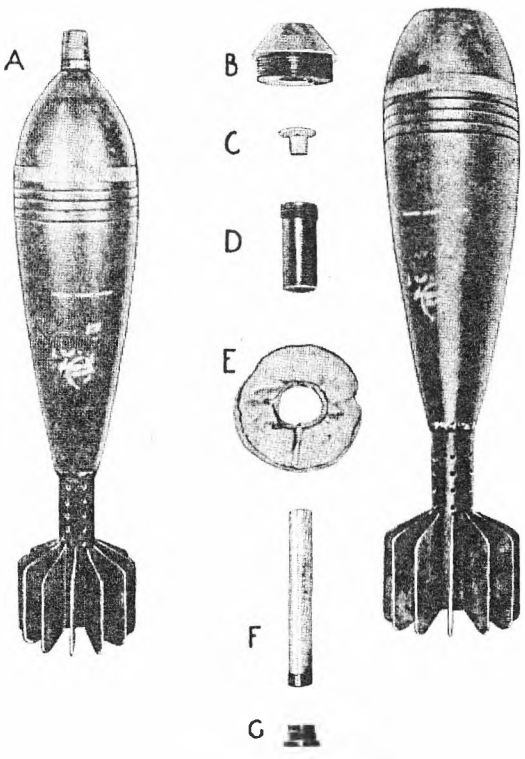
Threads of booster cup	
Per inch (L/H)	13
Outside diameter	1.3 ins
Length of threaded portion ..	.6 in.
Threads of fuse pocket	
Per inch (L/H)	13
Outside diameter	.9 in.
Length of threaded portion ..	.6 in.
Weight of empty round	20.5 lbs
Weight of main charge	6.0 lbs

(b) Propellant: The cartridge case, which fits inside the propellant tube, is made of cardboard and has a thin, black plastic cap on its after end. A cardboard disc is used to seal the forward end. It is held in the tube by a steel screw-in (R/H) primer of the type found in the case of the 88 mm AA round. (Vide AMF Tech Int Sum No. 22) The propellant cartridge is 5.8 ins long.
The propellant increments are flat, circular, blue lacquered silk bags which fit around the propellant tube just above the fins. There are five increments for each round and each increment weighs 2⅞ ozs. The propellant powders are the usual type found in every other Japanese mortar.

(SOURCE:- MEIU No. 4)

12 CM HE MORTAR BOMB

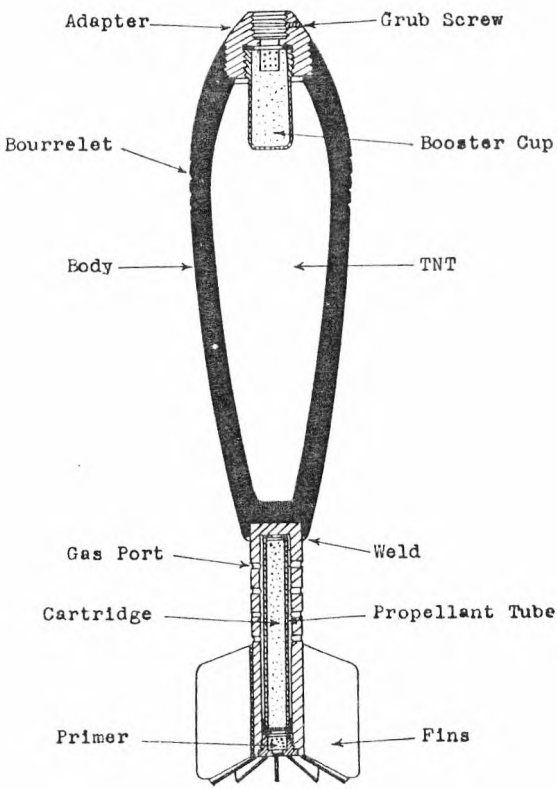
FIG 1 Projectile and Components



A Fuse
B Adapter
C Gaine cup
D Booster cup
E Propellant increment
F Cartridge
G Primer

12 CM HE MORTAR BOMB

FIG 2
Sectional View



SCALE 0 2 4 6 8 INCHES

NAVY TYPE O PARACHUTE FLARE MODEL I

1. GENERAL

A specimen of this flare, recovered at Palau, is believed to be of a type which our troops have reported as giving an intense light while seemingly hanging motionless in the air. It burns for three minutes forty seconds and casts a bright white light.

2. DESCRIPTION (Figs 1-3)

The flare consists of a body piece and a parachute. Its overall length is 42½ ins and it weighs 84 lbs (38 kg).

(a) Flare Body: This consists of three sections: a nose piece, barrel and the end cap. The nose piece is soldered securely to the barrel and the end cap is held in position by spot soldering in four places. Four fins are spot welded to the after two fifths of the barrel. Suspension is horizontal with a typical Navy lug.
The flare is bluish-grey in colour with a ¼ in. red band just below the end piece. Internally it consists of two sections: the illuminant and the parachute. They are joined together by 65½ ins of ¼ in. wire rope. At the junction of the parachute shrouds and the wire rope is a shock absorber made of ⅜ in. bungee strands.
The illuminant is contained in a cardboard cannister covered by a sheet brass plate .025 in. thick. The after end is closed by a steel plate screwed to the cylinder. The wire rope is attached to this end by means of a shackle. The forward end is open and fits against a wooden block in the nose piece. This end contains a first fire charge 3 ins in diameter and ¼ in. thick in the centre of the illuminant.
The composition is silvery-grey and appears to be a hard pressed mechanical mixture of powdered magnesium, asbestos flakes and other ingredients to account for its weight.
Additional flare data is as follows:

Overall length	42½ ins
Diameter of body	7 ins
Length of end cap	3 ins
Length of tail fins	15 ins
Thickness of wall	.05 in.
Weight complete	38.0 Kg.
Weight of outside container	8.6 Kg.
Weight of flare composition	23.6 Kg. (Approx)
Length of illuminant container	25½ ins
Length of illuminant	23¼ ins
Diameter of illuminant	5½ ins

(b) Parachute: This is packed compactly in the after end of the barrel, and a layer of cardboard between the flare case and the parachute ensures easier and smoother ejection. The parachute weighs 3.2 Kg, is 11 ft 10 ins in diameter, and consists of 32

peripheral shrouds and 8 central shrouds each 12 ft 3¼ ins long.

(c) Fusing: The flare can take either the D-3(a) or the D-4(a) fuse in the nose. Both function mechanically after a certain number of vane turns and both have black powder explosive trains which produce a flash at the base of the fuse to ignite the first fire charge. In 1942 and 1943 Navy parachute flares recovered in a fired condition have had the D-3(a) fuse. The D-4(a) is designated "Fuse for Type O Parachute Flare, Model I".

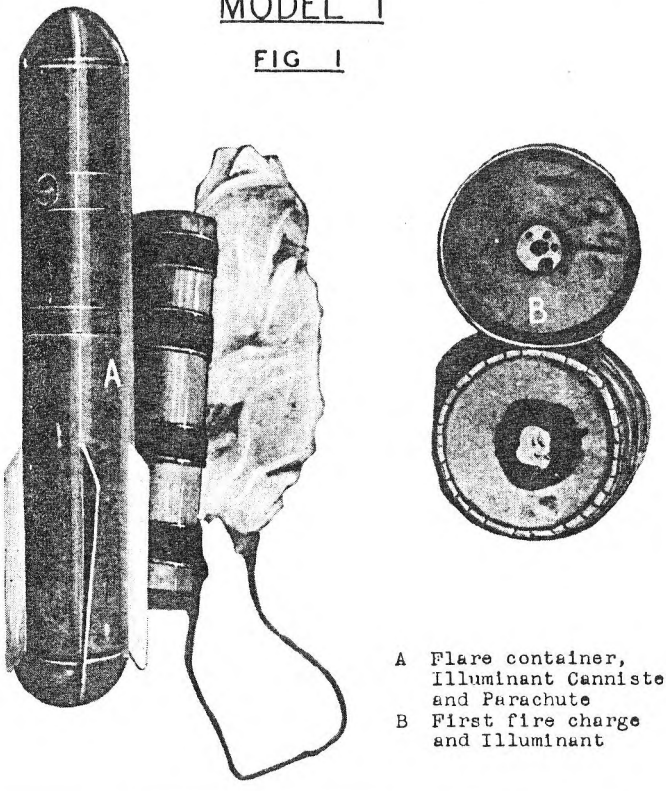
3. OPERATION

When the aerial burst fuse functions it ignites the flare composition. The expanding gases cause the end cap to be torn off and eject the parachute and illuminant.

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

NAVY TYPE O PARACHUTE FLARE MODEL I

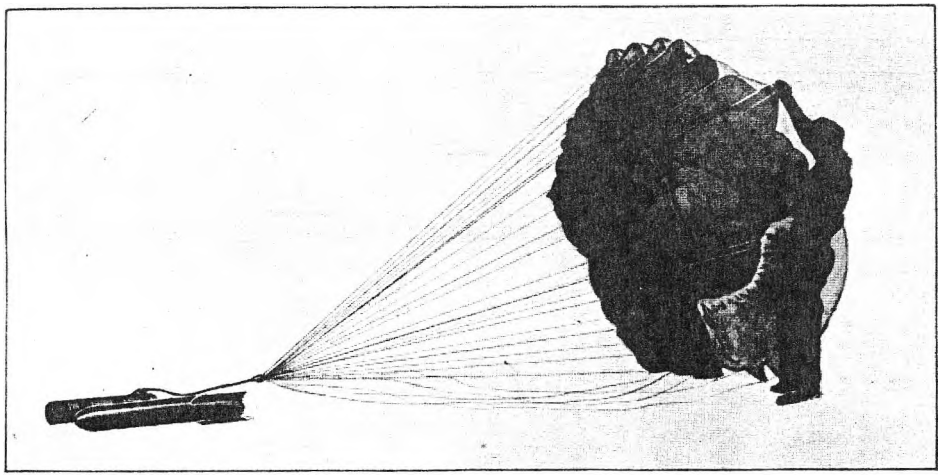
FIG I



A Flare container, Illuminant Cannister and Parachute
B First fire charge and Illuminant

NAVY TYPE O PARACHUTE FLARE MODEL 1

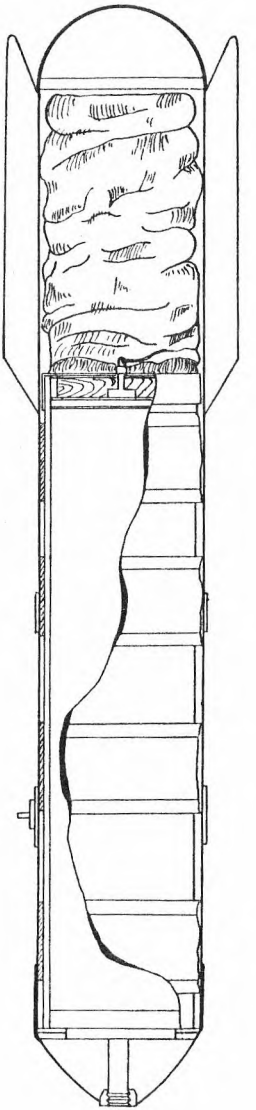
FIG 2 Parachute Inflated



NAVY TYPE O PARACHUTE FLARE

MODEL I

FIG 3



SCALE 0 6 12 24 INCHES

AIRCRAFT FLARE TYPE 90

1. GENERAL

Information on the labels of this flare and its similarity to the British Aircraft Flare, Landing Wingtip Mk IV suggest that they are Wingtip flares. However, their greater illuminating power and short duration of burning suggest that they are used for illuminating a target rather than for landing.

2. DESCRIPTION (Figs 1-3)

The flare consists of a body, filling, ignition system and fuse.

(a) Body: The flare is approximately 200 mm long and 53 mm in diameter and it weighs 625 gms. It has a 26 S.W.G. tinplate body closed at one end by a circular wooden block to which is secured, by four steel screws, a perforated zinc coated steel plate 1 mm thick and 36 mm in diameter. The end of the body is turned over to retain the block in position. The opposite end is closed by a removable lid of 24 S.W.G. tinplate which, during transit, is held in place by a length of cloth-backed adhesive tape.
The inside of the body is lined with long fibred brown paper attached to the wall by shellac to prevent contact of the filling with the metal.
A label on the lid and stencilled markings on the body of the flare are translated:-

On lid - "Type 90 Aircraft Flare
Manufactured September 1938
Tokyo Arsenal".
On body- "Type 90 Aircraft Flare".

(b) Main Filling: The main filling consists of approximately 420 gms of illuminating composition. Analysis gave the following results:-

Barium nitrate	23%	
Potassium nitrate	7.5%	
Magnesium powder	53%	
Paraffin wax	8%	
Resinous material	6%	97.5%

Approximately 1% of aluminium and iron and 0.6% of sulphur were also present probably as impurities in the constituents. The magnesium used is irregular in size and shape and consists mainly of fine magnesium turnings. Screening showed that:-

100% passed B.S. Sieve No. 44
50% passed B.S. Sieve No. 100
7% passed B.S. Sieve No. 300

(c) Ignition System: Embedded in the top of the filling are two igniter pellets 10 mm long and 10 mm diameter, having the following composition:-

Aluminium (super fine flake)	24.5%	
Sulphur (free)	20.1%	
Potassium nitrate	51.7%	
Resinous material	3.7%	100.0%

Protruding from the centre of each igniter pellet is a 20 mm length of quickmatch which is tucked under a 250 mm length of quickmatch laced in two circuits through perforations in a zinc plate 1 mm thick and 52 mm in diameter.
The igniter end of the body is serrated and the serrations are turned over to secure the perforated plate with the interlaced quickmatch firmly against the surface of the filling. On top of the perforated plate is a 50 mm diameter disc of starched cotton gauze (buckram) to which are attached by shellac, on the underside, six 40 mm strands of quickmatch and on the upperside, four 10 mm diameter cardboard stops which bear against the inside surface of the lid.

(d) Electric Fuse: An axial cavity, 10 mm in diameter, in the filling is lined with a rolled paper sleeve. This cavity houses an electric igniter which is held in position in the flare by a small wooden block recessed into the larger wooden block and retained by the perforated plate. A layer of paraffin wax covers the top and forms a seal.
The electrical igniting fuse consists of a bridge wire fuse head embedded in priming composition and connected to 22 S.W.G. D.C.C. copper wires approximately 300 mm long and housed in a rolled paper tube 180 mm long, 6 mm in diameter coated with shellac. A choke in the tube 23 mm from one end supports the fuse head assembly and the two leads project approximately 150 mm from the other end.
The free ends of the two insulated leads are bared for a length of 25 mm for connection to firing terminals. The electric fusehead is of the low tension type and the bridge wire is surrounded by a small quantity of match-head composition embedded in 0.5 gm of priming composition. Qualitative analysis of the match-head composition showed it to be of the potassium chlorate-antimony sulphide type. The priming composition cast around the match-head consists of 97% sulphur and a small quantity of paraffin wax.
The conducting foils of tin to which the leads and bridge wire are attached are mounted on two pieces of red fibre sheet each 0.5 mm thick coated with shellac and stuck together with shellac.

3. OPERATION

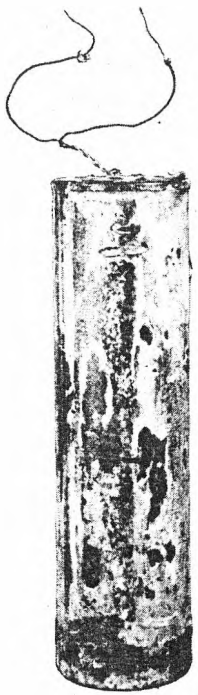
The flare is connected to the firing circuit, which when closed, fuses the bridge and ignites the match-head and priming compositions surrounding it. The flash is picked up by the quickmatch attached to the gauze and transmitted to the quickmatch laced through the perforated plate. This ignites the quickmatch protruding from the igniter pellets and thus ignites the illuminating composition. The lid of the container is blown off and the flare composition burns with an intense pale green flame.
A comparison trial was carried out with the similar British store, Flare, Aircraft, Landing, Wingtip Mk IV (filled S.R. 512B). The British flare gave an orange

illumination of approximately 21,000 candle power for a period of three and a half minutes. The Japanese flare gave a much more intense pale green illumination of approximately 55,000 candle power after 10 seconds, increasing to approximately 125,000 candle power at 20 seconds, when burning ceased.

SOURCE: MUNITIONS SUPPLY LABORATORIES
(through MGO Branch)

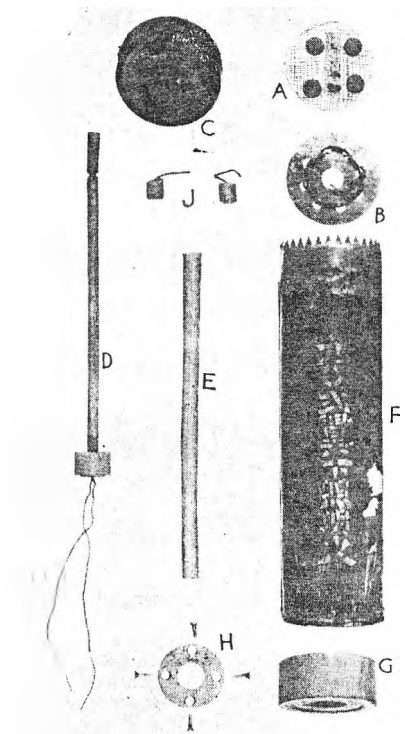
AIRCRAFT FLARE TYPE 90

FIG 1 Assembled Flare



AIRCRAFT FLARE TYPE 90

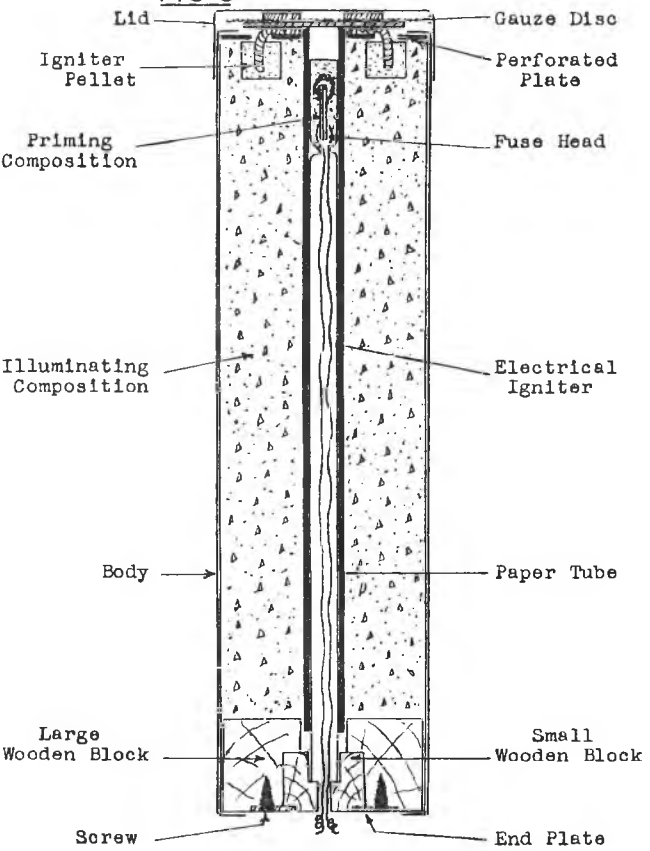
FIG 2 Components



A. Gauze disc (4 cardboard stops & quickmatch priming)
B. Perforated plate- quickmatch threaded through perforations.
C. Lid
D. Electrical igniter
E. Paper tube
F. Body
G. Wood block
H. End plate
J. Igniter pellets

AIRCRAFT FLARE TYPE 90

FIG 3



DIVISION - REGIMENTAL COMMUNICATION SET

1. GENERAL

This item of equipment embodies several new features. It is designed to permit an officer or responsible NCO to supervise confidential telephone-telegraph communications from division to regimental (or lower) headquarters.

2. DESCRIPTION (Figs 1-4)

The equipment consists of two items: a telegraph communication set for divisional HQ, and a relay set, Model No.4. The numbers marking the various components on each photograph correspond to similar numbers in the circuit diagrams.

(a) Telegraph Communication Set: This is installed at divisional HQ. The local telephone circuit is of normal construction except that it is superimposed upon the radio receiver circuit. A buzzer is connected into this circuit and is operated by a key to call the operator at the other end of the line by producing an audible signal in the loudspeaker. A button is used to adjust the buzzer. The outgoing line is connected to binding post No. 1, and a ground or metallic line is connected tc binding post No. 2.
The communications chief has a head-and-chest set plugged into jack No. 3, enabling him to listen to and monitor all communications from the set, and to engage in voice conversations. A telegraph operator has a head-and-chest set which plugs into jacks Nos. 5 and 18, and a telegraph key plugged into jack No. 6. This headset is of the split type: one ear phone being connected to the centre contact of jack No. 18 and to the ground for listening to the telegraph transmission, while the other ear phone connects directly to jack No. 5 for listening to voice and radio communications.
The output of a radio receiver plugs into jack No. 4 and the radio operator's headset plugs into jack No. 7. It should be noted that the radio operator will be unable to hear the radio receiver unless the headset of the chief operator is plugged into jack No. 3. All transmissions are so superimposed within the set that it is impossible for any transmission to be made without the knowledge of the chief operator, providing switch No. 20 is closed, and switch No. 19 is thrown, either to the right or left.
It is reliably reported that it was frequently the custom to have an additional operator for the telegraph, who had a telegraph relay in series with his key, which is plugged into jack No. 6; the relay operating a sounder in the usual manner. In this case, the operator may be some distance from the set itself, but the "regular" telegraph operator will monitor the transmissions. When switch No. 19 is thrown to the left, it connects the chief operator's transmitter into the circuit, allowing him to talk to either the telegraph operator or the operator at the other end of the line,

providing the line is not too long. If switch No. 20 is closed at the same time, it prevents the signal from the radio receiver from going out on the line and also materially reduces the volume of the radio signal heard in all headsets except that of the chief operator. When switch No. 19 is thrown to the right, the chief operator's transmitter is still connected to the circuit, but the telegraph key is grounded, which cuts it out of the circuit. This allows the chief operator to carry on telephone conversations without interference from the telegraph.

(b) Relay Set: This is located at a regimental or other subordinate HQ, and is connected to the line from the divisional set at binding post No. 1, while binding post No. 2 is connected either to the ground or to another metallic line. A telegraph key with a relay in series is plugged into jack No. 4, the relay being connected to a sounder in the usual manner. The operator's head-and-chest set plugs into jack No. 3.
With switch No. 5 thrown to the right, the operator closes key No. 7 and adjusts rheostat No. 8 until the telegraph relay operates satisfactorily. The switch is then thrown to the left and the set is ready for operation, either on telephone or telegraph, providing distances are not too great. The set is provided with a loudspeaker which gives an audible tone when the buzzer in the divisional HQ set is sounded. The operator may call divisional HQ by closing the key which operates a buzzer and an audible tone signal is heard in all headsets at divisional HQ.
A report from a reliable source indicates that the radio receiver operated up to 400 miles, while the telegraph line operated up to 20 miles. No figures were given as to the distance over which the telephone would work, but it is doubted that it would operate satisfactorily for more than a few miles. It is regretted that it has been impossible to operate this equipment under field conditions, due to the fact that no head-and-chest sets, key or relays, have been located.

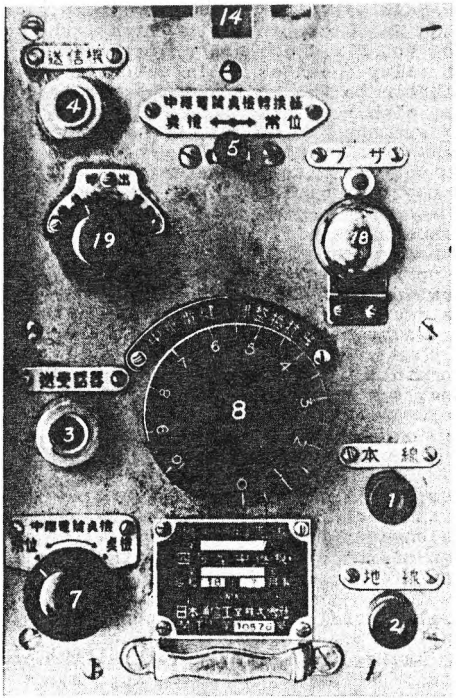
3. REMARKS

The system itself is very simple, and as the equipment is well designed and built, a minimum of difficulty should be encountered in its installation and operation. The design of the system seems to indicate a trend towards providing reliable communications, using but one reliable and highly trained man (chief operator) and several specialists who have been technically trained to perform one duty. This would be a natural result of having sufficient personnel who could be trained to perform any one given assignment. Obviously, a distinct disadvantage of the system is the number of personnel required for its operation.

(SOURCE:- USAFPOA)

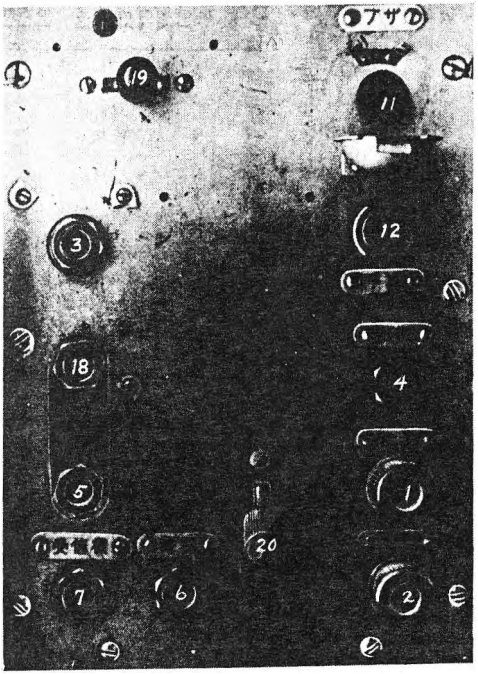
DIVISION - REGIMENTAL COMMUNICATION SET

FIG 1 Divisional Telegraph Set



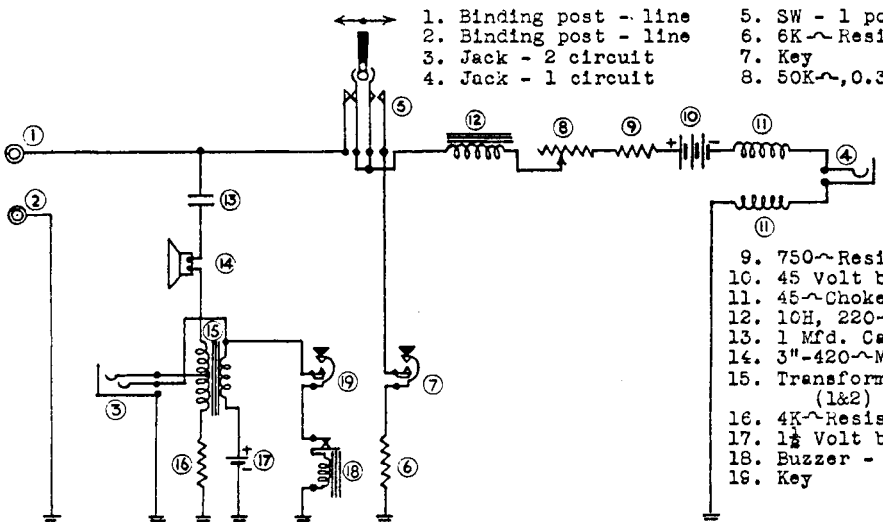
DIVISION - REGIMENTAL COMMUNICATION SET

FIG 2 Regimental Relay Set



DIVISION - REGIMENTAL COMMUNICATION SET

FIG 3 Circuit Diagram for Divisional Telegraph Set



1. Binding post - line
2. Binding post - line
3. Jack - 2 circuit
4. Jack - 1 circuit
5. SW - 1 pole - 3 pos.
6. 6K~ Resistor
7. Key
8. 50K~, 0.3W Var. Resistor
9. 750~ Resistor
10. 45 Volt battery
11. 45~ Choke coil
12. 10H, 220~ Choke coil
13. 1 Mfd. Capacitor
14. 3"-420~ Magnetic spkr.
15. Transformer
    (1&2) .4 (3,4,5) 24 CT
16. 4K~ Resistor
17. 1½ Volt battery
18. Buzzer - 8~ Coil
19. Key

DIVISION - REGIMENTAL COMMUNICATION SET

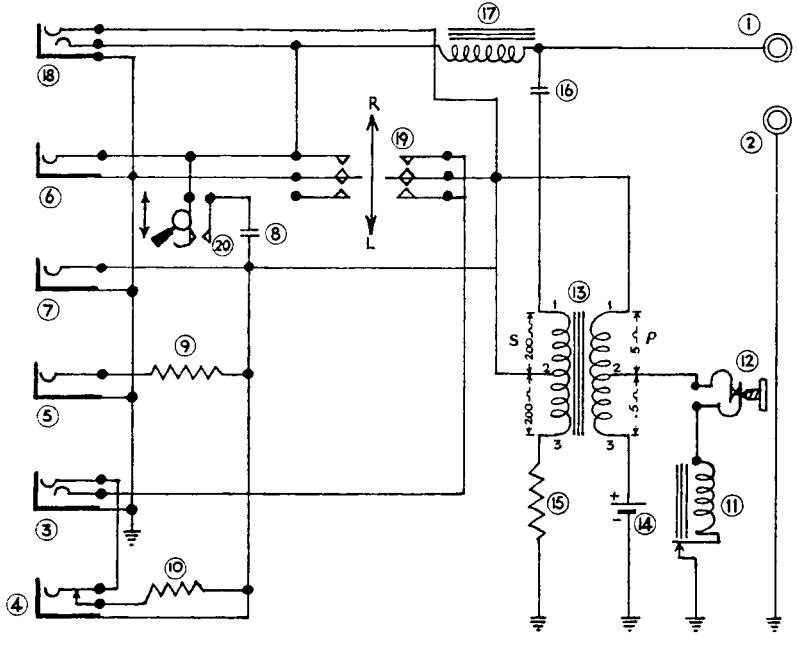


FIG 4 Circuit Diagram for Relay Set.

1. Binding post - line
2. Binding post - line
3. Jack - 2 circuit
4. Jack - circuit breaking
5. Jack - 1 circuit
6. Jack - 1 circuit
7. Jack - 1 circuit
8. 3 Mfd. - 500 Volt capacitor
9. 2K ~ 1½ Watt resistor
10. 2K ~ 1½ Watt resistor
11. Buzzer - 2½ ~
12. Test key
13. Transformer
14. 1½ Volt battery
15. 4K ~ 1½ Watt resistor
16. 1 Mfd. - 500 Volt capacitor
17. 5H - 135 ~ Choke coil
18. Jack - 2 circuit
19. Switch - Two pole - Three pos.
20. Switch - Single pole

MICROPHONE & HEAD RECEIVERS

1. GENERAL

The equipment comprises a microphone and a pair of head-receivers coupled to a terminating and junction box. The three items are complementary and form a composite communication station, probably used with fire-control equipment for naval or coastal defence purposes. The station, with a number of similar equipments, could be situated at various remote positions and connected by cables to a master control or Command Post.

2. DESCRIPTION (Figs 1 - 7)

The items were manufactured by the Oki Electric Co.Pty. Ltd., Tokio, and although they had been in tropical areas for some considerable time prior to examination, no deterioration or the remains of fungi growth was detected. The junction box weighs 4 lbs 12 ozs and the microphone and head-receiver assembly 31 lbs 3 ozs. The body of the junction box, microphone and head receivers are made of a light cast alloy. Robust construction and generous dimensions are features of the design, which has been carried out carefully with a view to heavy duty service. All fittings, such as screws, nuts, brackets, escutcheons, strips etc., appear to be made of brass and have been finished with a heavy nickel plating. Insulating supports and terminal strips are constructed of moulded material such as Bakelite, or alternatively, pressed or laminated fibre.

(a) Junction Box: This is constructed in two halves which may be separated by disengaging the two cover retaining screws and lifting the cover so that the hinge lugs slide off the hinge pins. This simple action facilitates maintenance and also provides a rapid means of putting the station out of service in an emergency.
The station is of the wall-mounting type; four lugs being provided on the junction box for this purpose. When not in operation the microphone clips into a leather-bound, spring-loaded retaining clamp attached to the cover, while the head-receivers rest on a metal bracket attached to the top of the base. Two external line or cable entries are provided; one at the top and one at the bottom of the base unit of the junction box. An effective seal between the cover and base of the box is provided by a cotton gasket recessed into the edge of the cover.
Metallic terminal identification strips are provided, the characters being clearly printed on the metal strip which appears to have been finally dipped into a transparent enamel of great durability. All switches are of the spring-leaf type and operate with a positive action. The cast alloy junction box is finished in a grey stove enamel.
The electric circuits for each half of the junction box

are clearly shown in the circuit diagram. The cover contains the microphone and pilot light switch, pilot light, condenser, and male portion of the inter-connecting five point contact strip. The base unit contains the female portion of the strip, terminal block and cable entries.

(b) Microphone: This is a heavy duty "carbon" type instrument finished with a high-gloss silver grey enamel. It is well constructed out of good quality materials and has several interesting features, the most important being the diaphragm. A spectroanalysis showed this to be made of pure copper, with the usual minute traces of lead. No sign of tarnish was apparent and it is thought that the copper disc surfaces may have been treated with a very thin film of gold applied by a process such as evaporation in vacuo. With such a process, the quantity of gold used would not necessarily show in the analysis. No other explanation can be given for the lack of tarnish and the excellent conductivity between the disc surfaces. Due to the weight and rigidity of this diaphragm (.03125 in. thick) the microphone is relatively insensitive. This feature has the advantage of lessening the effects of blast and extraneous noises being transmitted over the circuit when the equipment is used in action.

(c) Head Receivers: These are of the usual sensitive, electro-magnetic type fitted with rubber ear pads and head and chin straps. Each receiver has an impedance of 30 ohms and the two units are connected electrically in parallel giving a total input impedance of 15 ohms. The leads from the receivers are taken to a terminal strip in the microphone housing, which also contains another microphone switch and a tapped wire-wound resistance choke. Connection between the receivers and microphone housing, microphone housing and junction box, is carried out in three-core, tough rubber cable.

3. OPERATION

When the microphone is in the "stand by" position and clamped onto the junction box, the pilot light and microphone switch is automatically depressed by the microphone mouthpiece. The circuit of Fig 1 is then effective as indicated in the first diagram of Fig 2, i.e. the pilot light is connected straight across the external lines L1 and L2 from the command post. A "call" is signified by the 20 volt, 45 mA pilot light, which gives a bright white light when 20 volts are applied across L1 and L2. To answer a "call", the microphone is removed from the clamp, and with the head-receivers, is fitted to the observer. The action of removing the microphone from the retaining clamp releases the pilot light and microphone switch which places the pilot light out of circuit and re-arranges the circuit as shown in the second diagram of Fig 2.
Apparently, the steady 20 volts D.C. across L1 and L2 is modulated by speech actuating a "carbon" type microphone at the command or control post when the caller is communicating with the observer. This being so, the pulses developed across the 200 ohm resistance choke are passed on to the head-receivers which are connected across this choke via a 2 mfd blocking condenser. The purpose of the condenser is to prevent

the steady D.C. component in the line from polarizing the head-receivers.
When the observer is replying to the caller, the microphone switch on the side of the microphone housing is pressed in, and if necessary locked in. This transforms the circuit to the third diagram of Fig. 2. The 200 ohm resistance choke is disconnected from line L1 and one side of the head-receivers and replaced with one terminal of the microphone, the other terminal being connected to a tap on the choke. The microphone, in series with 50 ohms, now appears across L1 and L2. In this manner the 20 volt D.C. line potential is used for activating the microphone, which has been protected from the effects of a high line potential by the current limiting 50 ohm resistance choke. When the observer speaks into the microphone, the modulations generated are passed to lines L1 and L2 connected to the command post, and also to the observer's head-receivers in the form of a side-tone.

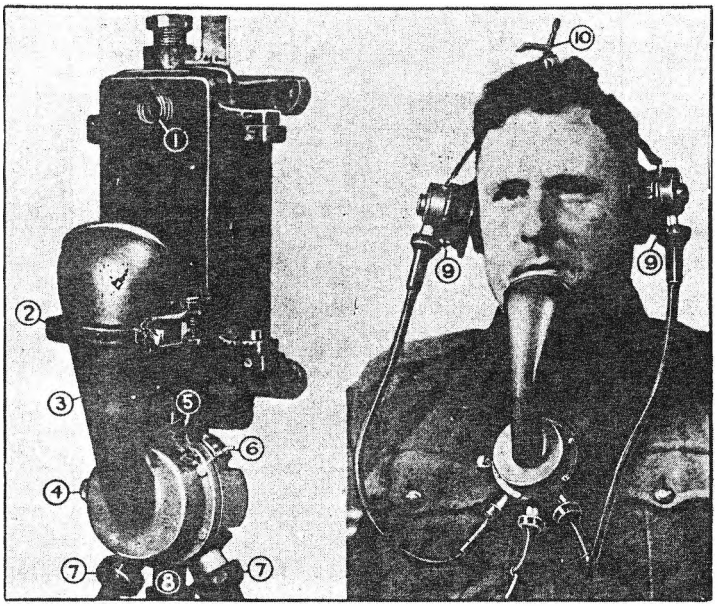
REMARKS

The station will operate with a potential of 20 volts D.C. applied across the two line input terminals. This may be interpreted to mean that two of these stations separated by a pair of cables having a loop resistance not greater than 8,000 ohms, and a battery of 20-22½ volts in series with the line, will give good speech quality at all ranges up to a line resistance of 8,000 ohms, but the signal level will obviously become lower with increasing line resistance. No facilities for "calling back" are provided with the station, or in other words, the out-station cannot communicate with the control station unless the control station is listening on the line, or alternatively, means are provided the out-station for attracting the attention of the control station. A number of these stations may be operated in parallel, a spare cable having been provided for this purpose.
The appearance of the various components did not indicate that treatment had been carried out for the protection of the equipment for use in tropical areas. With external circuit arrangements, taking into account the operating requirements of these equipments, they may be used for communication purposes by operational troops.

(SOURCE:- MEE - MONEGEETA)

MICROPHONE & HEAD RECEIVERS

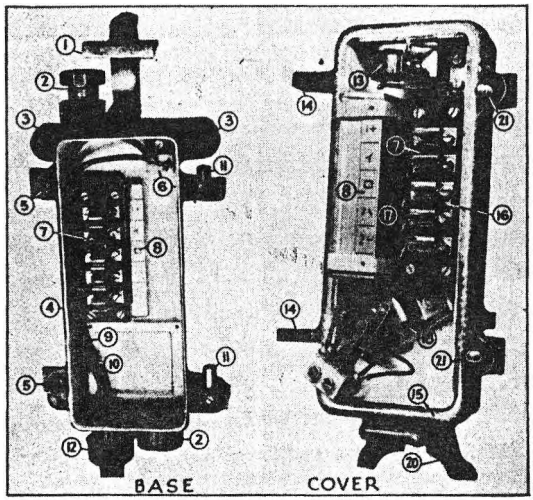
FIG I Complete Station



1. Pilot or warning light
2. Leather bound clamp retaining microphone (spring loaded)
3. Microphone mouth piece
4. Microphone switch
5. Locating saddle for microphone
6. Bracket for neck-strap
7. Head-phone leads
8. Lead to junction-box
9. Chin-strap eyelets
10. Harness adjustment

MICROPHONE & HEAD RECEIVERS

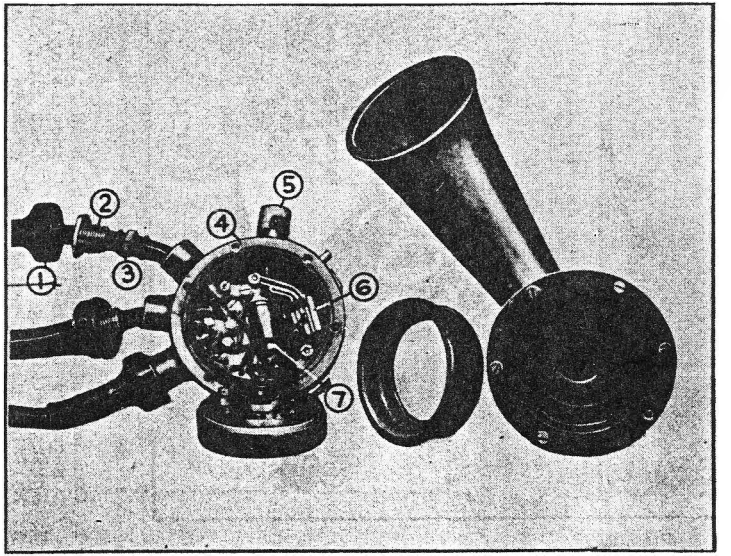
FIG 2 Interior views of junction box



1. Bracket
2. Cable entry
3. Mounting lugs
4. Light alloy cast case
5. Taped hole for cover screw
6. Head-phone terminal
7. Moulded terminal strip
8. Terminal identification strip
9. Spaghetti covering
10. Identification tag
11. Cover pin
12. Head-set assembly leads
13. Pilot light
14. Cover lug
15. Cotton gasket
16. Short-circuiting link
17. Condenser 2μF
18. Switch button
19. Pilot-light & microphone switch
20. Microphone saddle
21. Cover retaining screw

MICROPHONE & HEAD RECEIVERS

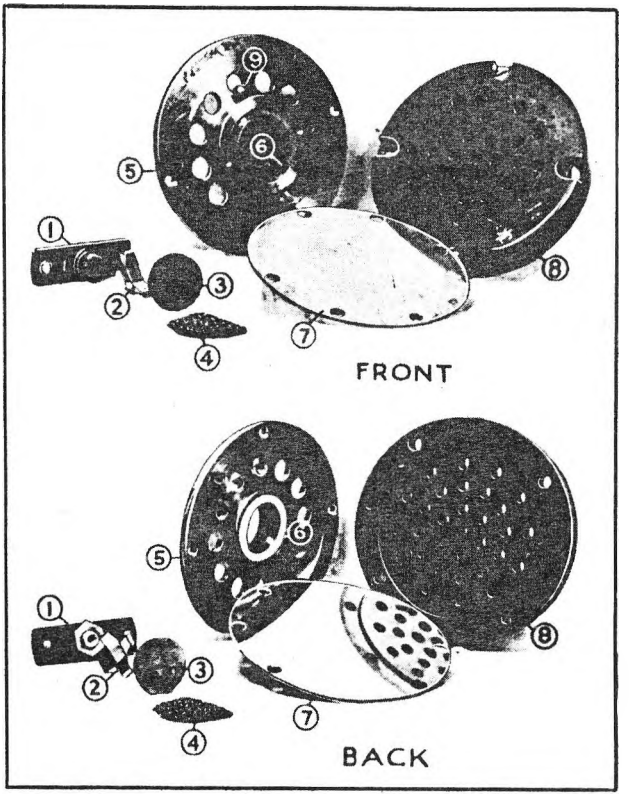
FIG 3 Microphone assembly and Phone junction box



1. Waterproof sleeve
2. Cable clamp
3. Rubber & metal washers
4. Light alloy housing
5. Lock-switch for microphone
6. Microphone switch
7. Tapped choke

MICROPHONE & HEAD RECEIVERS

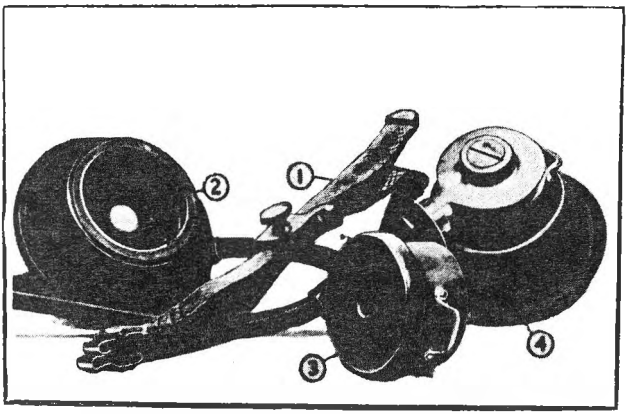
FIG 4 Disassembled views of Microphone Cartridge



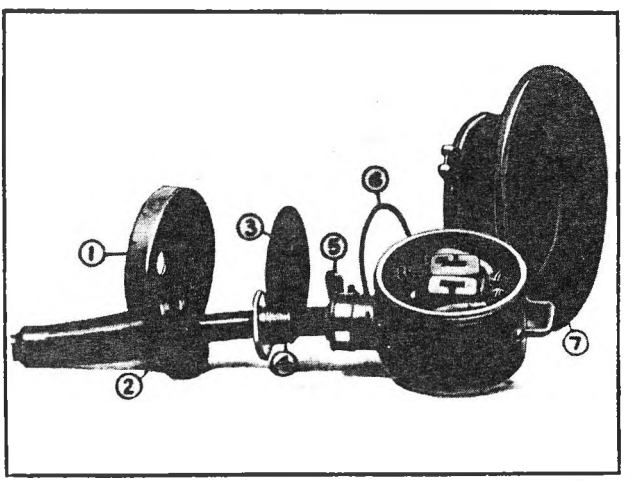
1. Moulded bridge piece & negative terminal
2. Spring retaining
3. Polished carbon-metal backed disc (negative electrode)
4. Carbon granules
5. Microphone cartridge back-plate & positive terminal
6. Bush fitted with insulating lining & felt ring for retaining granules
7. Diaphragm (polished copper)
8. Moulded front protector & spacing plate
9. Set screw

MICROPHONE & HEAD RECEIVERS

FIG 5 Disassembled views of head receivers



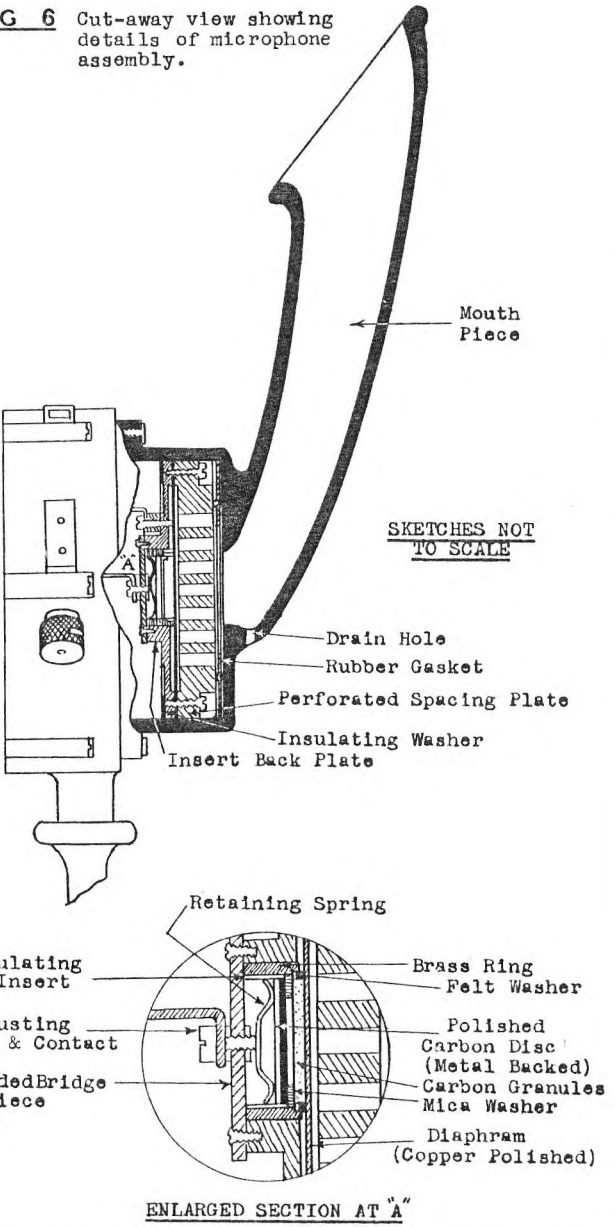
1. Adjustable head-straps (leather)
2. Moulded rubber ear-pad showing clamping ring
3. Ear-phone
4. Completely assembled



1. Head-phone cap
2. Waterproof rubber sleeve
3. Diaphragm
4. Cable clamp
5. Chin-strap eyelet
6. Fibre spacer
7. Ear-pad
8. Pole-pieces

MICROPHONE & HEAD RECEIVERS

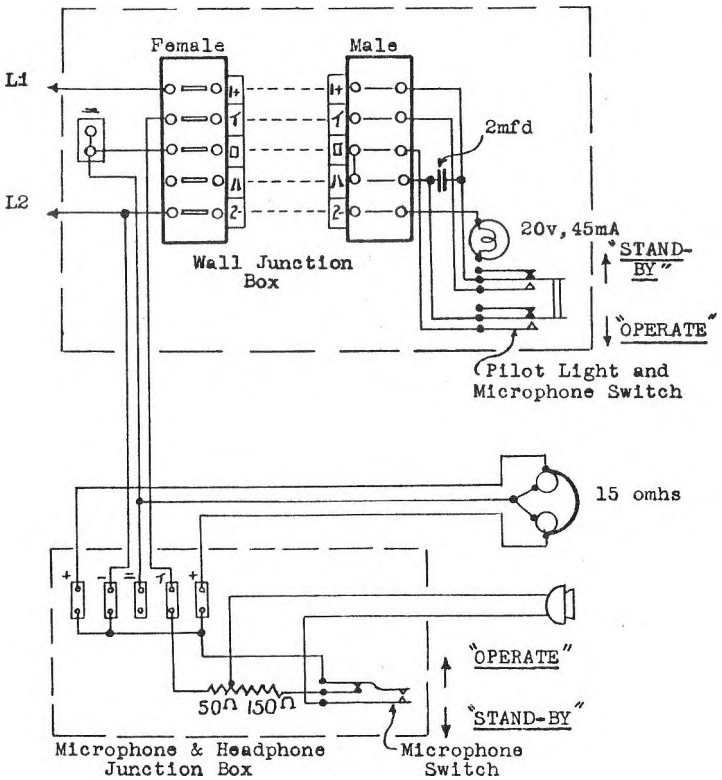
FIG 6 Cut-away view showing details of microphone assembly.

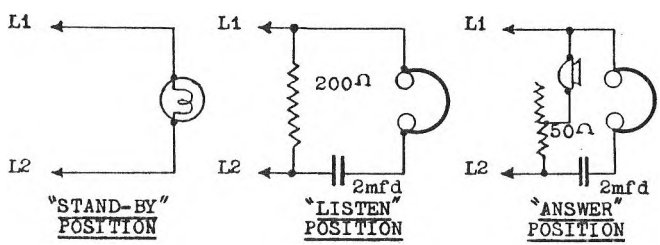


ENLARGED SECTION AT "A"

MICROPHONE & HEAD RECEIVERS

FIG 7 Complete Circuit Diagram Shown In The "Stand By " Position





TYPE 94 TRANSMITTER (MODEL 2B) & TYPE 5 RADIO CONTROL BOX

1. GENERAL

Both pieces of equipment were recovered in the Kamaing area of Northern Burma last year. The transmitter, in its operation and appearance, reflects German design.

2. DESCRIPTION (Figs 1-9)

The equipment consists of a transmitter and a radio control box.

(a) Transmitter: This is constructed in a welded, aluminium alloy angle frame housing. Hinged covers are provided on both sides, while the top, back and bottom cover panels are completely removable. No interlock switches are provided. Construction is sufficiently rugged for portable operation. All necessary tuning controls and indicators are provided for on the front panel. A feature of the tuning dials are small Bakelite strips that slide in grooves above the dial calibration, providing channel markers. Electrically the transmitter is a conventional master oscillator power amplifier circuit, comprising a Japanese type UV 47 C oscillator in a series fed Hartly circuit, coupled to a type UV 814 used as the power amplifier. As an alternative to the adjustable M.O., crystal control may be used by plugging a crystal into the holder provided. When using crystal control, a switch provides four readily selected operating channels by placing various sized capacitors across the crystal holder. Nine ganged switches provide various switching purposes. They are operated from the front panel and have four positions: Receive, Off, Frequency I and Frequency II. In the "off" position the high and low potential circuits are opened and the aerial is grounded.
Three sets of coils are provided. A set consists of an oscillator tank coil, power amplifier tank coil and aerial loading coil. Low frequency loading coils are so wired to engage a variometer rather than a tuning condenser, which is used on the high frequency range only. All coils are wound on wooden forms and access to them is gained through two panel doors. They are also tapped and have tap selector knobs that protrude through these doors, providing for adjustable oscillator coupling, aerial coupling and aerial loading. Block grid keying is employed in the power amplifier stage. Small neon tubes inserted in both the oscillator and power amplifier stages, and viewed through two small ports on the panel, give an indication of satisfactory operation.
The horizontal portion of the aerial is 20 M. and 5 M., while the lead-in wire is 8 M. Aerial poles are in seven telescopic sections each 1 metre in length.
Additional characteristics are as follows:-

Dimensions	16 ins by 18 ins by 6 ins
Weight	35 lbs

Total volume	1 cu. ft approx.		
Frequency range.. ..	950 Kc to 6675 Kc		
Coil I	950 - 1800 Kc		
Coil II	1750 - 3200 Kc		
Coil III	3100 - 6675 Kc		
Power output	50 - 100 watts		
Transmission	C.W.		
H.V. supply	Gasoline generator (L.V. also)		
	Volts	Amps	Watts
	1300	.225	292.5
Filament supply.. ..	12	3.9	46.8
Communication Range..	150 Km		

(b) Radio Control Box: This is 10 ins wide by 4 ins long by 6 ins high, and weighs 7 lbs. The translation of the nameplate of this unit directly associates it with the Type 94 Model 2B transmitter.
As no SOP was obtained, the following has been ascertained from the circuit diagram:-

One of these units is located with each transmitter, and is connected directly into a key jack. A second unit located in a remote position is connected to the second key jack. One or more units located in various remote positions can be connected directly or through a switchboard to the first remote position. This inter-voice communication is obtainable between all remote positions and the station, and radio control of the transmitter is possible from all positions.

3. REMARKS

The transmitter is very ruggedly constructed. The extreme in mechanics and production expense visioned in the nine ganged switch is not consistent with the wooden coil forms, especially the variometer, which is constructed of soft wood with concentric wire grooves and cross-overs rather than spiral grooves. No attempt at moisture proofing has been made.
The control unit is very poorly constructed. The ringing key is extremely poor in design and construction. By comparison of the design and construction of the transmitter and control unit, it is apparent that the latter was a rush design providing flexibility warranted by previous inefficient field use. It is recommended that this equipment be used by our own troops as an expedient, should shortages of our own equipment of a similar nature occur.

(SOURCE:- EEIS - APO 629)

TRANSMITTER TYPE 94 MODEL 2B

NOMENCLATURE LIST

1. Crystal Holder.
2. Channel Switch.
3. 50 cm.
4. 90 cm.
5. 180 cm.
6. Power terminal strip.
7. UV 47 C.
8. 50,000 ohms.
9. 300 cm.
10. Oscillator tank tuning condenser.
11. Osc. tank. coil.
12. 1000 cm.
13. 20,000 ohms.
14. 1000 cm.
15. Neon indicator.
16. 1000 cm.
17. High frequency choke coil (5 MH).
18. Low frequency choke coil (800 MH).
19. 10 ohms.
20. 1000 cm.
21. 1000 cm.
22. UV 814.
23. High freq. choke coil (400 MH).
24. Low freq. choke coil (800 MH).
25. 5000 cm.
26. 5000 cm.
27. 2000 ohms.
28. PA tank tuning condenser.
29. PA tank coil.
30. 5000 cm.
31. Neon indicator.
32. 4000 cm.
33. 4000 cm.
34. High freq. choke coil (5MH)
35. Low freq. choke coil (800 MH)
36. Thermocouple.
37. 10,000 cm.
38. Ant. current meter (0 - 2 A.)
39. Ant. tuning condenser.
40. Ant. tuning variometer.
41. Ant. Post.
42. Receiver ant. post.
43. Keying relay.
44. 1 mfd.
45. 15,000 ohms.
46. Operation Switch.
47. " "
48. " "
49. " "
50. " "
51. " "
52. " "
53. " "
54. " "
55. Filament voltmeter (0 - 15 V.)
56. Filament Rheostat. (1 ohm)
57. High voltage current meter (0-250 ma.)
58. 10,000 cm.
59. Bleeder (2 resistors) Missing
60. Bleeder (2 resistors) "
61. 10,000 cm.
62. Test key.
63. Key jack.
64. Key jack.
65. Ground terminal post
66. Aerial loading coil.

TYPE 94 TRANSMITTER (MODEL 2B) & TYPE 5 RADIO CONTROL BOX

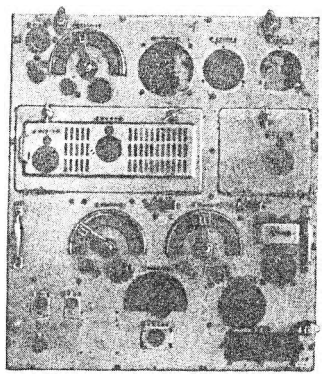


Fig 1 - Front view of transmitter

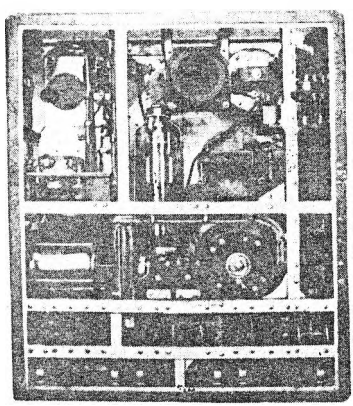


Fig 2 - Rear view of transmitter

TYPE 94 TRANSMITTER (MODEL 2B) & TYPE 5 RADIO CONTROL BOX

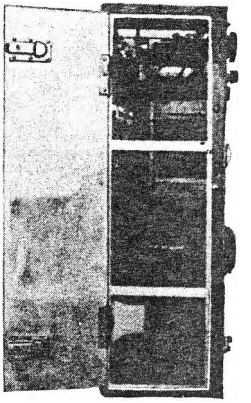


Fig 3 - Left side view of transmitter

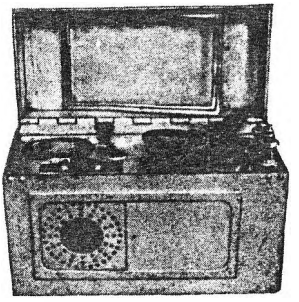


Fig 4 - Central view - Radio control box

TYPE 94 TRANSMITTER (MODEL 2B) & TYPE 5 RADIO CONTROL BOX

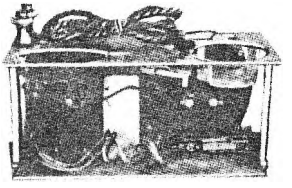


Fig 5 - Rear view with case removed -Radio control box

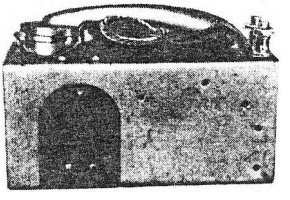


Fig 6 - Front view with case removed - Radio control box

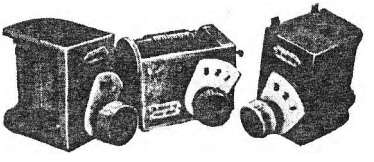


Fig 7 - General view of coil forms

TYPE 94 TRANSMITTER (MODEL 2 B) & TYPE 5 RADIO CONTROL BOX

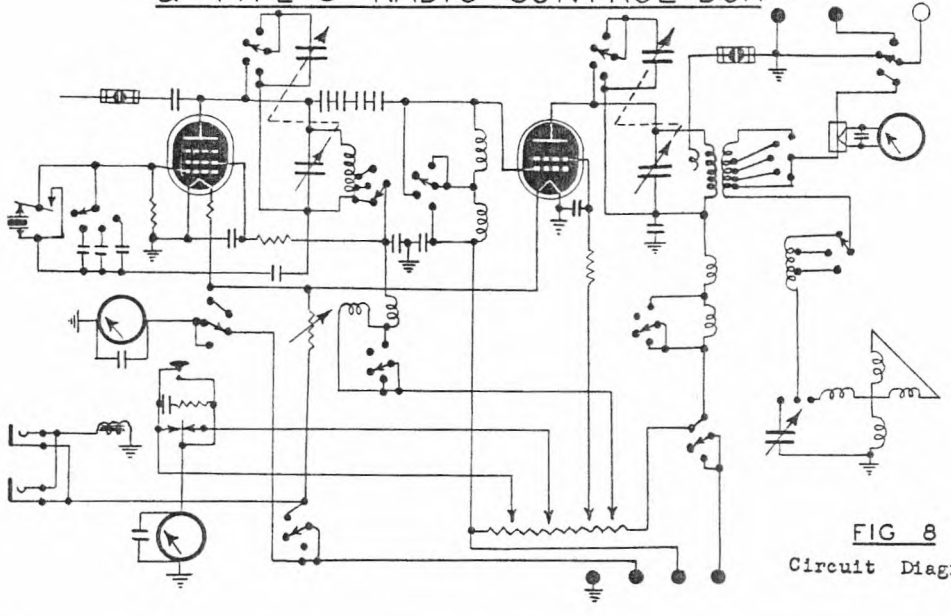
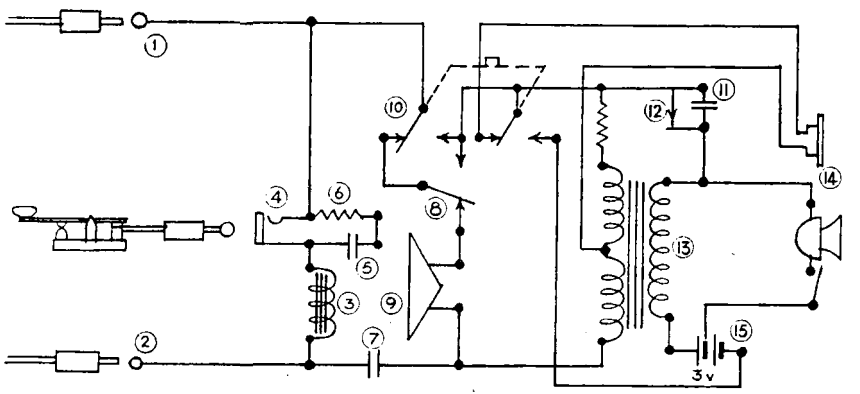


FIG 8

Circuit Diagram

TYPE 94 TRANSMITTER MODEL 2 B
& TYPE 5 RADIO CONTROL BOX

FIG 9 Circuit Diagram



1. Line
2. Ground
3. Choke coil - 6H
4. Key jack
5. Filter condenser - .05 Mfd.
6. Filter resister - 70 Ohms.
7. Blocking Condenser - 2 Mfd.
8. Speaker/Receiver switch
9. Speaker
10. Ring/Talk switch
11. Spark suppressor condenser - .05 Mfd.
12. Vibrator
13. Transformer
14. Handset
15. 3 volt battery

SMALL SMOKE BOMB (F M)

1. GENERAL

This bomb is a fuseless bakelite container filled with FM (titanium tetrachloride), which was recovered on Tinian Island, Marianas. Its tactical use is not known, but by the nature of its filling it could be used in producing smoke screens, as a target marker, as a practice bomb, or as a navigational aid. The Japanese designation of this item is unknown.

2. DESCRIPTION (Figs 1 - 2)

The bomb is 17 ins long, 3 ins in diameter and weighs 3 lbs 14 ozs. It consists of body, ballistic cap and tail sections.

(a) Body: This is of moulded bakelite construction with an opening in the after end only. This opening is threaded to receive the bakelite stopper, the union being sealed by a black rubber washer. The stopper is threaded internally to receive a bakelite tube which extends nearly the complete length of the bomb. The after end of the stopper is a slightly tapered tube and has a rubber tube cemented over it. Cemented into the after end of the rubber tube is a glass tube through which the bomb has been filled. When the bomb was approximately two-thirds filled with liquid FM, the glass tube was heated and sealed off. A small wire is attached to the glass tube at the point of sealing. Each of the cemented unions is reinforced with a wire wrapping.

(b) Ballistic Cap: A ballistic cap made of heavy paper and filled with iron fillings to make the bomb nose heavy, has been glued to the nose of the bomb.

(c) Tail Fins: The tail fins are made of black sheet tin. Pairs of adjacent fins are stamped from the same piece of metal and soldered to the upper and lower circular struts. The edges of the fins are strengthened by having a one-eighth inch turnback. The lower circular strut is similarly strengthened. The upper circular strut is of lighter gauge tin and is secured to the fins by soldering, except for one free end, which is secured by a bolt and nut after the fins are assembled to the bomb. To ensure positive seating of the fins, a rubber insert extends halfway around the inside of the upper circular strut.
Suspension of the bomb is by a steel ring held to the bomb body by a continuous tin strip soldered to make a snug fitting band. The steel ring is held on this strip by a second tin strip soldered to the first strip at right angles.

(d) General Data:

Weight of bomb minus ballistic cap., 2 lbs 9¾ ozs

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(d) General Data:

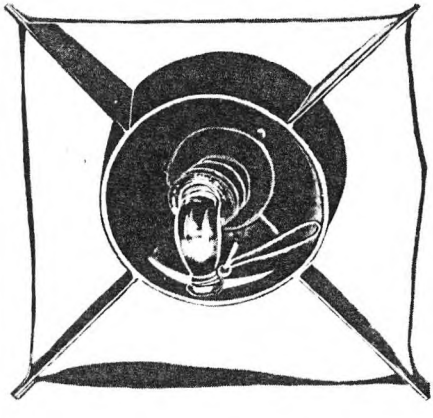
Weight of bomb minus ballistic cap., 2 lbs 9¾ ozs

Weight of empty bomb	1 lb 2 ozs
Weight of (FM) filler	1 lb 7 5/8 ozs
Length without cap	14 15/16 ins
Length of body	11 3/16 ins
Thickness of body	3/16 in.
Length of tail	4 1/8 ins
Width of tail	5 ins
Width of fin	1 9/16 ins
Length of brace	3 1/8 ins
Width of lower circular strut	1 in.
Width of brace	7/16 in.
Diameter of lower circular strut ..	1 1/4 ins
Width of upper circular strut	9/16 in.
Diameter of upper circular strut ..	1 1/16 ins
Length of bakelite tube	9 7/8 ins
Outer diameter of bakelite tube ..	1/2 in.
Inner diameter of bakelite tube ..	1/4 in.
Length of rubber tube	2 3/16 ins
Internal diameter of rubber tube ..	7/16 in.

3. USE AND OPERATION

The use and operation of this bomb is not known, but since it was found on Tinian Island, a Japanese Naval Air Base, a logical assumption is that it is of Japanese naval construction, or at least of Japanese naval use. Not enough specimens are on hand to conduct tests, therefore its possible uses and operations can only be conjectured.
If dropped in quantity and from sufficient altitude on either land or sea targets, the bomb cases will rupture, releasing the FM to produce a smoke screen. If dropped from a lower altitude, the bomb case may remain intact and the glass tube may break, allowing the FM to be ejected under the pressure of the air contained within the two thirds filled bomb case. It is also possible that the glass tube may be broken at the instant of release from the airplane.

(SOURCE:- MEIU - No. 4)

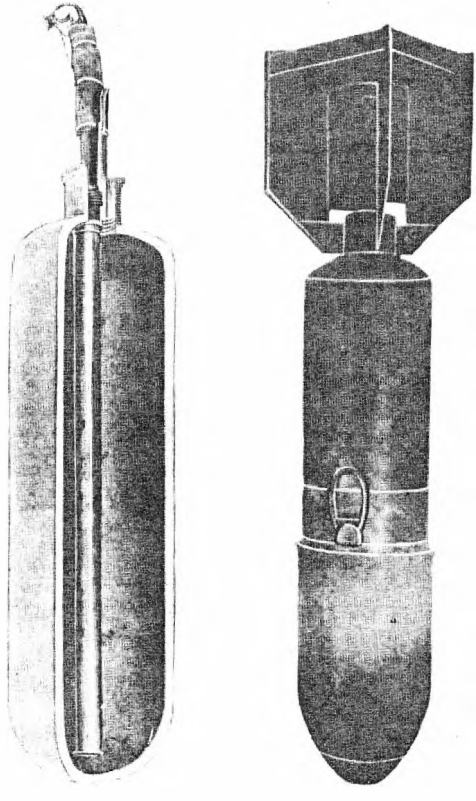


SMALL
SMOKE BOMB
(F M)

FIG I Tail view

SMALL SMOKE BOMB (FM)

FIG 2 Interior and Exterior views



SUICIDE BOATS

1. GENERAL

Two types of suicide motor boats have been recovered. The first, found on Lingayen, Philippine Islands, mounted two 120 Kg depth charges released by a push rod device upon impact, while the second was recovered on Corregidor. The latter consists of a 640 lbs Type 98 explosive charge packed in a metal container below the deck forward of the cockpit.

These boats are intended primarily for use against shipping, and consequently are unlikely to be encountered in any numbers by Army personnel, but it is felt that a knowledge of the switch and circuit details might prove invaluable, as from a disposal point of view they are inherently very dangerous. They would also be simple to booby trap, either electrically or through the pull igniter.

2. DESCRIPTION (Figs 1 - 3)

The boat recovered from Corregidor was 16 ft 8 ins long and had a beam of 5 ft 8 ins. The hull was of plywood, and motive power consisted on an automatic type 6-cylinder engine.

The explosive container was 11 ins long, 19½ ins wide, 18¼ ins high at the rear, and 12⅞ ins high at the forward end. On the rear of the container were wells to accommodate two Type 93 Mine Boosters. One of the boosters contained an electric detonator; the other a non-electric detonator with a pull type firing device. Two junction boxes were mounted below the booster wells. A switchboard is mounted in the cockpit. On this board is a safety switch, a selector switch, a test lamp, and a manual firing switch. A 6 volt battery is set near the motor and a knife switch, putting the battery in the circuit, is set by the switch panel.

The first switch on the left of the switch board is the safety switch. It is of the cam type and closes two sets of contacts at the same time. When the pointer is turned to the left, the detonator is isolated from the bow contact switch and the charge cannot fire on impact. When the switch is turned to the "up" position, the bow contact switch is put in the detonator circuit.

The selector switch in the centre of the switch panel is also of the cam type which closes three sets of contacts, one set at a time. The switch has four positions numbered 0 to 3. When this switch is in the 0 or "down" position, all three sets of the contacts on the selector switch are open and the detonator is isolated from the manual firing switch. (The boat can still fire by closure of the bow contact and safety switch). Turning the switch to position 1 (pointer to the left) puts the lamp above the selector switch across the battery and tests the voltage of the latter.

When the switch is in position 2 (pointer up), the bow contact switch (but not the detonator or the manual firing switch) is in the circuit. Should the bow

contact switch be defective and closed, the lamp will light and it will be necessary to detonate the charge by throwing of the firing switch or by the pull igniter. Turning the selector switch to position 3 (pointer to the right) puts the manual firing switch in the detonator circuit. If the safety switch is also closed, both the bow contact and firing switches are in the circuit, and the charge can be detonated either by the action of the bow contact switch or by closing the manual firing switch (See wiring diagram).
The manual firing gear is also located in the cockpit. There are two toggles and pull wires mounted on a white metal plate. Above the toggle to the left is the inscription "Safety Peg", while over the one to the right is "Detonating Peg". The pull igniter was not recovered.

3. FIRING METHODS

The charge can be fired by three methods:
(a) Electrically on impact;
(b) Electrically by closing a switch;
(c) By operating the pull igniter.

(a) On Impact: A contact switch is mounted inside the bow of the boat. It consists of a curved, rubber-covered steel strip which is in the battery circuit. Inside the strip and insulated from it is another steel piece which is grounded to the charge case. There are several steel spikes on the outer side of the inner contact strip facing the rubber-covered strip. These "T" shaped wooden hammers bear against the middle and both ends of the rubber-covered contact strip and also against the hull of the boat. When the bow is crushed inward on impact with the target, the rubber-covered strip is driven inward by the hammers. The spikes pierce the rubber covering of the outer strip, making electric contact between the two strips and closing the switch. This fires the charge if the circuit is armed.

(b) Electrical: The pilot first closes the battery switch and tests it by throwing the selector switch to position 1. Then he tests the contact switch by moving the selector switch to position 2. If both tests are successful, he closes the safety switch and turns the selector switch to position 3. By closing the firing switch he can fire the charge; otherwise the charge is detonated on impact by closure of the contact switch. It is believed that the firing switch is a self-destroying device and that normal firing occurs on impact. It is possible to detonate the charge on impact by simply closing the safety switch, but there is no selective firing unless the arming contact is closed.

(c) Manual: The operator first pulls the "Safety Peg", withdrawing the safety pin. When ready to fire, he pulls the "Detonating Peg" operating the igniter and exploding the charge. This device is a stand-by in case the electrical gear fails.

4. EXPLANATION OF CIRCUIT DIAGRAM

(1) When the safety, selector, and firing switches are open, the charge cannot be fired electrically.

(ii) Safety and firing switches open, lamp contact of selector switch closed: Current flows from the plus side of the battery through No. 2 terminal through the lamp contact back through the lamp to the negative side of the battery. The lamp lights if the battery voltage is sufficient.

(iii) Safety and firing switches open, contact switch test contact of selector switch and bow contact switch closed: Current flows from the plus side of the battery through No. 2 terminal to the starboard terminal box and ground. It passes through the charge case to the inner contact strip, through the spikes to the outer strip and back to the starboard terminal box and No. 3 terminal. From there it travels through the contact switch test contact back through the lamp to the negative side of the battery. Thus if the contact switch is closed (i.e. defective) the lamp lights when this test is made.

(iv) Safety and firing switches, arming contact closed, bow contact switch open: Current flows from the plus side of the battery up through the firing switch and arming contact back to No. 4 terminal through the detonator and back to No. 5 terminal. From there it passes back through the firing switch to the negative side of the battery. This is normal manual firing of the armed circuit.

(v) Safety and bow contact switches closed, firing switch and arming contact open: Current flows from the plus side of the battery to No. 2 terminal and ground, through the charge case and the two bow contact strips back through the starboard terminal box to No. 3 terminal. From there it passes through the left contact of the safety switch back to No. 4 terminal through the detonator to No. 5 contact. From there current travels above the firing switch to the right hand contact of the safety switch back through No. 1 contact to the negative side of the battery. This is normal impact firing of the armed circuit.

(vi) The selector switch is not required to fire the charge by means of the bow contact switch. Its purpose is circuit testing and to provide the selective manual or contact firing. To detonate the charge either the firing or bow contact switches must be closed. The arming contact of the selector switch must be closed before the firing switch can explode the charge, while the bow contact switch cannot operate unless the safety switch is closed.

5. TO RENDER SAFE

(i) Open the battery switch in the cockpit.

(ii) Open the safety switch and firing switch on the cockpit switchboard. (Steps (i) and (ii) should be performed from a distance in case of booby traps).

(iii) Cut the detonator leads near the detonator and remove the electric detonator. Care must be taken to avoid tripping the pull igniter during Steps (i) through (iii).

(iv) Insert a safety pin in the pull igniter (on the rear of the charge case).

(v) Cut the pull wire on the igniter if it is not under tension. Remove the igniter and detonator.

(vi) If the pull wire is under tension, do not attempt to dismantle. Destroy the charge in situ.

(vii) Remove the two boosters and destroy the detonators.

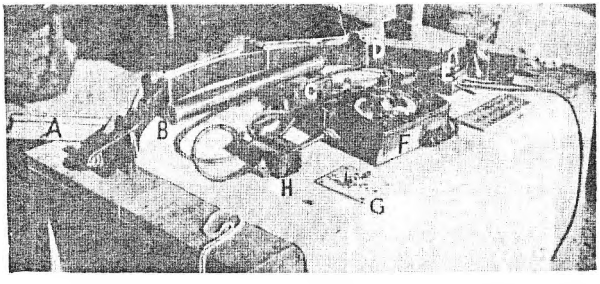
6. CONCLUSIONS

One apparent flaw in the circuit is the grounding of the bow contact switch on the charge case instead of using a simple wire connection between No. 3 terminal and the inner bow contact switch. (See wiring diagram). Faulty wiring or salt water spray on the charge case and the wiring could easily result in a short circuit through the ground. The detonator might even be prematurely shorted across the battery. This arrangement also requires careful insulation of the charge case from the boat and the rest of the circuit.
It is not known whether there is any delay in the electric and percussion detonators to permit the operator to escape. This does not seem likely.
A label on the switch box designates it as "Type 4 Electric Distribution Box", indicating that other varieties of electric firing gear may be in production.
The switch box was manufactured by the Military Construction Bureau in August, 1944.

(SOURCE:- MEIU)

SUICIDE BOATS

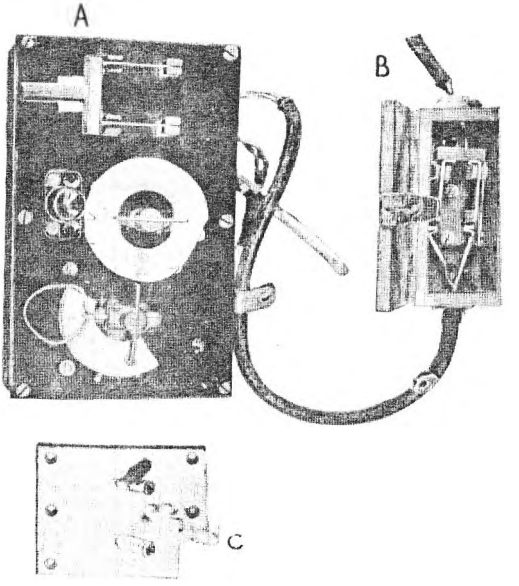
FIG 1 Electrical assembly



A. Hammer
B. Booster
C. Battery switch
D. Bow contact switch
E. Starboard terminal box
F. Switchboard
G. Pull wire holder
H. Port terminal box

SUICIDE BOATS

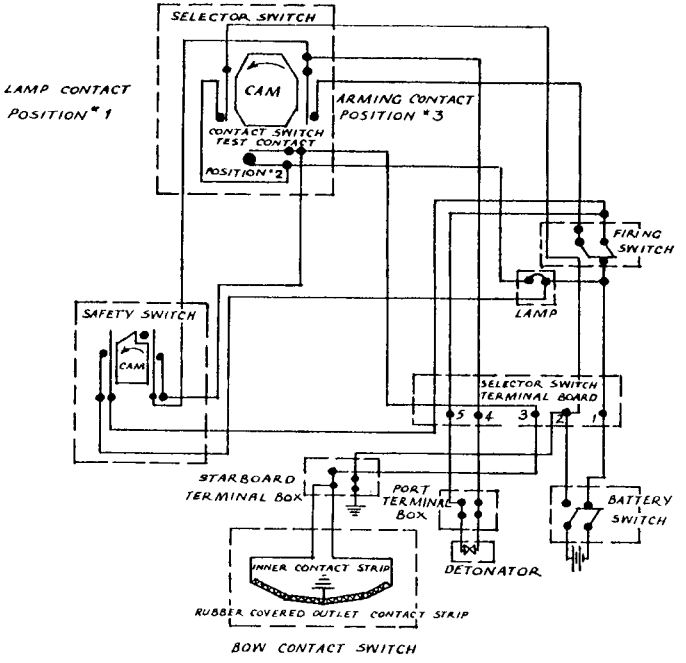
FIG 2



A. Switch box
B. Battery switch
C. Pull wire holder

SUICIDE BOATS

FIG 3 Wiring circuit diagram.



1.5 METRE BASE RANGE FINDER MODEL 96

1. GENERAL

This is a 1.5 metre base instrument with an erect coincident field of view. Its unique feature is the diopter movement which allows maximum sealing to be made. Furthermore, it is of comparatively recent manufacture, having been made in 1943.

2. DESCRIPTION (Figs 1 - 2)

The instrument consists of two assemblies, namely:- (a) Range finder proper, (b) Built-in low power telescope used to quickly place targets in the field of view of the range finder.

(a) Range Finder: The outer tube is made of brass, and the optical tube of steel. Its most unusual feature is the diopter movement. The eyepiece cell slides into the eyepiece sleeve, and a pin, screwed into the eyepiece cell, fits through a slot in the sleeve and mates with the focusing cam. The latter, which is adjacent to the sleeve, is positioned by means of a lever placed between the eye-guard and shoulder of the eyepiece adapter plate. The top of the eyepiece sleeve is covered by a glass window burnished in place. The second lever of the eyepiece adapter is to place an amber filter in front of the field lens.
Jack screws are used to fasten the penta-prism end reflectors to their holders. This arrangement allows the prisms to be adjusted for correct height of image and elimination of tilt. The penta-prisms are positioned by dowel pins and retained by holding screws. Each end-box is fitted with a cover in which provision has been made for silica-gel containers in the form of small silk bags. Desiccating ports are also provided in each end-box cover.
Neutral filters are located in front of each objective of the range finder and of the target locating telescope. These are deep black in colour and almost opaque. They are brought in or out of the field of view by means of a large knob in front of the instrument and to the right of the eyepiece assembly. Astigmatising lenses are provided for ranging to luminous objects such as search-lights. The astigmatisers are positioned on each side of the ocular prism by a lever to the left of the eyepiece assembly.
Adjustment for range is done by rotating a glass wedge located between the left objective and halving plate. A range adjusting knob is to the left of the eyepiece. Height of image is corrected by tilting a plano-parallel glass plate placed between the ocular prism and range correction wedge. Range is measured by translating an optical wedge housed in the right optical tube. The range scale is engraved on a translucent strip of which an image is projected into the bottom of the field of view.

General Data:-

Power	15 diameters (approx)
Field of view	Undetermined
Diameter of exit pupil ..	plus 2 to minus 4 diopters.
Overall length	72 ins
Weight	169 lbs.

(b) Target Locating Telescope: This is housed between the outer tubes and left optical tube. The entrance port is adjacent to the left end-box assembly. The reticle design consists of a simple circle having a radius of approximately one-eighth of the field of view. The eyepiece assembly, focusing movement and filters are similar to the corresponding assemblies of the range finder proper. The telescope has a magnifying power of approximately six diameters.

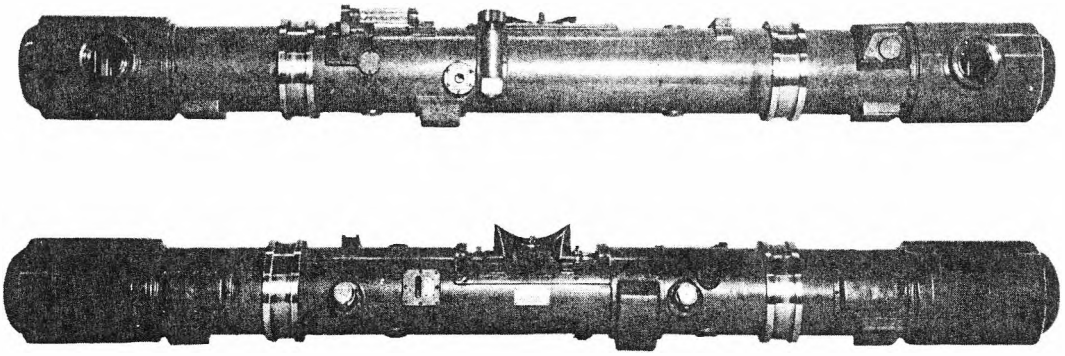
3. REMARKS

The instrument is well built and excellently sealed. The eyepiece assembly is considered worthy of further investigation because of the focusing feature which appears to allow maximum sealing to be effected. The use of the "dead space" between the end-box covers and penta-prism holders to house silica-gel containers is considered a valuable expedient to prevent or reduce moisture content in the instrument.

(SOURCE: ABERDEEN PROVING GROUND, MD)

1.5 METRE BASE RANGE FINDER MODEL 96

FIG 1 Top: Front view Bottom: Rear view



1.5 METRE BASE RANGE FINDER MODEL 96

FIG 2