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AUSTRALIAN MILITARY FORCES

TECHNICAL INTELLIGENCE SUMMARY

No. 25

COMPILED MAY 1945

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JAPANESE EQUIPMENT

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PARATROOPERS' 8MM SMG (TYPE UNKNOWN)

1. GENERAL

This is believed to be the first submachine gun manufactured by the Japanese. It preceded the Type 100 SMG, described in AMF Tech Int Sum No 21, and which was proved unsatisfactory when tested at the Aberdeen Proving Ground.

2. DESCRIPTION (Figs 1 - 2)

It is a straight blowback-operated, magazine fed weapon equipped with a poorly designed folding stock. The front sight is an inverted V, while the rear sight, which is only partly attached, appears to be of the ramp type.

Characteristics:

Weight (without magazine)	7 lbs 8 ozs
Length overall	36 ins
Length folded	$22\frac{1}{2}$ ins
Length of barrel	9 ins
Diameter of bore	8mm (.315 in)
Number of lands and grooves	6
Type of feed	Magazine

3. DISASSEMBLY

Rotate the back plate locking pin 180 degrees, draw it out to the right and at the same time maintain a slight pressure on the back plate to allow for the tension exerted by the driving spring. Draw the back plate, driving spring, driving spring guide, and buffer spring to the rear and out of the bolt. Remove the bolt stud, press the trigger, raise the muzzle and allow the bolt to slide out of the rear of the receiver.
To remove the barrel and barrel housing groups, unscrew and withdraw the barrel retaining pin. The barrel and barrel housing groups can then be drawn forward and out of the receiver.
The shoulder stock folds along the right side of the weapon. The hinge is crudely made and allows the shoulder stock to swing round and to be locked into position. Woodscrews are used to fasten the hinge to the stock.

4. REMARKS

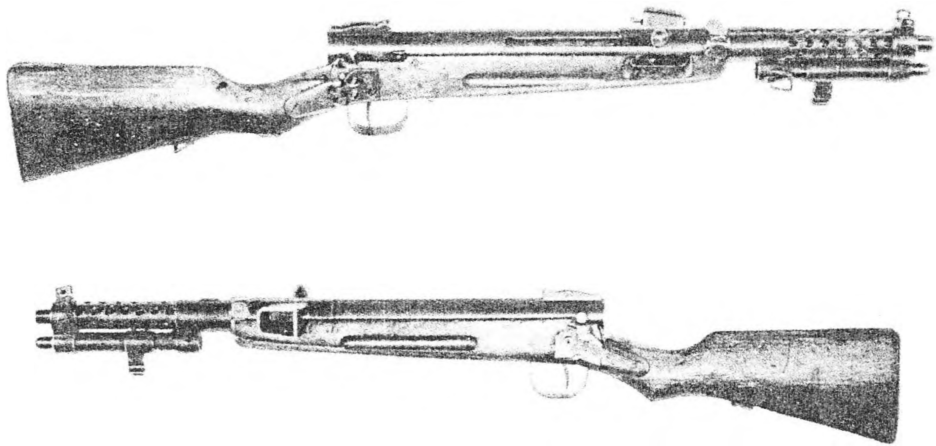
This SMG has a low serial number (5) and the model number is unknown, although there is reason for believing it may be a Showa 17 type. It appears that the Model 100, 8mm SMG is a later development of this weapon.

An unusual characteristic is a safety feature on the face of the bolt. When the bolt is retracted a projection on the receiver body cams this safety into the cartridge seat on the bolt face. As the bolt strips the cartridge from the magazine the safety piece prevents the primer from coming into contact with the firing pin and prevents the weapon from firing prematurely. In the final forward movement of the bolt the safety is cammed out of the cartridge seat in the face of the bolt and allows the firing pin to strike the primer.

(SOURCE: ABERDEEN PROVING GROUND, MD)

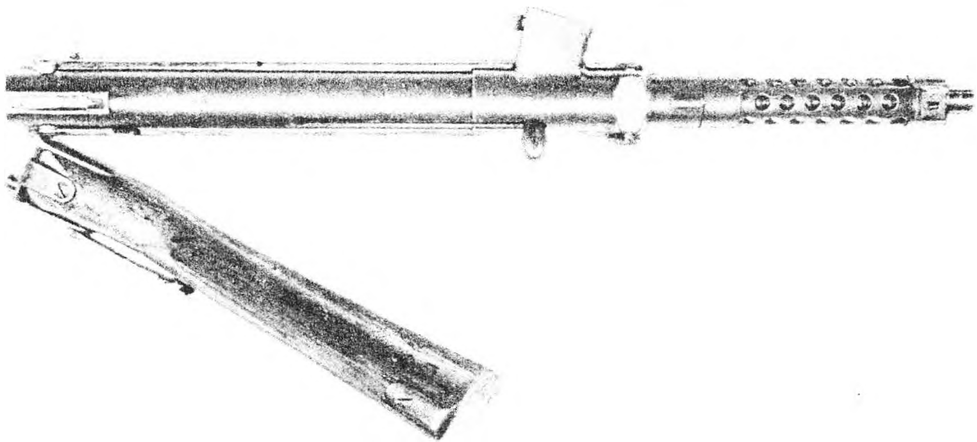
PARATROOPERS' 8 MM SMG (MODEL UNKNOWN)

FIG I Side views.



PARATROOPERS' 8MM SMG (MODEL UNKNOWN)

FIG 2 Folded stock.



12 CM INCENDIARY SHRAPNEL ROCKET

1. GENERAL

Demolition or suicide boats (vide AMF Tech Int Sum No 23) mounting two 4.7 inch incendiary, aerial-burst rockets of naval manufacture, as well as the usual 560 lb explosive charge, have been captured on Okinawa. This rocket is projected from a launcher secured on either side of the cockpit. The angle of trajectory of the rocket is determined by the angle of the longitudinal axis of the boat from the horizontal at the moment of firing. Later models of the boat have been recovered with an adjustable launcher.

2. DESCRIPTION (Figs 1 - 5)

The projectile was manufactured by the Sasebo Navy Yard in December 1944 and is painted black overall with a yellow band 19cm from the nose. It is different from any other Japanese rocket hitherto recovered, although basically of the conventional spin stabilised design, consisting of a forward warhead and a rocket motor in the rear. The complete round is 28-9/16 ins long and weighs 51 lbs.

(a) Warhead: The body of the warhead is a one-piece steel cylinder on the forward end of which is welded a hollow ogival steel nose. The after end is threaded internally to receive the warhead motor adapter. A wooden plug fills the space in the hollow nose, and inside the body is a metal cannister filled with 62 incendiary pellets. Running the length of the cylinder and centrally located is a small burster tube containing five picric acid cylinders. Weights and dimensions are as follows:-

Weight (empty)	6 lbs $5\frac{3}{4}$ ozs
Length overall	10 ins
Length of cylinder	7-7/16 ins
Outside diameter	(12cm) $4\frac{3}{4}$ ins
Inside diameter	$4\frac{3}{8}$ ins
Threads: R/H	
Diameter	$4\frac{1}{3}$ ins
TPI	8
Depth	$\frac{3}{4}$ in
Case thickness	3/16 in
Weight of main explosive charge	$4\frac{3}{4}$ ozs
Wooden nose plug:	
Weight	$2\frac{3}{4}$ ozs
Height	$1\frac{7}{8}$ ins
Diameter	$3\frac{1}{2}$ ins

Cannister:	
Weight	10 lbs $11\frac{3}{4}$ ozs
Height	7-7/16 ins
Diameter	3-13/16 ins
Diameter of burster tube hole	10/16 in
Burster tube:	
Diameter	7/16 in
Weight	$\frac{1}{2}$ oz
Length	1/16 in

(b) Warhead-Motor Adapter: This is threaded externally fore and aft. Separating the two sets of threads is a flange. The after end of the adapter contains a small, centrally located opening threaded to take the warhead fuse. Aft of the metal cannister in the warhead and housed in the forward end of the warhead-motor adapter is a metal plate, the centre of which has a small hole filled with a picric acid pellet. Aft of the metal plate, and housed in the warhead-motor adapter, is the main explosive charge - a block of picric acid. Into the centre of this charge is fitted a small tetryl booster, which surrounds the gaine of the base fuse. Additional data is as follows:

Weight	3 lbs $6\frac{3}{4}$ ozs
Height	2-3/16 ins
Diameter	4-13/16 ins
Threads (Fore & aft) R/H:	
Diameter	4-13/16 ins
TPI	8
Depth	13/16 in
Fuse Pocket Threads (L/H):	
Diameter	$1\frac{1}{8}$ ins
TPI	15
Depth	$\frac{5}{8}$ in
Metal Plate:	
Weight	$14\frac{3}{4}$ ozs
Thickness	$\frac{1}{4}$ in
Diameter	3-13/16 ins
Diameter of central hole	$\frac{3}{8}$ in

(c) Motor Body: This is a steel cylinder similar to the warhead cylinder. The forward end is threaded internally to take the after end of the warhead-motor adapter. The after end is threaded internally to take the base plate, which houses the offset orifices and the primer. In the forward end of the body is a square grid with each corner bent 90 degrees to form four legs. There is one large hole $1\frac{7}{8}$ ins in diameter in the centre of the forward grid, and around the central hole are six smaller ones.
Attached to the grid by a silk line is a circular, silk powder bag containing 1 oz of black powder, which is ignited from the flash of the primer in the base of the motor body. The after grid in the base of the motor body contains six circumferential holes and one centrally located hole threaded to receive the primer sleeve. The after grid is supported by three lugs on the inner surface of the base plate and a short central collar, which extends aft and is part of the after grid. The primer sleeve appears to be a short length of hollow pipe threaded on either end.

Data:

Weight	13 lbs 11 ozs
Length	17-5/16 ins
Outside diameter	4-11/16 ins
Case thickness	3/16 in
Threads (Fore & aft) R/H:	
Diameter	$4\frac{1}{8}$ ins
TPI	8
Depth	$\frac{7}{8}$ in
After grill:	
Weight	$9\frac{1}{2}$ ozs
Height	13/16 in
Diameter	3-15/16 ins
Thickness	3/16 in
Threads of Igniter Sleeve pocket:	
Inside diameter	$\frac{3}{4}$ in
TPI	9
Depth	13/16 in
Forward grill:	
Weight	2 ozs
Height	$\frac{5}{8}$ in
Width	$3\frac{1}{2}$ ins
Thickness	1/16 in
Igniter sleeve:	
Weight	$3\frac{1}{2}$ ozs
Length	$2\frac{1}{4}$ ins
Diameter	1 in
Forward Threads R/H:	
Diameter	13/16 in
TPI	9
Depth	1 in
After Threads R/H:	
Diameter	13/16 in
TPI	9
Depth	$\frac{3}{8}$ in

(d) Propellant: The rocket fuel consists of one short and seven long grains of dark brown propellant. Each grain has one central longitudinal perforation.

Data:

Length:	
Short	$10\frac{1}{2}$ ins
Long	14 ins
Weight:	
Short	$13\frac{1}{2}$ ozs
Long	1 lb $1\frac{1}{2}$ ozs
Diameter of grain	1-5/16 ins
Diameter of perforation	3/16 in
Analysis	Smokeless powder

(e) Motor Base Plate: The forward end of the base plate is threaded externally to fit into the after end of the motor. On the forward surface are threaded three lugs 120° apart, which support the after grid. On the forward end of one lug is a button which fits into a recess in the after grid and positions the internally threaded collar of the grid in line with the central opening of the base plate. Six openings, located around the circumference of the base plate and offset approximately 21° to the longitudinal axis of the rocket, impart a spin to the rocket in flight.

The forward end of these six ports is flared in the direction of the spin and covered with a small wax paper disc. Aft of the threads is a flange of slightly greater diameter than the motor body. The diameter of the six offset orifices gradually increases aft. The after end of the base plate has a centrally located well into which is fitted the motor igniter. Covering the spin-stabiliser holes and fitting snugly on the after end of the base plate is a celluloid cover to prevent entrance of water and other foreign matter into the motor.

Data:

Weight	4 lbs $14\frac{1}{4}$ ozs
Height	$2\frac{3}{8}$ ins
Diameter	4-13/16 ins
Height of lugs	9/16 in
Diameter of lugs	$\frac{3}{8}$ in
Threads R/H:	
Diameter	$4\frac{1}{4}$ ins
TPI	8
Depth	$\frac{3}{4}$ in
Igniter Well:	
Diameter	2-3/16 ins
Depth	1-5/16 ins

(f) Aerial Burst Fuse: The fuse threads into the after end of the warhead-motor adapter and is, in effect, a powder delay train. Into the forward end of the fuse is threaded a small gaine containing a high explosive which is actuated by the delay train housed in the body of the fuse. The powder delay element is initiated by a small black powder bag which is crimped to the after end of the fuse, and is in turn initiated by the primer. Field reports indicate that the delay train allows the rocket to travel 2000 to 3000 yds before the main charge is detonated.

Data:

Weight	$14\frac{1}{4}$ ozs
Height	$3\frac{3}{4}$ ins
Diameter	$1\frac{3}{8}$ ins
Threads L/H:	
Depth	9/16 in
Diameter	$1\frac{1}{8}$ ins
TPI	16

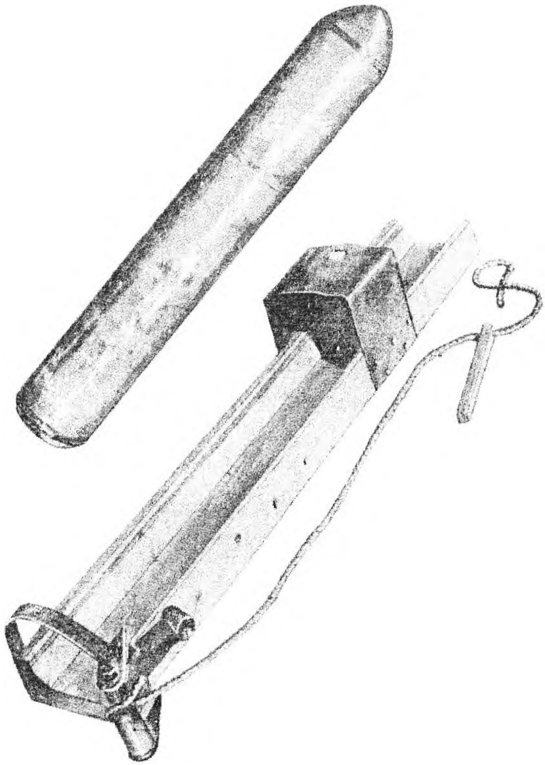
(g) Launchers: Two types of launcher have been recovered. One of these is a wooden U-shaped trough, mounted on the gunwale and fixed for elevation and direction. A percussion hammer is pivoted at the rear of the launcher and attached to a lanyard leading into the cockpit. The rocket is retained in position on the launcher by a metal band at the rear and a small wooden peg passing through the top of a metal cover at the forward end. The peg is removed immediately before the launcher is fired.

The other type of launcher is similar, but can be set for elevation. In this case the launcher is not mounted on the gunwale but on a vertical plate at the side of the cockpit. A clamp on the inside of this plate is used to set the launcher at the required elevation.

(SOURCE: MEIU NO 4 & MILITARY INTELLIGENCE SERVICE, WASHINGTON)

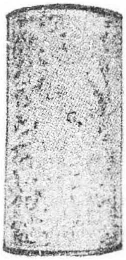
12 CM INCENDIARY SHRAPNEL ROCKET.

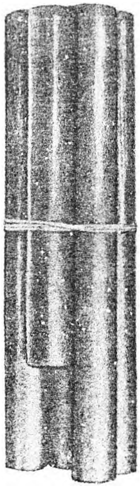
FIG I — Assembled Round and Launcher.



12 CM INCENDIARY SHRAPNEL ROCKET.

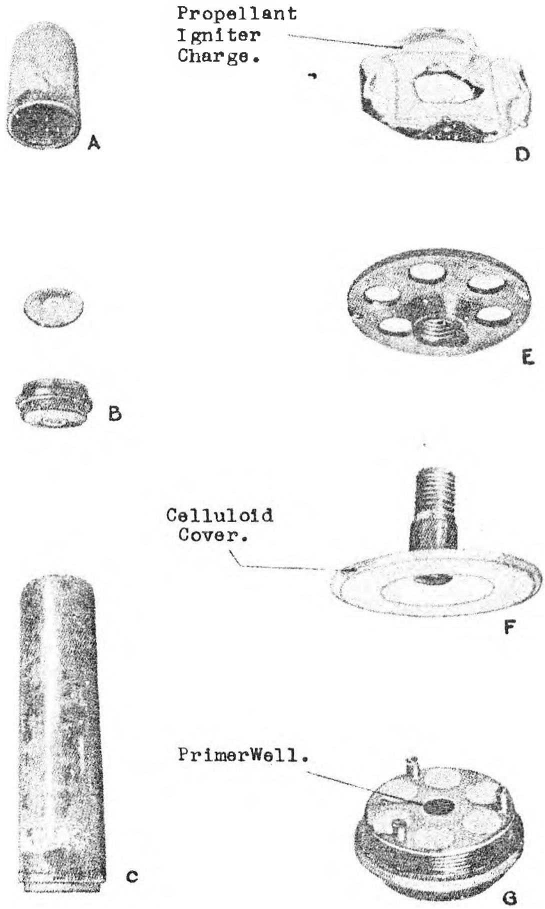
FIG 2 Incendiary Cannister and Propellant.





12 CM INCENDIARY SHRAPNEL ROCKET.

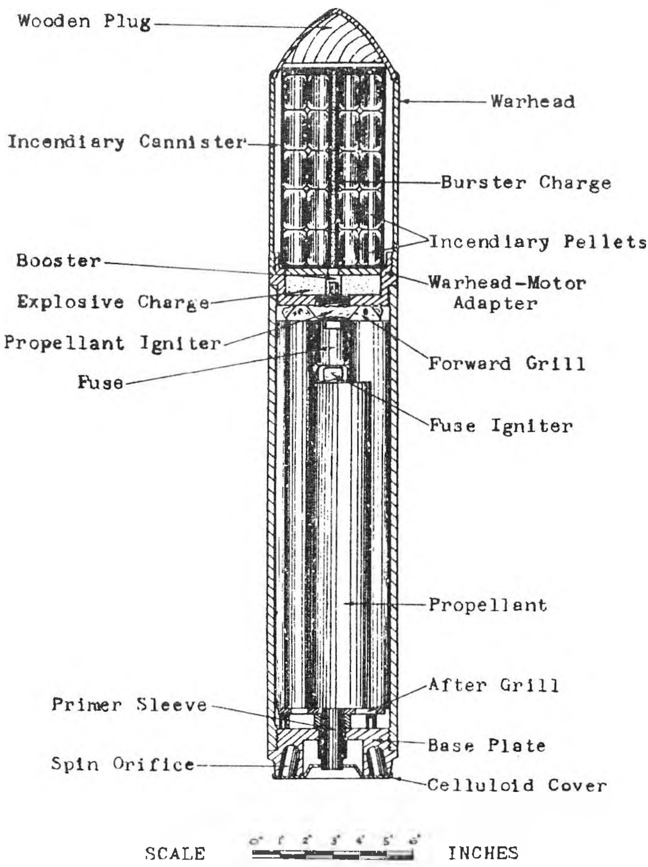
FIG 3 Components.



(A) Warhead. (B) Warhead Motor Adapter.
(C) Motor Body. (D) Forward grill.
(E) After Grill. (F) Primer Sleeve.
(G) Base Plate.

12 CM INCENDIARY SHRAPNEL ROCKET

FIG 4 Assembled Round



WARHEAD & FUSES OF "BAKA" BOMB

1. GENERAL

Not unlike an oversize torpedo equipped with wings, the flying bomb has a simple cylindrical fuselage with a stubby, double-tapered, low-mid, cantilever wing and a high set rectangular tail plane, at the ends of which are squarish fins and rudders. A prominent, well-faired bubble type canopy over the cockpit is located just aft of the mid-point of the fuselage. Proportions and shapes are not unlike those of the German Hs-295 radio-controlled bomb.
A complete rocket bomb was recovered on Okinawa, but this report is concerned only with the explosive warhead, fusing and propulsion units.

2. DESCRIPTION (Figs 1 - 14)

(a) Warhead: The warhead of the "Baka" bomb consists of a steel body, the after end of which is closed by a heavy base plate. The after end of the warhead is threaded to take the base plate, which is locked in place by a grub screw. A second grub screw in the nose secures the nose fuse in place. The warhead body has a fuse pocket in the nose, while the base plate contains four fuse pockets grouped around a threaded central hole which takes the arming device. The base plate also has four brackets on its outer edge, each pierced by a central hole, by which the warhead is attached to the fuselage of the piloted bomb. The forward portion of the base plate is hollow and contains a separately cast sedtion of the main explosive filling, in which four boosters are imbedded. An aluminium alloy plug is located in the forward end of the warhead's explosive cavity. This is pierced by a central hole and is evidently intended to cushion the explosive filling from the shock of impact.
When the piloted bomb is completely assembled, the warhead is enclosed within an aluminium alloy cover which has a hole in its forward end through which the nose fuse protrudes.
The warhead is blue-grey overall, and has a $4\frac{1}{2}$ inch green band around the nose, and a 6 inch brown band directly aft of the green one. The aluminium cover is painted a muddy cream colour, and has a red plum blossom painted on its side.
By analysis the main filling was found to be cast TNA. The rear of this main charge is covered by a heavy coating of wax. The cavity of the base plate is filled with cast TNA, which positions and locks four picric

boosters in place beneath four base fuse pockets. The picric boosters are wrapped in paper coated with wax. A sheet of light paper and a heavy layer of wax cover the forward end of the complete charge in the base plate.
Dimensions and weights are as follows:-

Overall length	$68\frac{1}{2}$ ins
Maximum diameter	24 ins
Length of bracket	7 ins
Width of bracket	$2\frac{7}{8}$ ins
Thickness of bracket	$\frac{3}{4}$ in
Diameter of hole in bracket	$\frac{3}{4}$ in
External diameter of bomb	$23\frac{5}{8}$ ins
Wall thickness	1-9/16 ins
Length of base plate	5-9/16 ins
Diameter of base plate	$23\frac{5}{8}$ ins
Thickness of base plate at centre	$1\frac{1}{4}$ ins
Threads on base plate (R/H):	
Diameter	$20\frac{3}{4}$ ins
Per inch	4
Length of threaded portion	4 ins
Maximum diameter of nose plug	$9\frac{7}{8}$ ins
Thickness of nose plug	1-7/16 ins
Diameter of central hole in nose plug	$1\frac{1}{4}$ ins
Weight of bomb case (empty)	1300 lbs
Weight of base plate (empty)	225 lbs
Weight of bomb (empty)	1525 lbs
Total weight of explosive filler	690 lbs
Total weight of bomb	2215 lbs

(b) Fusing

(i) Nose Fuse (Probable designation A-3(g)): This is of the same basic construction and design as the A-3 (d), with the following notable differences. The conventional nose cap is missing, and a spacer disc of the same thickness as the nose cap is inserted between the vanes and the arming sleeve to allow the use of the same screws to fasten the vanes to the arming sleeve. The ordinary brass shear wire is replaced by a heavy, steel sheer pin. This shear pin has a head at one end, while the opposite end is split. The split end is spread slightly to hold the shear pin in place in the fuse. Each vane is pierced by a $\frac{1}{4}$ in hole, $\frac{1}{4}$ in from the end of the vane, presumably to take an arming wire. There is no flange on the fuse body above the threads and also no starting wire or eyelet present on this fuse.
The fuse is of plated steel construction except for the locating screw, arming sleeve and striker spindle, which are of brass. Operation is the same as the A-3(d) fuse.
Data:

Overall length	$7\frac{1}{8}$ ins
Vane span	$4\frac{3}{4}$ ins
Maximum diameter of body	2-3/64 ins
Diameter of spacer	$1\frac{3}{8}$ ins
Diameter of shear pin	15/64 in
Length of shear pin	$1\frac{3}{4}$ ins

(ii) Impact Base Fuse: (Probable designation B-10(a)): This is a simple impact fuse which operates on the inertia principle. The body is of heavy, one-piece, brass construction, and the top is closed by a brass plate, pierced by two spanner holes and a central hole. The closing plate is locked in place by a grub screw. There are six spanner holes in the main body located slightly below the central portion. In the same plane as the spanner holes are a locating pin, which engages a longitudinal slot in the striker body, and, 180 degrees removed, the arming detent which is spring loaded outward. The arming detent is held in the fuse body by the detent retaining screw. This screw is threaded into the fuse body directly below the detent cavity, and its head partially covers the cavity and effectively limits the outward movement of the detent.

A groove in the bottom of the fuse body, cut into the shoulder above the threads, contains a locking spring. This spring is held in place by four stakes in the fuse body and serves to secure the fuse firmly in its pocket. A washer, made of layers of paper impregnated with rubber, is located directly forward of the locking spring.

The body is pierced longitudinally by two safety fork holes, one of which is connected to the outer end of the detent cavity. When in place, the safety fork holds the T-shaped arming detent inward so that its inboard end engages a hole in the striker body.

The safety fork was not present in the specimen examined, but construction and method of arming leave no doubt as to its general features of construction and its function.

The heavy, solid brass striker has a sharp steel striker point threaded into its lower end. There are four air escape vents in the striker head. The striker also contains a longitudinal groove in which the locating pin rides, and 180 degrees removed, a hole for the arming detent. The striker rests on a creep spring, which is located in the central channel of the fuse body. The bottom shoulder of the striker channel is pierced by four air vents. The base of the fuse is internally threaded to take a standard navy gaine.

Data:

Overall length	4-3/32 ins
Maximum diameter	$1\frac{3}{8}$ ins
Threads:	
Diameter	1-31/32 ins
Per inch	12

When the safety fork is pulled by the arming device, the spring loaded detent moves outward, disengaging the hole in the striker body. The fuse is now armed. The striker is held away from the primer by the creep spring, and on impact the striker moves downward compressing the creep spring and impinges upon the primer.

(iii) All-ways Action Fuse (Probable designation B-9(a)): This has a heavy, solid, brass body and there are six spanner holes slightly below the centre of the fuse body. This fuse employs the same type arming detent, locking spring, and safety pin holes as are found in the impact fuse. No locating pin is used, and there was no washer present on the recovered fuses, although it is presumed a washer of similar type as that employed on the impact fuse is used. There are two air vents, 180° apart, in the lower portion of the fuse body, and the base of the fuse is internally threaded to take a standard Navy gaine.

The opening in the top of the fuse is closed by a dome-shaped cap, which has a curved inner surface. This cap is pierced by two spanner holes and a central hole, through which a stud on a safety fork fits to engage a recess in the top of striker extension. The cap is held in place by a grub screw.

The internal mechanism consists of a striker extension, striker, creep spring, and arming detent. The striker extension is an egg-shaped, brass knob having a cylindrical lower shaft, at the end of which is machined a small ball. The top of the striker extension is recessed to take the middle stud on the safety fork.

The striker body is made of aluminium, and a steel striker point is threaded into its lower portion. The main body of the striker has a wide head, which is recessed in its centre to take the ball of the striker extension. The striker is held away from the primer by a creep spring.

The safety fork holds the arming detent inward so that it engages the deep, annular groove in the striker head. An additional safety feature is provided by the lower stud on the safety fork, which engages a recess at the top of the striker extension to prevent functioning of the all-ways action feature.

Data:

Overall length (excluding safety fork)	4-17/32 ins
Maximum diameter	$2\frac{3}{4}$ ins
Threads:	
Diameter	1-31/32 ins
Per inch	12

When the safety fork is pulled by the arming device, the spring loaded detent moves outward, disengaging the groove in the striker body. The fuse is now armed. The striker is held away from the primer by the creep spring.

On direct impact the weight of the striker extension forces the striker down against the creep spring to impinge on the primer, thus firing the fuse.

If the impact is not direct, the striker extension is cammed to the side against the curved dome of the closing cap. This action forces the striker down against the creep spring, firing the fuse.

(c) Arming Device: This consists of a main body, upper body, central spindle, heavy safety spring, bridle, nut, and four flat metal arms which are attached to the buttons on the safety forks of each fuse. The main body is a brass tube with a shoulder at the bottom to both guide the steel central spindle and support the main safety spring. This tube is internally threaded in the top to take the upper body, and it also contains the steel safety spring. The central spindle is threaded at the bottom to take a stop nut and to screw into the base plate. It has a flange near the top against which the safety spring bears. The lock nut holds the central spindle securely within the main body when the device is assembled.

A flat metal plate, having four arms, fits down onto the top of the main body. A U-shaped portion is cut out of the end of each arm to give a hook-like effect. Two of the arms, 180 degrees apart, are provided with locking tabs. These consist simply of a flat strip of metal with a thumb piece at one end and a deep indentation at the opposite. A brass rivet holds the tab tightly to its arm, and the arm has two holes in it. One engages the indentation in the tab to lock it in the open position, while the other holds it locked in the closed position. The hooks at the end of each arm engage a button on the top of the safety fork of each fuse. By locking two arms in place on the safety fork button, the other two are automatically positioned correctly and held securely in place.
The brass upper body is screwed into the top of the main body and locked securely by a grub screw. The upper body has two grooves in its under side into which the ends of the bridle are fitted. Screwing the upper body into place secures the bridle. The bridle is roughly triangular in shape and has an eye at its top to which it is attached to the arming lanyard from the cockpit of the piloted rocket.
Data:

Overall length	$5\frac{1}{4}$ ins
Maximum diameter	1-37/64 ins
Spread of arms	$5\frac{1}{8}$ ins

To operate, the arming device is threaded into a hole in the centre of the warhead base plate. A slight tension in the safety spring holds the safety forks of the four fuses securely in the unarmed position. When the lanyard is pulled by the pilot, the bridle, upper body, and main body are drawn aft compressing the safety spring against the flange on the upper portion of the central spindle. This action retracts the safety forks of the fuses sufficiently to allow the arming detents to spring outward, thus arming the fuse. The pressure of the safety spring cannot force the safety forks back down as the safety fork holes of each fuse have been blocked by the arming detents.

(d) <u>Propulsion Units</u>: The main motivating force of the rocket bomb in flight is provided by three propellant filled, steel cases located in the after end of the fuselage, which will be called rocket motors for the sake of convenience. Additional rocket motors of slightly different design, which are attached beneath the wings of the piloted bomb, and are labelled "For use in ground launching", have been recovered.

(i) <u>Fuselage Unit</u>: This propulsion unit consists of three rocket motors placed in the after end of the fuselage and arranged in the form of a triangle, with two on the bottom and one on top. The venturi tube of the upper motor extends aft beyond the ends of the venturi tubes of the two lower motors. The overall length of a single rocket motor is 78 ins, while the total weight is 266 lbs. Each motor consists of: Conical nose piece, cylindrical body, venturi tube adapter, venturi tube, forward and after grills, initiating charge and propellant.
The forward section of the motor consists of a thin, machined, steel cylindrical body containing the rocket

fuel and nose piece. The inner surface of the body is lacquered and its after end internally threaded to receive the venturi tube adapter.
On the forward end of the body is welded a conical steel nose piece. The forward end of this contains an opening into which is fitted an internally threaded, machined steel collar. The outer surface of this collar is welded to the nose piece, and the inner surface is threaded to take the propellant igniter.
Welded to the outer surface of the body are three steel supporting lugs, two of which are in the same longitudinal plane, 10 ins from either end of the body and 20 ins apart. The third lug is 90 degrees removed from the previously mentioned lugs and is centrally located 22 ins from the forward and after ends of the body. Each lug consists of two small $\frac{1}{4}$ in metal plates welded upright to the body, $\frac{1}{4}$ in apart, Through the hole in each of these plates is passed a $\frac{1}{4}$ in bolt.
The forward end of the venturi tube adapter is externally threaded to fit into the after end of the motor body. Just forward of and welded to the adapter is a metal grill. Eight 2 in holes are circularly arranged around the outer edge of the grill, while a second circular row of four smaller holes is located toward the centre. On the forward surface of the grill are two metal strips which cross in the centre at a 90 degrees angle. This after grill serves as the after support for the propellant grains. The adapter tapers sharply aft to an opening into which is threaded and welded an internally threaded steel collar, which has two external wrench flats. The forward end of the venturi tube is threaded into this collar.
The venturi tube is composed of forward, middle and after sections. The inside diameter of the tube increases from the forward end of the forward section to the after end of the middle section. The after section is cylindrical. The forward section is machined inside and out, and is threaded externally to fit the after end of the venturi tube adapter. Just aft of the threads are two, large external wrench flats. The middle and after sections of the venturi tube are made of sheet steel plates which have been formed into tubes and welded longitudinally.
Resting against an inner shoulder formed by the junction of the nose piece and the body is a thin metal grill containing 54 holes, each hole 13/16 in. in diameter. A flat, circular, oiled silk pad containing an igniting charge of black powder is attached to the forward surface of this grill. The grill serves as a forward support for the propellant grains.

Dimensions and Weights:

Body	
Length (excluding nose piece)	$43\frac{1}{4}$ ins
Diameter	$10\frac{1}{8}$ ins
Wall thickness	5/16 in
Weight	123 lbs
Nose Piece	
Length	$3\frac{1}{4}$ ins
Outside diameter	$10\frac{1}{4}$ ins
Inside diameter	$9\frac{1}{2}$ ins
Threads of after end	10 TPI
Length of threaded portion	$1\frac{1}{2}$ ins

Propellant Igniter Pocket	
Outside diameter	2¾ ins
Inside diameter	1⅞ ins
Threads	12 TPI
Length of threaded portion	1¼ ins
Venturi Tube Adapter	
Length	4⅞ ins
Maximum diameter	9¾ ins
External threads of forward end:	
TPI	9
Length of threaded portion	1⅛ ins
Diameter	9-9/16 ins
Weight (plus grill)	16½ lbs
Internal threads of collar:	
Diameter	4⅜ ins
TPI	10
Length of threaded portion	1½ ins
Outside diameter of collar	5 ins
After grill thickness	5/16 in
After grill diameter	9½ ins
Venturi Tube	
Overall length	33 ins
Overall weight	24 lbs
Forward section:	
Overall diameter	4¾ ins
Diameter of threads	3⅛ ins
TPI	10
Length of threaded portion	1½ ins
Middle section:	
Length	15½ ins
Overall diameter aft	4¾ ins
Overall diameter forward	3⅞ ins
After section:	
Length	12⅞ ins
Overall diameter	4¾ ins
Wall thickness	⅛ in
Forward Grill	
Weight	1 lb 5½ ozs
Thickness	1/16 in
Diameter	9½ ins

The propellant grains are tan coloured and are tied into two separate bundles of three grains per bundle. One bundle is located in the forward end of the body and the other in the after end. Each propellant grain has one centrally located, longitudinal hole. Composition of the propellant is: Nitrocellulose, 59.4%; nitroglycerine, 36%; sodium sulphate, 1.6%; and stabiliser, 3%. It is reported that this propellant is dangerous if exposed to sunlight, dampness or iron rust. Each grain is 19⅜ ins long, 4⅜ ins in diameter and weighs 16 lbs.
The rocket body is unpainted except for a narrow red band around the collar of the venturi tube adapter.

(ii) Wing Unit: The rocket motor which is attached to the wings, differs slightly from the fuselage motor, but the fuel is identical in size, quantity, and appearance. With the exception of the lugs and the venturi tube, there are no welds.
An internally threaded igniter pocket is machined into the forward end of the nose piece. The nose piece threads into the forward end of the rocket body. Four positioning lugs are welded onto the case. The forward

lug is 6 ins aft of the forward end of the steel cylinder and is made of two steel plates welded to the case. The short, after lug is 6 ins forward of the after end of the body and is of the same general construction as the forward lug. The forward lug has three ½ in bolts passing through both of its ends and the centre, forming in effect, three eyes. The after lug has only one eye. The forward and the after lug are in the same longitudinal plane. Sixty degrees on either side of the forward and after lugs, and welded to the cylinder, are two additional lugs. Both of these have one ½ in bolt passing through the two plates and are positioned 21¾ ins from either end of the cylindrical case.
The venturi tube adapter is made in one piece, the after end of which is internally threaded to receive the venturi tube. The venturi tube has only two sections. The extension noted in the fuselage rocket motor is omitted in the venturi tube of the wing motor.
Three quarter in forward of the after end of the venturi tube adapter is a ½ in red band, otherwise the rocket motor is neither marked nor painted. A wing rocket motor has been recovered which is painted blue-grey overall with a red band on the venturi tube adapter and two red bands on the after part of the motor body.
The propellant igniter unit is an electrically fired squib which threads into the forward end of each rocket motor. The igniter is connected to the electric firing circuit of the plane by a four-socket female plug, and a 26 in, two-strand, insulated cable. A selector in the pilot's cockpit permits firing of any one of the three fuselage motors, or the wing motors. The cable leads to two high resistance wire igniter bridges around each of which is wrapped a small quantity of gun cotton. A flash from the gun cotton ignites a small black powder charge, which in turn ignites the black powder contained in the perforated igniter body. The flash from this charge flashes through the red lead covered holes in the igniter body and ignites the black powder initiating charge. The initiating charge in turn ignites the propellant. The igniter is covered by yellow lacquer and is 6¼ ins long and 2-1/16 ins in diameter.

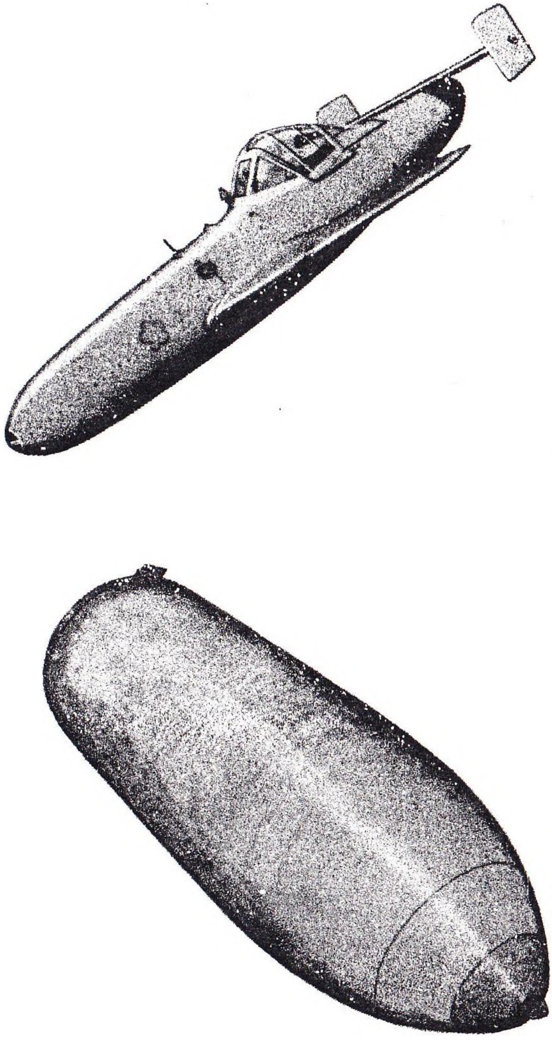
3. REMARKS

It is believed that release from the parent aircraft is designed to take place at a point some 25-30 miles from the target, the flying bomb pilot being given the proper course prior to release. Release is probably made at approximately 200 mph, the flying bomb then increasing speed in a shallow glide for a period of perhaps two minutes. Altitude is then regained by means of a rocket burst and the process is repeated until the target is sighted, whereupon the nose is lowered, a bead is drawn on the target by means of a simple ring and post sight, and the death plunge is started. Once committed, the great speed of the flying bomb, plus its very small control surfaces, will allow very little if any course deviation.

(SOURCE: MEIU NO 4 & CINCPAC-CINCPOA VOL 1, NO 40)

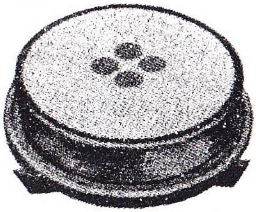
WARHEAD & FUSES OF "BAKA" BOMB.

FIG I. Piloted Rocket Bomb and Warhead.



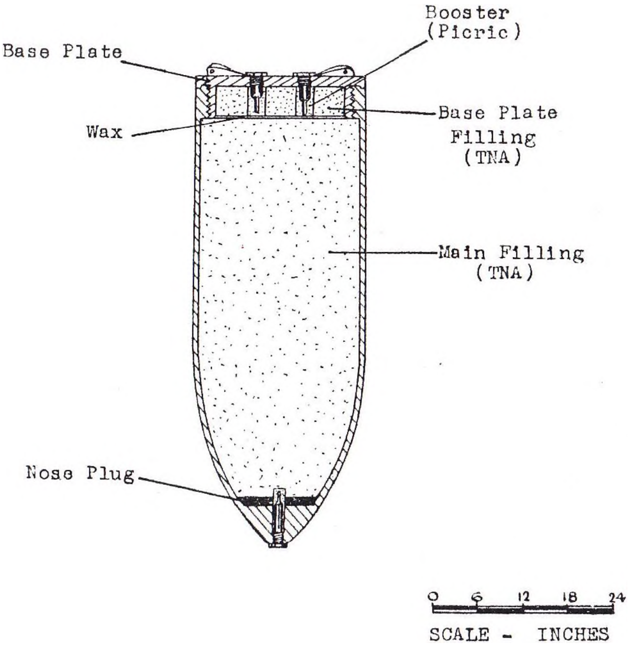
WARHEAD & FUSES OF "BAKA" BOMB

FIG 2 Views of Base Plate.



(B) Forward end of Base Plate.

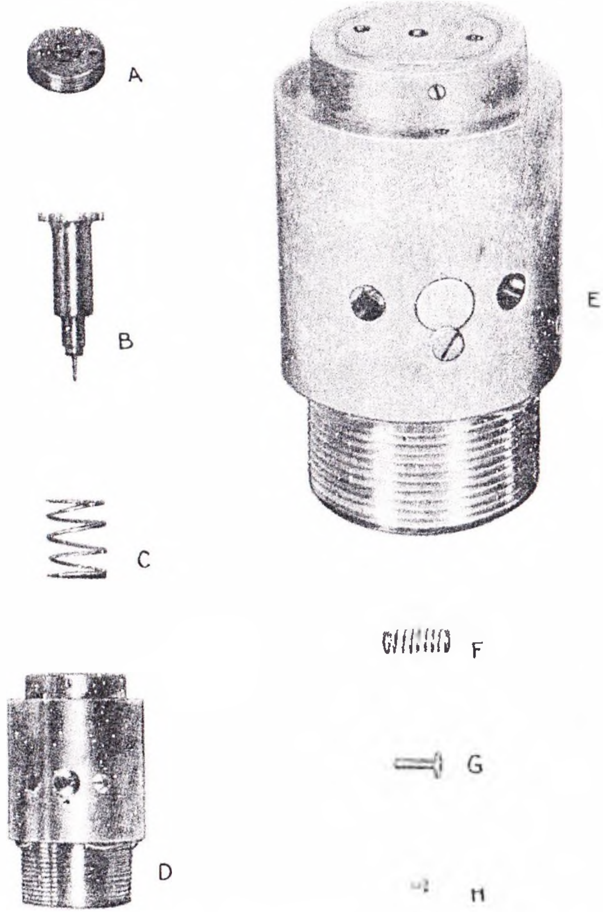
(A) After End of Base Plate.



Cross Section of Warhead.

WARHEAD & FUSES OF "BAKA" BOMB.

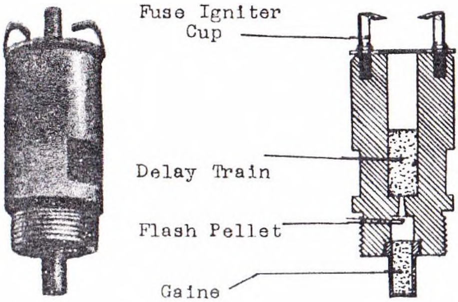
FIG 3 Impact Fuse and Components.



(A)Closing Plate. (B) Striker. (C) Creep Spring.
(D)Fuse Body. (E) Assembled Impact Fuse.
(F)Detent Spring. (G) Arming Detent.
(H) Detent Retaining Screw.

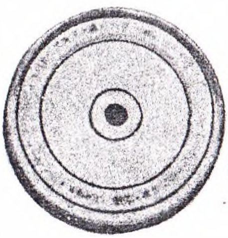
WARHEAD & FUSES OF "BAKA" BOMB

FIG 4 Fuse and Warhead Components.



A

B



C

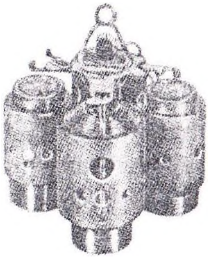
D

E

(A) Base Fuse. (B) Incendiary Pellets.
(C) Main Explosive Charge.
(D) Burster Tube. (E) Burster Pellets.

WARHEAD & FUSES OF "BAKA" BOMB

FIG 5 Relative Position of Arming Device and Tail and Nose Fuses.

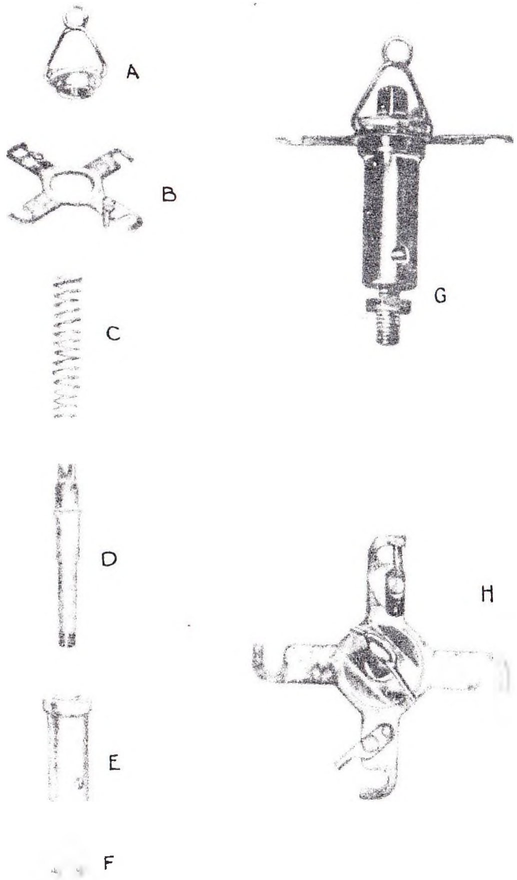


Tail Fuse with
Safety Fork.

Nose Fuse.

WARHEAD & FUSES OF "BAKA" BOMB.

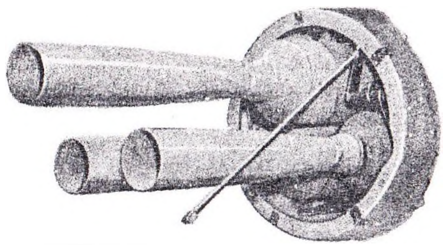
FIG 6 Components of Arming Device.



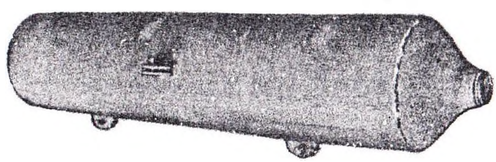
(A) Bridle and Upper Body. (B) Arms.
(C) Safety Spring. (D) Spindle. (E) Main Body.
(F) Nut. (G) Arming Device Assembled.
(H) Top of Arming Device.

WARHEAD & FUSES OF "BAKA" BOMB

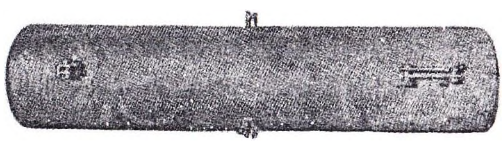
FIG 7 Propulsion Units and Motor Bodies.



Fuselage Propulsion Unit.



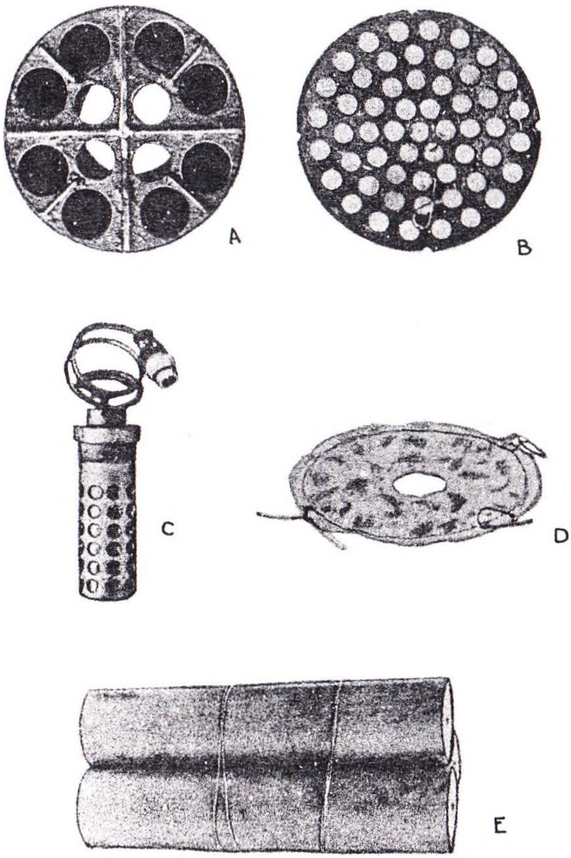
Fuselage Rocket Motor Body
Showing Nose Cap Welded in Place.



Wing Rocket Motor Body.

WARHEAD & FUSES OF "BAKA" BOMB

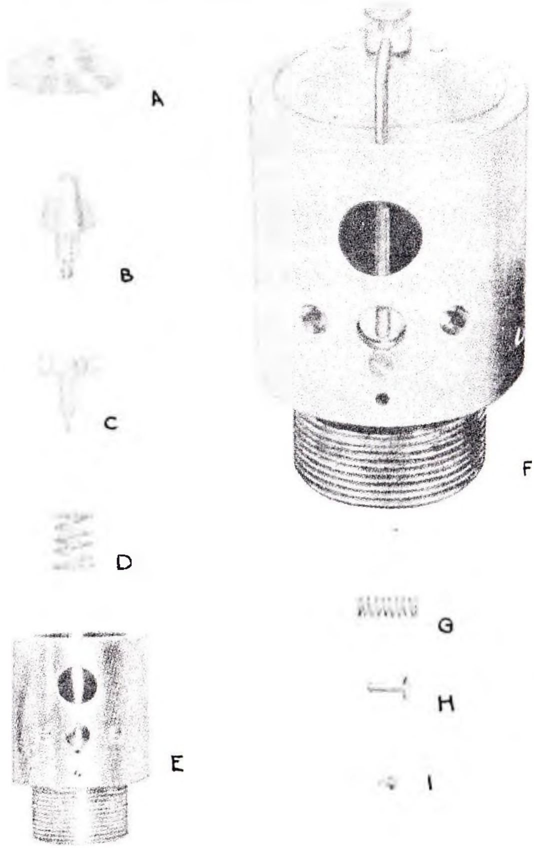
FIG 8 Internal Components of Motor.



(A) After Grill. (B) Forward Grill.(C) Igniter.
(D) Initiating Charge. (E) Propellant.

WARHEAD & FUSES OF "BAKA" BOMB

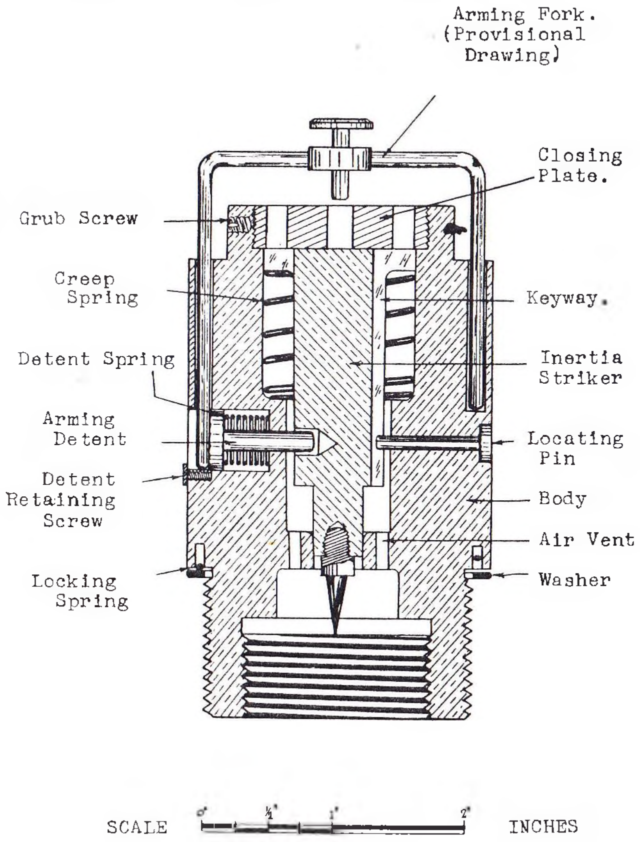
FIG 9 All-Ways Action Fuse.



(A) Domed Cap. (B) Striker Extension. (C) Striker.
(D) Creep Spring. (E) Fuse Body.
(F) Assembled All-Ways Action Fuse. (G) Detent Spring.
(H) Arming Detent. (I) Detent Retaining Screw.

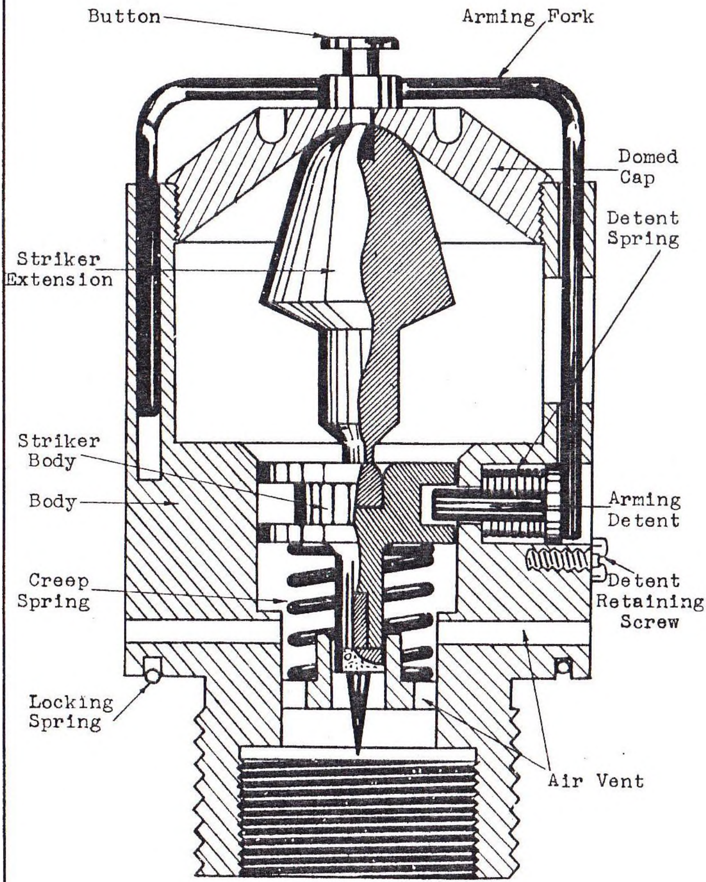
WARHEAD & FUSES OF "BAKA" BOMB

FIG 10 Navy Model 1 Base Impact Fuse.



WARHEAD & FUSES OF "BAKA" BOMB

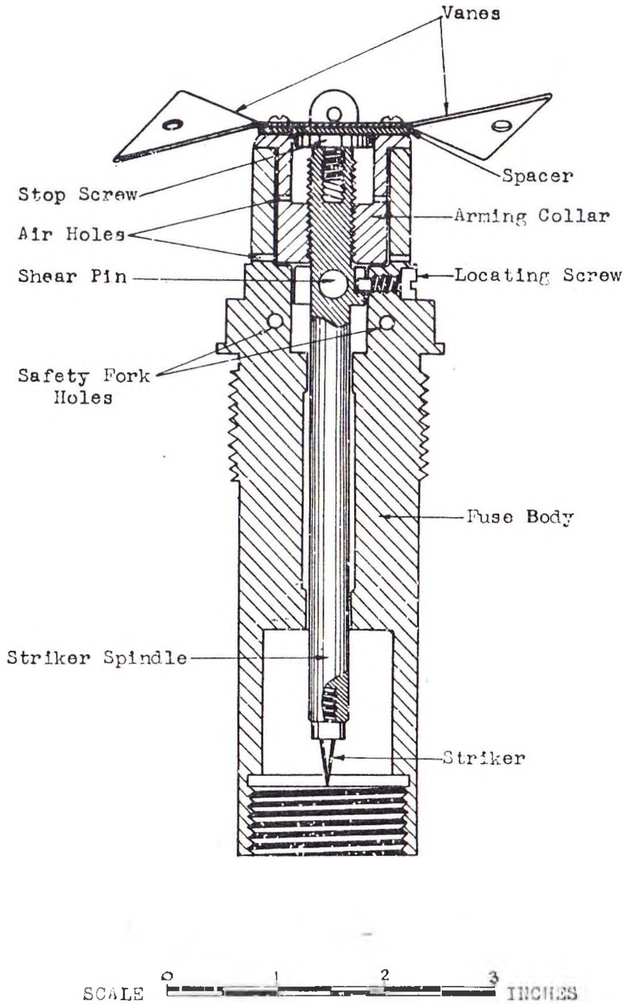
FIG II Navy Model 2 All-Ways Action Fuse.



SCALE 0" 1" 2" INCHES

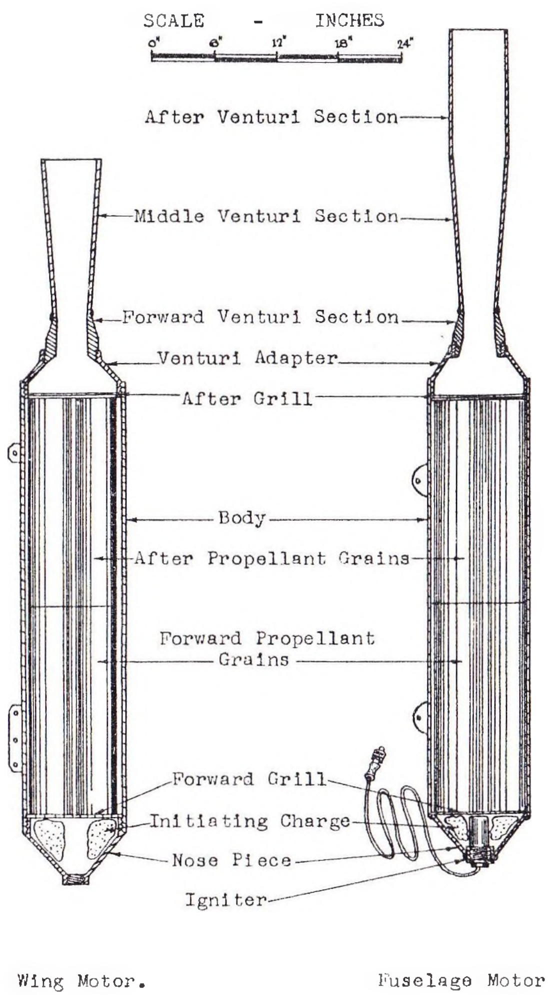
WARHEAD & FUSES OF "BAKA" BOMB

FIG 12 Nose Fuse.



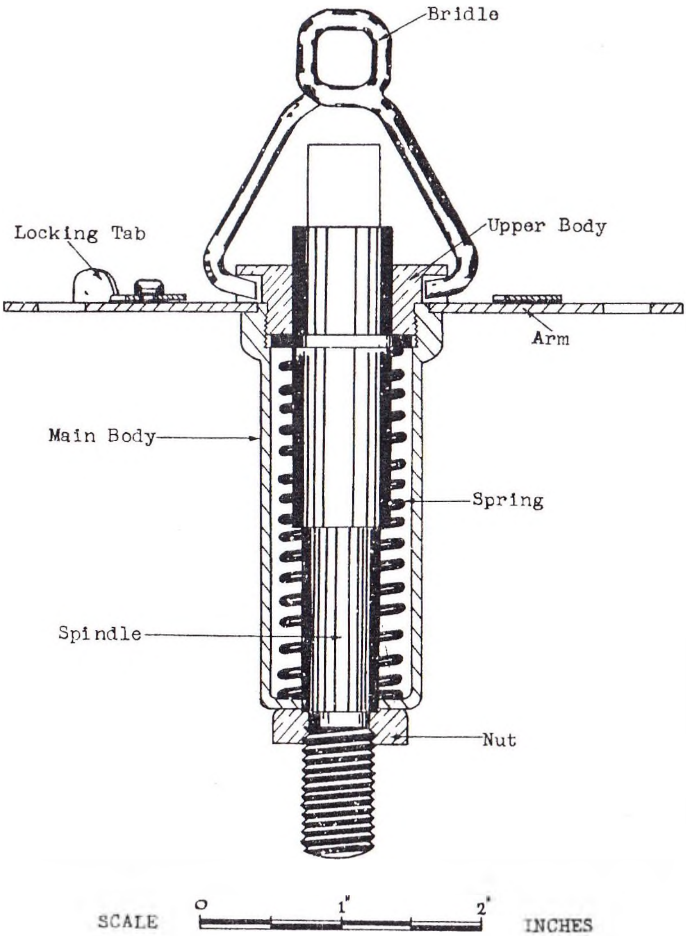
WARHEAD & FUSES OF "BAKA" BOMB

FIG 13 Rocket Motors



WARHEAD & FUSES OF "BAKA" BOMB

FIG 14 Fuse Arming Device.



75 MM AP SHELL

METALLURGICAL EXAMINATION.

1. GENERAL

Metallurgical examination has been carried out on two Japanese 75mm armour piercing shells for Type 41 Mountain Gun. The general construction of this projectile and details of the explosive fillings have been described in AMF Tech Int Sum No 7.

2. DESCRIPTION (Figs 1 - 4)

For purposes of differentiation, the shells were designated A and B respectively.
The bodies of both were painted black overall with red noses and a white band around the centre. A white plus-minus sign was present above the white band and the marking 17.9 ⊕ just below the band.

(a) Shell Body: The body of the projectile had been made from a plain high carbon steel of the following composition:

Carbon	0.79%
Silicon	0.24%
Manganese	0.80%
Sulphur	0.05%
Phosphorus	0.01%

The nose had been roughly forged into shape and then machined. The HE cavity at the rear had also been formed entirely by machining and not by piercing.
The results of hardness surveys along two generators 180 degrees apart on the outer surface of the shell bodies are shown graphically in Fig 4. It is noted from these curves that in one of the shells (B), the hard zone extended approximately 1½ ins further than in the other (A); in addition soft spots were present on the surface of shell A.
With a view to determining the cause and nature of these soft spots the ogival surface of the shell was etched. This revealed a network of dark etching patches typical of those caused by vapour pockets formed at the surface during quenching. The appearance of the etched nose surface is shown in Fig 3.
Micro-examination showed the shell to have been heat treated by heating the body throughout and then quenching the nose, probably in water. The soft spots on the ogival surface were superficial in nature and indicative of poor quenching practice. Owing to the shallow hardening nature of the plain carbon steel employed

hardening had taken place at the surface layer only. This layer extended to a depth of 0.20 in approximately. The hardness at the centre of the section was DPH No 320 approximately.
In course of the examination it was noted that, considering that these were armour piercing shells, the cleanliness of the steel was rather poor. There were numerous relatively large non-metallic inclusions.

(b) Driving Band: The single driving band was fitted into a lightly undercut groove and had been made from pure copper tube. The hardness was DPH No 54, indicating that hot banding had been employed.

3. REMARKS

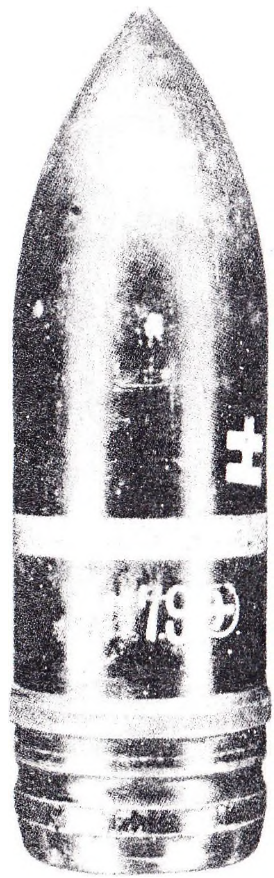
The use of a plain carbon steel for the body of the shell, heat treated to give only a shallow hardened zone at the outer surface. differs considerably from the practice adopted in production of British and American AP ammunition. In the latter case, alloy steels are invariably employed and heat treated to give full hardening throughout; this is followed usually by base tempering. Experience has shown that projectiles having a steep hardness gradient from the outer surface to the centre of the section, especially at the shoulder, possess inferior penetrating properties and a greater tendency to premature fragmentation. In this respect the Japanese shell would be expected to be inferior to British and American AP shell and to possess only limited armour piercing properties.

(SOURCE: MUNITIONS SUPPLY LABORATORIES THROUGH MGO)

75 MM AP SHELL

METALLURGICAL EXAMINATION

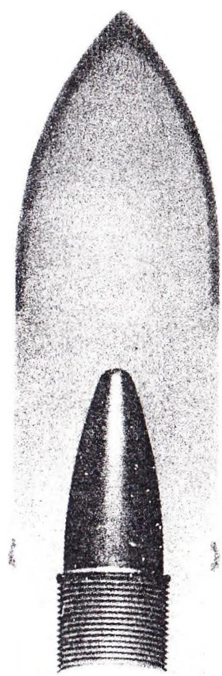
FIG I.



75 MM AP SHELL

METALLURGICAL EXAMINATION

FIG 2. Longitudinal Section of Shell, Etched, showing hardened zone.



75 MM AP SHELL

METALLURGICAL EXAMINATION

FIG 3 Ogival Surface of Shell A, etched, showing Soft Spots.

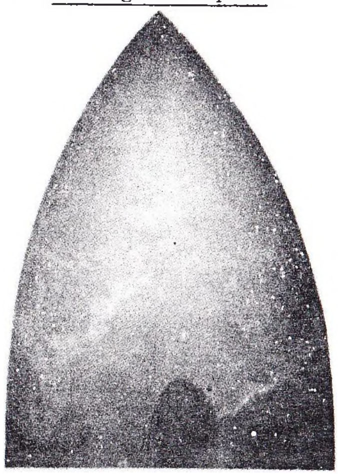
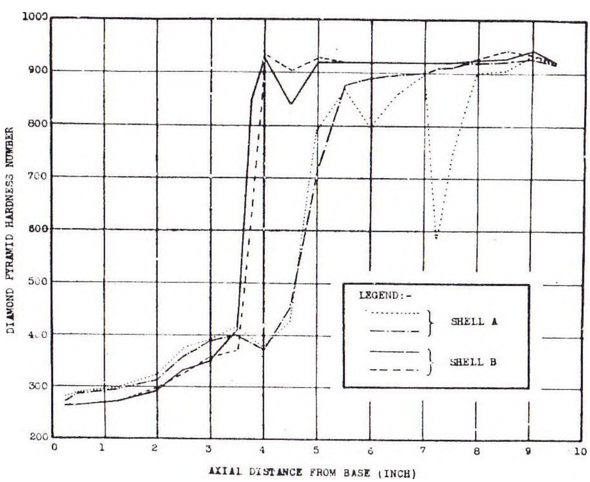


FIG 4 Graph Showing Gradation of Surface Hardness along the length of both Shells.



12 KG TYPE 97 INCENDIARY BOMB.

1. GENERAL

Complete specimens of this bomb were recovered for the first time in the Clark Field area on Luzon, Philippine Islands. The tail section and evidence of thermite burning were reported from India in 1943, and lately one complete bomb and the remains of three others have been found in the United States, but this is the first evidence of its use in this area.
The bomb's function upon impact is the base ejection of three magnesium containers with a thermite type filling.

2. DESCRIPTION (Figs 1 - 5)

(a) Bomb: The munition weighs 26 lbs and is 25$\frac{5}{8}$ ins long. It consists of a steel tubular case, a heavy steel nose and a long finned tail assembly. The nose piece screws into the body and is secured by a grub screw, while the tail cone is friction fitted inside the body and held by four copper shear wires.
Three aluminium alloy thermite filled cannisters with a central flash channel provide the incendiary charge. Black powder charges in the nose and tail are separated from the thermite cannisters by steel discs with holes that centre on the flash channels. Four fins are riveted to the tail cone, and suspension is by a typical, hinged army suspension lug.
This bomb takes the A-2(b) or A-2(d) fuses in the nose, and there is no tail fuse pocket.
The munition is black overall with a white band around the mid-portion of the body. Its designation, taken from a packing case, is "Remodelled Type 97 12 Kg Incendiary".
Dimensions and weights are as follows:-

Length of body	11$\frac{3}{4}$ ins
Length of cannister:	
Forward	4$\frac{3}{4}$ ins
Mid	4-11/16 ins
Aft	5-5/16 ins
Length of tail fins	11$\frac{3}{4}$ ins
Diameter of body	3$\frac{7}{8}$ ins
Diameter of cannisters	3-7/16 ins
Width of tail diagonally	5$\frac{1}{2}$ ins
Wall thickness	3/16 in
Bomb weights:	
Total weight of bomb case	15$\frac{1}{2}$ lbs
Weight of black powder	100 grams
Weight of 3 cannisters (filled)	9-5/6 lbs
Weight of thermite charge	4$\frac{5}{8}$ lbs

(b) Filling: The black powder charge in the nose of the bomb blows the incendiary cannisters out the after portion of the bomb body, shearing the copper wires and blowing the tail section off the bomb. The cannisters are filled with pressed thermite with a flash channel through the centre of each cannister. The flash channel contains a starter mixture that initiates the thermite charge. A small black powder charge in the tail cone, ignited through the flash channel, insures the expulsion of the tail cannister from the tail cone.

3. PERFORMANCE

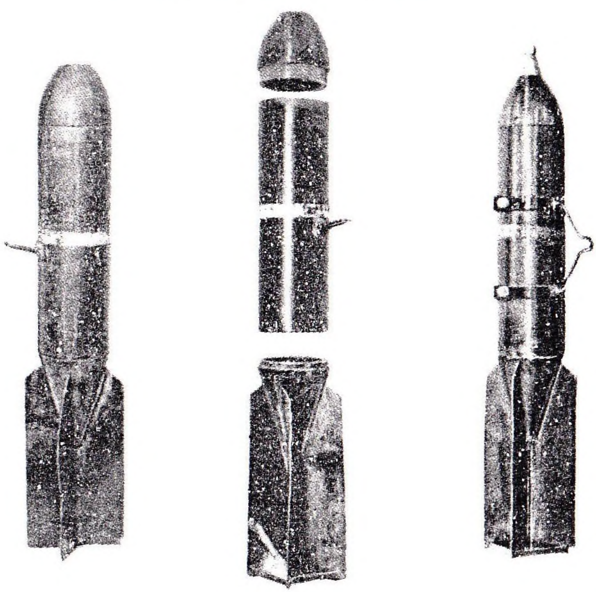
Two cannisters were tested by burning. Each cannister emitted a strong white flame of intense heat for 30 secs. It continued to burn intensely for 15 to 20 mins. After approximately 2½ mins, the cannister scattered incendiary fragments within a radius of 5 yds of the cannister. This continued spasmodically for about one minute.

(SOURCE: MEIU NO 1 AND EDGEWOOD ARSENAL,MARYLAND)

12 KG TYPE 97 INCENDIARY BOMB.

FIG I.

External Appearance of Bomb.



12 KG TYPE 97 INCENDIARY BOMB.

FIG 2 Components.
(A) Centre Cannister & Closing Disc.
(B) After Cannister & Closing Disc.
(C) Forward Cannister & Closing Disc.

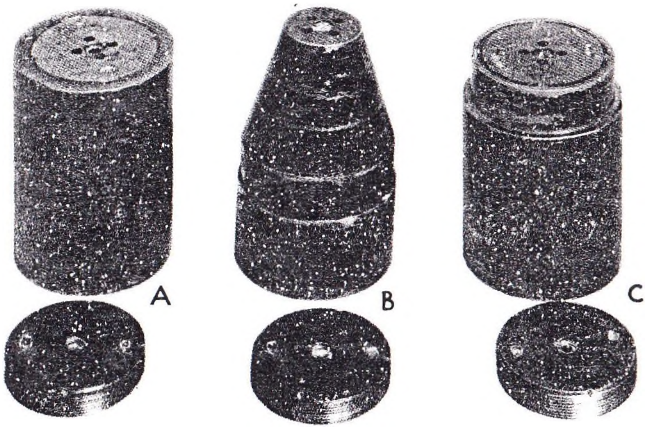
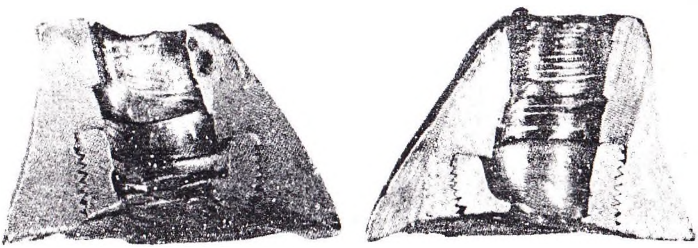
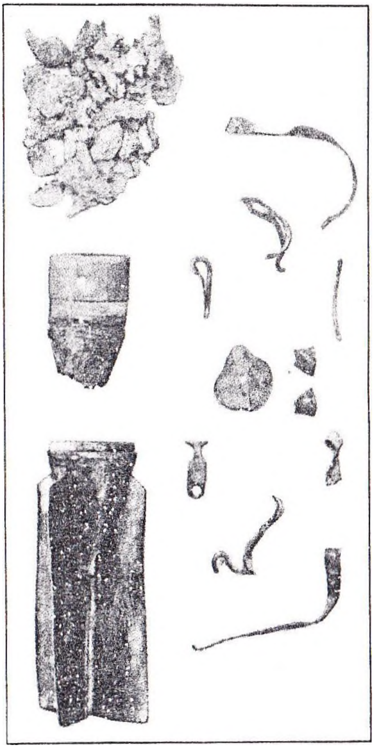


FIG 3 Brass Fuse Body Malformed by Impact.



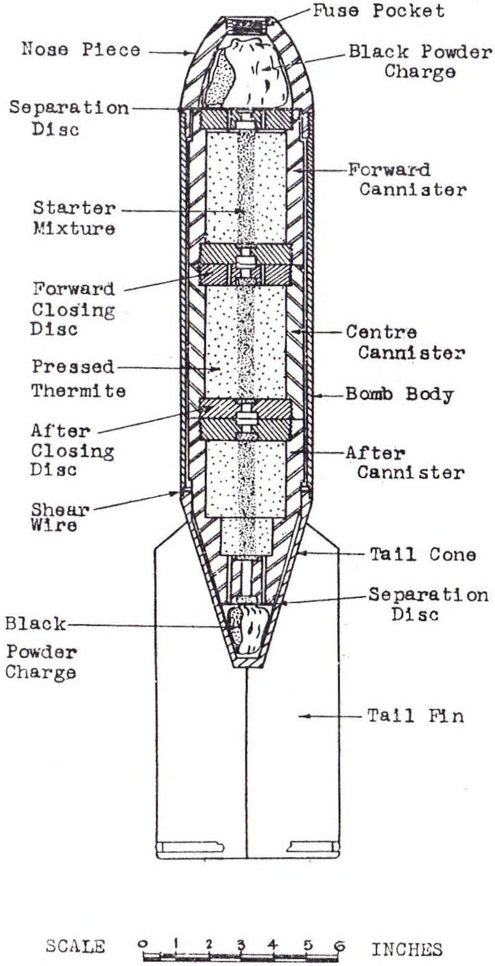
12 KG TYPE 97 INCENDIARY BOMB.

FIG 4. Debris of Consumed Bomb.



12 KG TYPE 97 INCENDIARY BOMB

FIG 5



12 CM ILLUMINATING SHELL & TIME FUSE

1. GENERAL

This report was compiled as a result of the examination of a projectile and fuse recovered on Iwo Jima. The projectile is thought to be an illuminating round of the 12cm navy coast defense gun, but information as to its use is incomplete. A captured document lists a star shell with a 30 second fuse for use in the naval 12cm 45 cal coast defense gun. Since no other Japanese navy 30 second time fuse has been recovered to date, this projectile, based on the above evidence, may be considered a star shell by the enemy.

2. DESCRIPTION (Figs 1 - 5)

(a) Projectile: This ammunition is semi-fixed. The projectile is made in two sections, the main projectile body and the nose section. The after end of the nose piece is cut away, externally, to form an inner sleeve which fits into the forward end of the main body. Four screws, spaced 90° apart, thread through the forward end of the body and the inner sleeve of the nose piece, securing the nose piece in place. Two larger screws which serve to position the forward end of an inner cylinder, are threaded through the leading edge of the main body and the after exterior edge of the nose piece so that each screw enters the projectile at the junction of the nose piece and body. The inboard end of the large screws engage a recess in the upper disc of the inner cylinder. Located 90° apart near the base and protruding internally are four ¼ in studs which fit into recesses in the lower disc of the inner cylinder, positioning the inner cylinder and preventing its rotation in flight. The inside of the base is recessed to hold a ring of black powder encased in a silk bag which serves as an expelling charge. The inside of the projectile is machined to a diameter of 3-7/16 ins. The inner cylinder consists of ten small pyrotechnic cylinders, arranged in layers of five and supported by a metal frame work. A pyrotechnic cylinder is formed of a very tough, waxed cardboard tube containing a silver pyrotechnic compound in the centre and a reddish-brown pyrotechnic mixture in either end. The ends of the cardboard are crimped over the filling. Around a paper covered hole, 5/16 in in diameter, in each end of the pyrotechnic cylinder, a felt washer is glued. The igniter cylinder frame, which supports and provides a method of igniting the pyrotechnic charges, consists of three metal discs, spaced equidistant and supported by a central metal spindle. The spindle is made of three sleeves, threaded to each other, into which is fitted a steel shaft having four longitudinal grooves which serve as a vehicle for four powder trains, extending the length of the spindle. The top disc consists of two metal pieces. The forward piece is a machined plate containing a centrally located collar fore and aft, through which is passed the inner shaft. This collar contains five circumferential ports which are flush with the bottom surface of the plate and filled with black powder. These ports contact a black powder filled circumferential groove on the forward end of the inner shaft which intercepts the longitudinal powder trains.

The forward plate has two recesses on the circumference, to receive the two positioning screws. The after plate of the top disc contains a circular powder train on its top and bottom surfaces which are connected by five ports passing through the plate. Leading from the circular powder train on the top surface are five short powder trains set in radial grooves which contact the aforementioned ports in the collar of the forward plate. The circular powder train on the bottom surface serves to ignite the forward end of the upper layer of pyrotechnic cylinders. Five indentations are machined into the circumference of the after plate to receive the upper studs of five steel wedges which position the pyrotechnic cylinders in the inner cylinder frame.

In manner and material, the centre disc is made similar to the top one. The forward plate of the centre disc and the middle portion of the spindle sleeve are machined in one piece. The forward plate has five circumferential indentations to receive the studs of five circumferential steel wedges positioning the upper layer of pyrotechnic cylinders. Machined into the top surface is one circular groove containing a powder train which ignites the after end of the upper layer of pyrotechnic cylinders and is in turn ignited by five ports extending through the forward plate and making contact with the powder train on the top surface of the after plate. The after plate is fitted on the after collar of the forward plate and is ignited and functions in a fashion identical to the after plate of the top disc. The after collar of the forward plate threads onto the forward end of the after spindle sleeve.

The forward plate of the bottom disc is identical in construction and operation to the after plates of the top and centre discs. The base plate of the bottom disc and the after section of the spindle sleeve are machined in one piece. The top surface of the base plate contains two ports, passing through the plate. These are filled with black powder and lead to a circular groove, containing a black powder train in the bottom surface of the plate. The charge in this groove ignites the ejecting charge located in the base of the projectile. On the circumference of the base plate are vertical recesses which take the positioning studs.

The after end of the inner shaft of the spindle threads into the centre of the base plate.

A wooden plug in the nose section of the projectile positions the upper end of the spindle, with its exposed powder trains directly under an opening leading from the fuse black powder magazine and a small black powder charge.

(1) Data:

Projectile:	
Diameter of bourrelet	(4-11/16 ins) - 119mm
Overall length (unfused)	13-13/16 ins
Weight complete	44 lbs
Length from base to nose section	11-13/16 ins
Length of nose section	2 ins
Diameter of top of nose section	2⅝ ins
Width of rotating band	1-15/16 ins
Fuse pocket threads:	
Threads per inch (R/H)	8
Diameter	1⅝ ins
Depth	½ in
Inside diameter of body	3-7/16 ins
Wooden plug:	
Base diameter	2-7/16 ins
Top diameter	1-15/16 ins
Thickness	⅞ in
Diameter of hole	13/16 in
Inner cylinder:	
Weight	11 lbs
Diameter of discs	3¼ ins
Overall height	11-7/16 ins
Diameter of spindle	13/16 in
Steel spacer bars:	
Weight (each)	4⅛ ozs
Total number	10
Length overall	4-9/16 ins
General shape	triangular
Width of sides	⅝ in
Studs on each end:	
Diameter	5/16 in
Height	⅛ in
Increments:	
Number	10
Length overall	4¼ ins
Diameter	1-7/32 ins
Weight (each)	5⅝ ozs
Analysis of powder:	
Silver Pyrotechnic:	
Weight	3.5 ozs
$Ba(NO_3)_2$	35.6%
KNO_3	10.4%
Magnesium	38.0%
Wax	13.9%
Carbon	0.8%
Sulphur	1.3%
Red Pyrotechnic:	
Weight	⅝ oz
KNO_3	63.2%
Fr_2O_3	3.8%
AL_2O_3	1.1%
Sulphur	8.2%
Wax	5.5%
Glass	6.1%
Carbon	12.1%

Expelling charge:
One-half oz of black powder encased in a silk bag.

(ii) Colour and Markings: The projectile is coloured blue overall, with a $\frac{1}{4}$ in yellow band painted below the bourrelet. The Kure Navy Arsenal Mark, November 1940, and the projectile weight are stamped on the rotating band.

(iii) Operation: When the fuse functions, the flash from the black powder magazine ignites a small black powder charge in the nose of the projectile, which in turn ignites the powder trains in the central spindle. The flash from this train ignites the powder trains in the three discs and thus the ten increments and the ejecting charge. When the cylinder is blown from the case it shears the studs and forces the nose and body of the projectile apart. Centrifugal force causes the ten increments to scatter in all directions giving the desired signal or illumination.

(b) Fuse: Since no definite Japanese designation is known, this fuse will be referred to as the "Thirty Second Time Fuse". It is built with a brass nose piece, an aluminium midsection, a stationary and moveable powder ring and a brass base section which houses a black powder magazine in the after end and supports a central spindle which houses the stationary firing pin. The spindle and base section are in one piece. The nose piece is a hollow truncated cone containing four vent holes forward and threaded (R/H) internally, aft, to fit the forward end of the aluminium mid-section. The aluminium midsection has four vents forward and a threaded (R/H) opening located centrally, aft, into which is fitted the forward end of the brass spindle. Just forward of the threaded opening the aluminium piece has a longitudinal recess to take a small coiled spring whose purpose is to prevent the freezing of the moveable detonator, which is partially housed in the aluminium mid-section. A narrow lip around the base circumference of the mid-section fits into a groove on the forward surface of the stationary (upper) time ring and forms a seal. The after end of the moveable detonator is housed in the forward end of the hollow central spindle.
The detonator carrier is made of a small brass cylinder, 9/16 in long and 11/32 in in diameter, into the top of which is threaded a small weight. An explosive cap is placed in the after end of the cylinder and rests upon an internal lip. Surrounding this cylinder and secured by a tight friction fit is a split brass collar which rests upon an internal shoulder in the forward end of the spindle. The moveable (lower) powder ring contains the time setting (0 to 30 secs) in increments of 1/5 sec. A segmented brass friction washer is keyed to the central spindle and holds in position the stationary (upper) powder ring. A thin brass disc threads into the after end of the black powder magazine.

(i) Data:

Overall length	$2\frac{3}{4}$ ins
Maximum width	$2\frac{5}{8}$ ins
Length visible above the projectile	$2\frac{1}{4}$ ins
Weight	1 lb $10\frac{1}{4}$ ozs

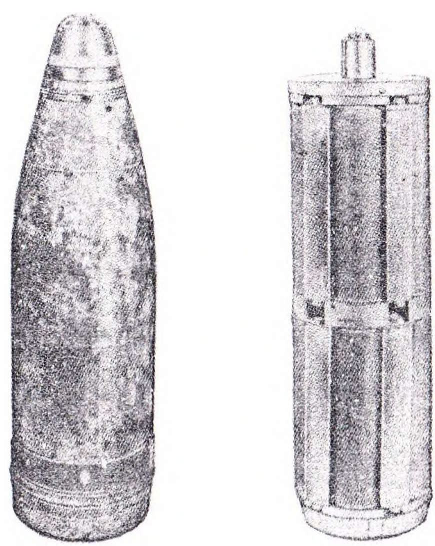
Threads R/H:	
Per inch	5
Diameter	$1\frac{5}{8}$ ins
Depth	$\frac{1}{2}$ in
Setting time	0 to 30 secs

(ii) Operation: The force of setback upon firing causes the detonator carrier to snap down out of the split collar and onto the fixed firing pin. The flash from the cap in the detonator carrier ignites the black powder delay train in the stationary ring. The delay trains in the stationary and moveable rings work on the principle of the Frankford Arsenal Time Fuse and after the set delay period has elapsed, the booster or black powder magazine is ignited.

(SOURCE: MEIU NO 4)

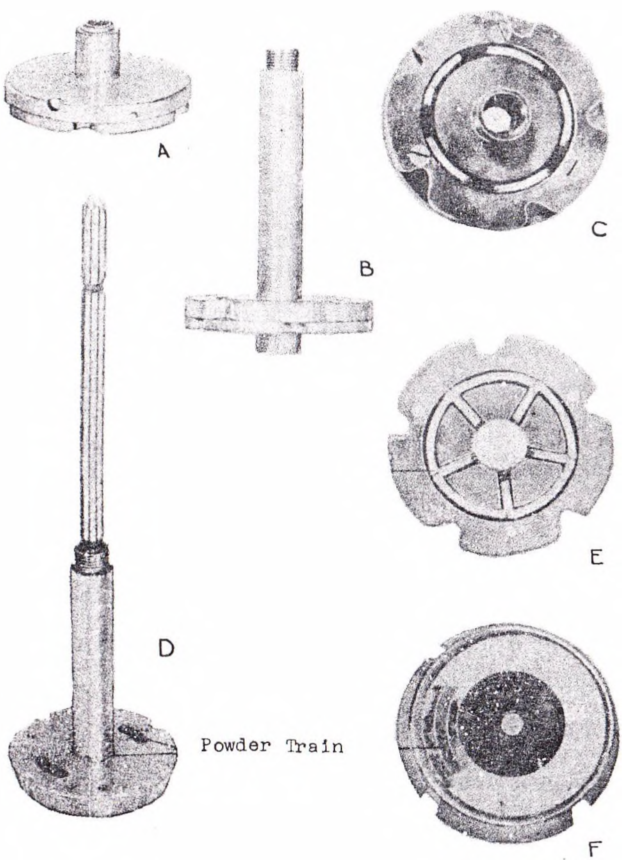
12 CM ILLUMINATING SHELL & TIME FUSE

FIG.I. Assembled Round and Inner Cylinder.



12 CM ILLUMINATING SHELL &TIME FUSE

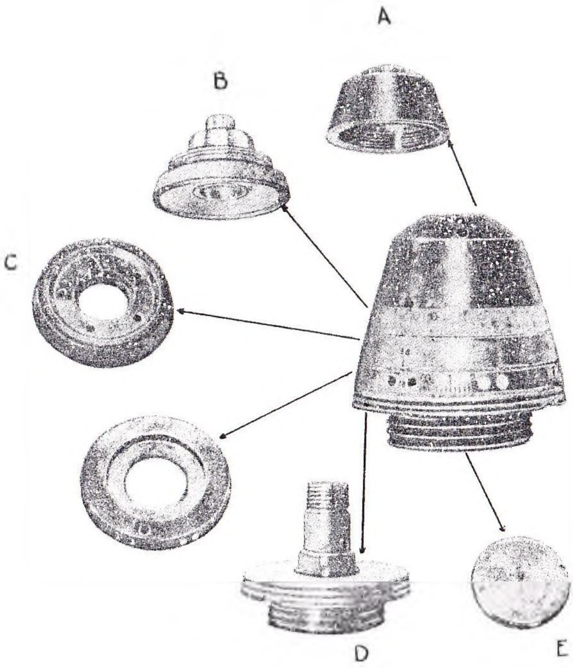
FIG 2. Projectile Components.



(A) Top Disc. (B) Centre Disc. (C) Bottom View of After Plate (Top Disc). (D) Top View of Base Plate. (E) Bottom View of Forward Plate.(Bottom Disc). (F) Bottom View of Base Plate.

12 CM ILLUMINATING SHELL & TIME FUSE

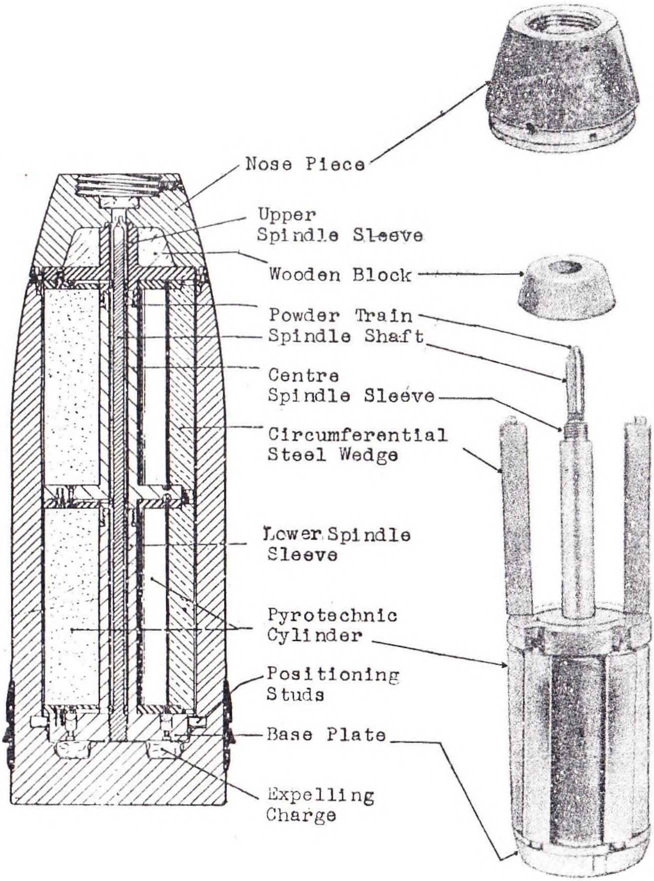
FIG 3 Fuse Components.



(A) Nose Piece. (B) Aluminium Midsection.
(C) Stationary Powder Ring. (D) Base Section.
(E) Magazine Plate.

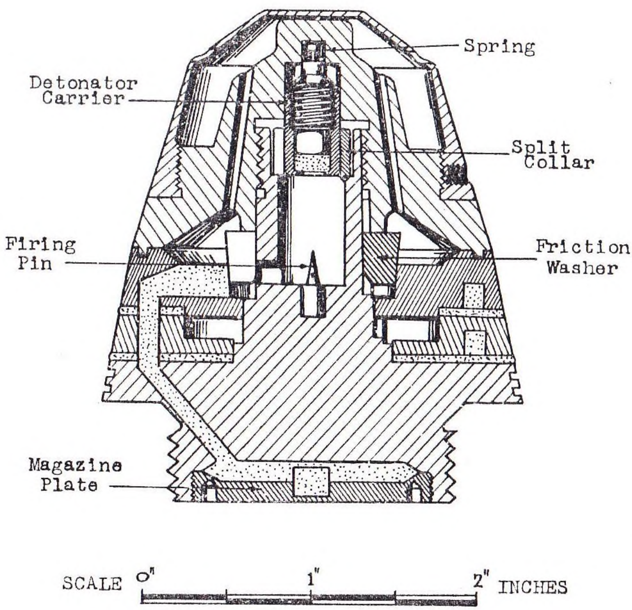
12 CM ILLUMINATING SHELL & TIME FUSE

FIG 4 Sectional View of Complete Round.



12 CM ILLUMINATING SHELL & TIME FUSE

FIG 5 30 Sec. Time Fuse.



TYPE 97 SIGNALLING MACHINE

1. GENERAL

The machine is portion of a signalling system, electrically operated on the principle of a "telegraph". It could be used to receive from and transmit to a remote station, 12 standard messages in each direction. Apparently there are two similar units, a power supply of 12 to 15 volts DC at 1 amp capacity, and a simple alarm system to each complete set-up station. Intercommunication between the "master" and "remote" station would be carried out by means of a nine-core cable.

2. DESCRIPTION (Figs 1 - 6)

Manufactured in April 1942 by the Kitatatsu Electric Works, Osaka, the apparatus is carefully made and attached to a cast alloy housing which, in turn, is fitted into a pressed metal case. It measures 7$\frac{3}{8}$ ins wide, 6-3/16 ins high and 6$\frac{1}{4}$ ins deep and weighs 6 lbs 10 ozs. The transmitter and receiver movements within the unit are quite independent in operation, and each has its own dial pointer, coloured red and green respectively.
The white dial is made of translucent plastic with black figures and characters clearly defined. Three pilot lights, controlled by a toggle switch on the panel, are fitted behind this dial which may therefore be used at night. A push button marked "alarm" is mounted on the top right hand side of the panel.
Two studs protrude from the rear of the case, and have been provided for attaching the machine to a bracket.
The machine operates from a 12-15 volt DC supply, consuming 1.1 amps at 15 volts with the pilot lights on, and 0.65 amps with them off. All connections to the equipment are made through a 9 pin plug attached to the side of the case. Pins 1 and 2 are for the 15 volt DC supply, pins 3, 4 and 5 are for the transmitting circuit, and pins 6, 7 and 8 for the receiver. Pin 9 is for an alarm circuit. When the alarm button is pressed, it closes a circuit through pin 9 to one side of the DC supply.

3. PRINCIPLE OF OPERATION

The transmitter is manually operated by a knurled knob which is attached to a shaft passing through a hole in the glass cover. This shaft has the red pointer attached to it, and terminates on an insulated selector disc (transmitter) which has three slip rings located coplanar and concentrically. As shown in the circuit

diagram, the outer slip ring is divided into three equally spaced sections. Turning the knobs rotates the selector disc beneath five collector brushes which transfer positive and negative polarity combinations of the 15 volt supply to pins 3, 4 and 5. The receiver is essentially a motor containing a laminated stator with twelve slots. Into these slots is wound a 2 pole 3 phase type winding-in, it is assumed, delta connection. The rotor consists of a 2 pole permanent magnet on a shaft supported by Swedish SKF ball bearings. This rotor shaft connects to the green scale pointer, through suitable gears. The three leads from the field winding are connected directly to pins 6, 7 and 8.
The transmitter is now seen to be a selector switch, which, in a sense, is capable of connecting twelve different combinations of DC polarity to the motor of a remote receiver. Interconnection between the transmitter and the remote motor is carried out by cables and sockets, so that transmitter pins 3, 4 and 5 and appropriate pins (5, 6 and 7) on the receiver, are through-connected. For each position of the transmitter, or selector switch, the effective field produced by the stator winding in the remote motor will result in a different position being taken up by the rotor, and therefore, the green scale pointer. The transmitter pointer and the remote receiver pointer are thereby electrically interlocked.
As shown by the vector analysis, each position of the selector switch results in the receiver rotor moving through an arc of 30°. In this manner, the movement of the transmitter pointer to any one of the twelve indicated positions will result in the remote receiver pointer taking up a similar position on its scale; the movement of the receiver pointer is practically instantaneous with that of the transmitter.

4. OPERATING INSTRUCTIONS

(a) Connect the 9 core cable from the remote station comprising a "telegraph" power supply and alarm, to the plug on the left hand side of the case. If used at night, the dial lights may be switched on by means of the toggle switch.

(b) When the equipment is not in use the red transmitter pointer should be kept in the lower position marked "stop"

(c) To operate, press the "alarm" button, which will call up the operator of the remote station.
By means of the knurled knobs on the front of the dial glass, rotate the red transmitter pointer to the position marked "start"; this operation will cause the green pointer of the receiver at the remote station to take up a similar position, thereby indicating to the operator that a message is to follow. The normal drill for this form of signalling is then for the remote operator to rotate the red pointer of his machine to the same position, i.e. relay the signal back to the sender in order to indicate that he has received the signal and is ready to start.
Having received the check signal back from the remote station, the sender then rotates the transmitter pointe to the desired message or messages engraved on the dial,

receiving a repeat-back from the remote station for each consecutive movement of the transmitter pointer.

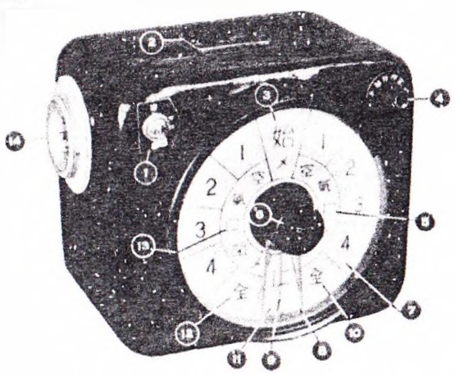
5. REMARKS

The quality of the design and workmanship is high, but the machine shows evidence of the effects of tropical climatic conditions. The stator winding on the receiver motor has been well protected by insulating varnish, and apart from rust on the laminations, the motor was in good condition.
From the results of the investigation on the equipment, and the assistance gained from an interpretation of the nameplate, it is thought that a signalling device of this particular type would most likely be used as a control telegraph between the navigator and operator on a submersible stores tube etc.

(SOURCE: MEE - MONEGEETTA)

TYPE 97 SIGNALLING MACHINE

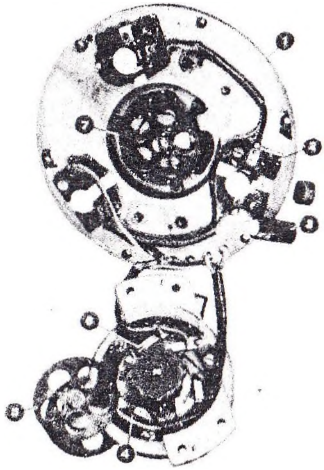
FIG I Front View.



(1) Dial Lamps Switch.
(2) Name Plate.
(3) Start.
(4) Alarm Button.
(5) Open Air Vent.
(6) Transmitter Control Knob.
(7) Glass Cover.
(8) Transmitter Pointer(Red)
(9) Receiver Pointer (Green).
(10) Full. (11) Stop. (12) Full.
(13) Close Air Vent.
(14) Connection Plug. 9 Pin.

TYPE 97 SIGNALLING MACHINE

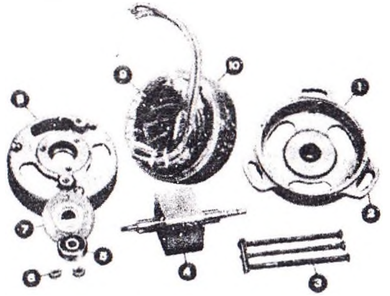
FIG 2. Exploded View of Transmitter Selector Switch and Receiver Motor Gearing.



(1) Cast Alloy Housing.
(2) Fungus Growth on Canvas Bakelite.
(3) Dial Lamp, 15 Volt, 1 C.P.,0-14 Amp.
(4) Transmitter Slip Rings.
(5) Receiver Pointer Drive Gearing.
(6) Collector Brushes.
(7) Receiver Motor.

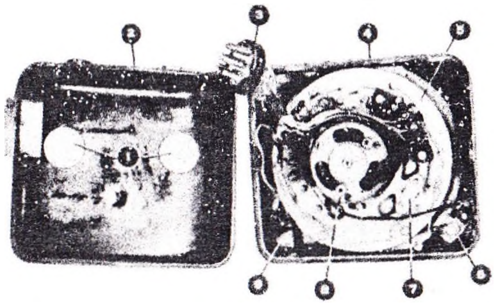
TYPE 97 SIGNALLING MACHINE

FIG 3 Exploded View of Receiver Motor.



(1) Cast Alloy End Plate. (2) Adjustment Slots.
(3) Clamping Bolts. (4) Permanent Magnet Rotor.
(5) Swedish S.K.F. Ball Race. (6) Locking Nuts, Rotor Shaft. (7) Bearing Retaining Plate.
(8) End Plate. (Rear End). (9) 3 Phase Type Winding.
(10) Laminated Stator. 12 Slot.

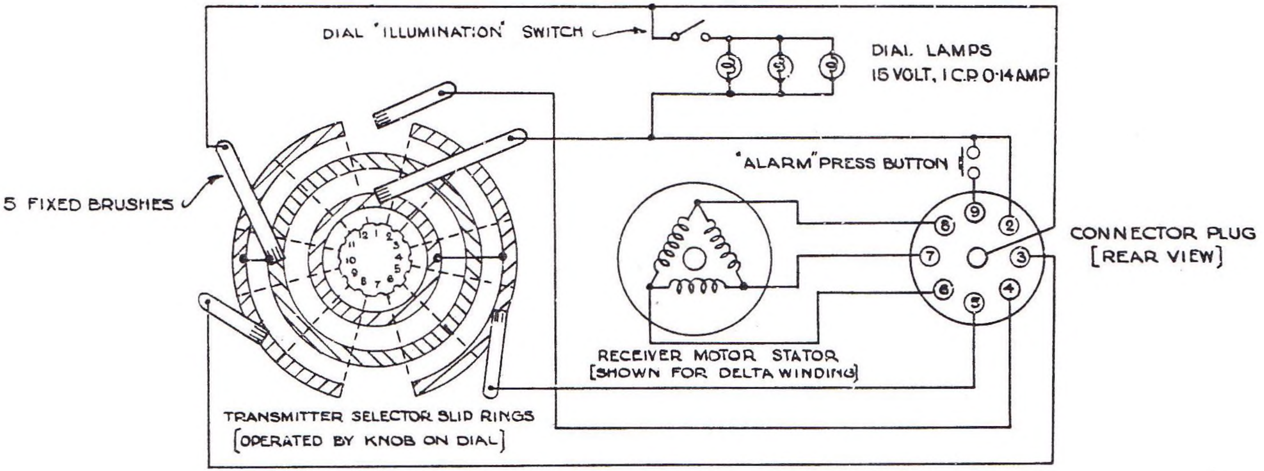
FIG 4 View with Rear Cover Removed.



(1) Rear of ¼" Dia. Mounting Studs.
(2) Rear of Case (Pressed Steel).
(3) 9 Pin Panel Mounting Plug.
(4) Pressed Aluminium Case.
(5) Cast Alloy Movement Housing.
(6) Alarm Press Button.
(7) Unscrew Strip to Remove Dial Lamps.
(8) Receiver Motor.
(9) Dial Lamp Switch.

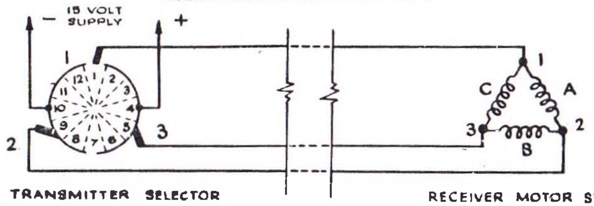
TYPE 97 SIGNALLING MACHINE

FIG 5 Schematic Circuit Diagram.



TYPE 97 SIGNALLING MACHINE

FIG 6 Vector Analysis of the Principle of the Pulse Operated Motor.



TRANSMITTER SELECTOR
[Dotted lines indicate switch sectors
Brushes are fixed. Slip-rings rotate]

RECEIVER MOTOR STATOR
[Assumed Delta connected]

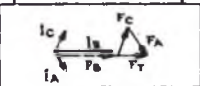
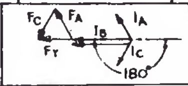
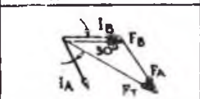
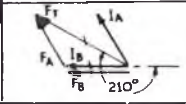
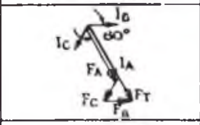
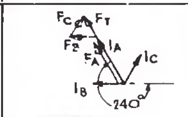
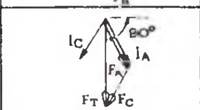
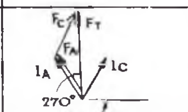
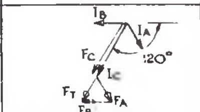
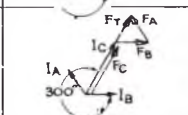
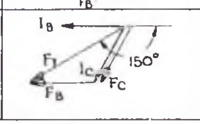
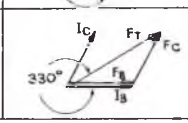
FUNCTIONAL DIAGRAM

STATOR FIELD VECTOR DIAGRAMS

LEGEND

I_A = CURRENT IN A
I_B = " " B
I_C = " " C

F_A = FIELD IN A
F_B = " " B
F_C = " " C
F_T = TOTAL FIELD

SELECTOR SWITCH SECTOR IN VERTICAL POSITION IN ABOVE DIAG	VECTOR DIAGRAM	ANGLE OF RESULTANT FIELD FROM INITIAL FIELD	SELECTOR SWITCH SECTOR IN VERTICAL POSITION IN ABOVE DIAG	VECTOR DIAGRAM	ANGLE OF RESULTANT FIELD FROM INITIAL FIELD
					
					
					
					
					
					

T M TYPE LIGHT WIRELESS SET MODIFICATION Nº 2

1. GENERAL

The complete station is thought to comprise:-

(i) Transmitter-Receiver Unit
(ii) Battery Box containing "A" and "B" battery supply
(iii) Power Supply Unit for operating station from an AC supply of 85 or 100 volts.

The station covers a frequency band from 4 to 12 mc/s. Its effective operating range is difficult to estimate since it is governed to a large extent by aerial height, terrain and receiver sensitivity. Satisfactory operation between two similar stations should be possible over distances of five to ten miles. CW operation only has been provided for.
The complete station could be transported by two men since it is light yet of sturdy construction. No special precautions have been taken to safeguard the equipment against operation under field conditions in humid tropical areas.
An interesting feature is the provision of adaptors which, with suitable power supplies, enable either battery or AC operated valves to be used.

2. DESCRIPTION (Figs 1 - 10 & Graph 1)

Two transmitter-receivers were examined. One was manufactured by the Tokyo Wireless Coy Ltd in Sep 41, while the other was made in Nov 42 by the Nichiden Electrical Wave Industries Ltd. The Tokyo Wireless Coy Ltd made the power supply unit in Dec 40. Each unit bears the navy symbol ⚓. The complete station is strongly constructed from good quality materials. The set and power supply are housed in fabric-covered wooden cabinets, the corners of which are reinforced with metal caps and straps. All covers or lids are securely held in position with snap-fasteners. Practically all metal fittings are nickel plated, and liberal use has been made of good quality phenoloid plastic insulating sections and mounts.

(a) Transmitter-Receiver Unit: This is housed in a fabric covered wooden cabinet measuring $20\frac{1}{2}$ ins x 11 ins x $7\frac{1}{2}$ ins, and weighs $27\frac{1}{4}$ lbs. It is constructed along the lines of early type "Transceivers". A unique feature is the valve arrangements. When operated from a battery supply, battery valves of the

201A type are utilised, whereas when operation is required from alternating current supply, these valves are replaced with valves more suitable for this type of operation.
Two adaptor plugs and sockets are provided for AC operation.
Another interesting point is the aerial arrangement. Two drums fitted with winding handles are fitted within the cabinet and on either side of the control panel. The right hand side drum contains 60 ft of flexible braided aerial wire, the end of which terminates on an insulator. The left side drum contains 115 ft of rope halyard which also terminates on the insulator. When setting up, the aerial and halyard are run out and attached over or around some support well above the ground. The transmitter, when in operation, has its aerial length adjusted to resonance for maximum efficiency by shortening or lengthening the aerial through the agency of the halyard. The aerial length is determined electrically by mechanical adjustment of the drum handles while observing the aerial current metre. The advantages to be gained from this means of adjustment to aerial length are very obvious when setting up the station in the shortest possible time.
When the front cover is dropped, it forms an operating table with the Morse Key mounted on the top right hand side and a tuning graph attached centrally on the left.
All controls are clearly marked and simple to operate. A "bread-board" construction is used and wiring has been carried out with 16 SWG tinned copper wire, with sleeving insulation. Shielding from "ground" and hand capacity changes are effected by means of copper sheet attached to the rear of the front panel and top surface of the base-board.

(b) Transmitter: Suitable switching arranges the two valves in parallel and the set operates as a CW self-excited oscillator keyed in the B+lead. The set operates from both battery and power supply unit; a plug and two sockets located on one of the base-board support brackets is provided for the purpose of changing the value of the oscillator grid-leak for battery or "AC" operation.
Due to non-availability of the correct type or types of valves used with the equipment, it was not possible to carry out satisfactory electrical tests. However, with a pair of type 201A valves fitted, the transmitted signal was found to be quite "clear", but considerable frequency variation occurred during 'keying' when the transmitted signal was detected on a communication type receiver.
A thermo-ammetre in the aerial circuit is used for tuning purposes. A voltmetre in conjunction with a rheostat is provided for adjustment of the filament or heater current for both valves.
When operated from the AC power supply unit the battery type valves are removed and replaced by "AC" type valves and the adaptors. Anode and grid connections are carried through the adaptors, but the filament leads and a cathode lead are terminated in a three and two pin plug respectively. If operated under "AC"on transmit, cathode resistor R3 is short circuited by

switch section Number 1, and the filament of V1 is "grounded", via centre tapped resistor R6.

(c) Receiver: As shown by the circuit diagrams, separate tuning circuits are employed for "transmit" and "receive", so permitting independent tuning of both channels. When in the "receive" position, switching arrangements engage the receiver tuning circuits and convert the two valves into a two stage receiver. Valve V1 becomes a regenerative type detector transformer coupled to an audio-frequency amplifier V2, into the output circuit of which is connected head receivers. Regeneration control is provided by means of a small variable condenser. Bias for the audio-amplifier is obtained from the filament supply on battery operation, and cathode resistor R3 on "AC" operation.
The circuit employed is quite conventional, but judged by modern standards is considerably outdated. Both "battery" and "AC" type valves are used in the receiver, and similar remarks apply as for the transmitter. Electrical measurements were not conducted, but operating the unit as a receiver with the 201A type valves revealed the performance to be quite satisfactory for the type of circuit employed.
Due to the use of a regenerative type detector in this circuit, considerable re-radiation may take place whilst on "receive", with the possibility of subsequent "location" of the equipment on D/F.

(d) Power Supply Unit: This is housed in a fabric covered wooden cabinet measuring 13⅜ ins x 8 ins, and weighs 26½ lbs. It operates from 85 volts AC or 100 volts AC; probably a two position plug is supplied for either voltage. The supply frequency is not indicated, but tests conducted with a type 80 valve indicate the filtering for the transmitter and receiver to be quite adequate on 100 volts, 50 cycle AC supply.

3. OPERATING INSTRUCTIONS

(a) BATTERY OPERATION - TRANSMIT

(i) Open front and rear covers of set.

(ii) Fit "battery" type valves, insert transmitter grid leak plug in "Battery operation" position.

(iii) Connect battery supply with appropriate connectors.

(iv) Run out aerial and erect. Connect with terminal to ground.

(v) Move transmitter tuning condenser to desired frequency as indicated by tuning graph. (RED line).

(vi) Turn filament rheostat in fully anti-clockwise direction.

(vii) Move "Send-Receive" switch to "Send" (up position).

(viii) Adjust filament rheostat until filament voltmetre indicates 5 volts.

(ix) Close back of set.

(x) Plug in "Receivers" and morse key.

(xi) Close key and vary aerial length to obtain maximum deflection on aerial ammetre.

(xii) Set is now ready for operation.

(b) BATTERY OPERATION - RECEIVE

(i), (ii), (iii), (iv) as in Instructions for Transmit.

(v) Close back of set.

(vi) Turn receive tuning condenser to desired frequency.

(vii) Move "Send-Receive" switch to receive (down position). Adjust sensitivity with receiver-reaction condenser until 'rushing' noise is heard in receivers; whilst set is in this condition slowly search for desired signal with receiver-tuning condenser.

(viii) Proceed with normal drill for CW or R/T reception.

IMPORTANT:

ADJUST FILAMENT VOLTAGE ONLY WHEN SETTING UP TO TRANSMIT.

(c) OPERATION FROM "AC" SUPPLY

(i) Open front and rear lids.

(ii) Remove "battery" type valves.

(iii) Fit adaptor sockets, inserting attached plugs into the respective sockets on the bakelite platform at rear of valve sockets.

(iv) Plug in the AC type valves.

(v) Insert transmitter grid-leak selector plug in "AC operation".

(vi) Connect receiver and morse key to respective sockets.

(vii) Connect power-pack to set with appropriate cable.

(viii) Connect power supply to mains ensuring that mains voltage is correct for power plug position, i.e. 100V AC or 85V AC.

(ix) Switch HT on at power supply (small toggle switch on case).

(x) Tuning of sender and receiver can now be carried out as under instructions for battery operation.
Dial settings are read from black line on tuning graph.

IMPORTANT:

The filament rheostat and filament voltmetre are inoperative when on 'mains' operation; therefore no adjustments are required. Transmitter frequency control and receiver tuning control operate individual circuits; either may be varied without interaction.

4. SUMMARY

Compared with wireless equipment manufactured in this country during the period 1940 - 42, the circuit adopted in this set is out of date. Little direct information on the trend of Japanese design can be deduced from such a comparison since it is known that during the same period much more advanced equipments were in use by the enemy. The setting up and operation of this unit should not provide difficulties to forward troops familiar with the use of wireless apparatus.

(SOURCE: MEE - MGO BRANCH)

Nomenclature List
Figs 1-5

1. Tuning Graph
2. Head-Receiver Socket
3. Filament Rheostat
4. Aerial Halyard
5. Receiver Reaction Condenser
6. Receiver Tuning Condenser
7. Transmitter Tuning Condenser
8. "Send- Receive" Switch
9. Morse Key
10. Aerial Wire
11. External Earth
12. External Aerial
13. Aerial
14. Winding Handle (folded)
15. Compartments for Connectors, Headgear etc.
16. Aerial Halyard
17. Copper Sheet attached to rear of panel & top surface of Base-board
18. Transmitting Grid Leak Selector Plug shown in battery-operation socket
19. Aerial loading inductance
20. RF Choke
21. Aerial Ammetre
22. Send-Receive switch
23. Filament Voltmetre
24. Filament Rheostat
25. LF Transformer
26. Extra filament sockets for AC operation
27. Voltage divider
28. Filter condensers
29. AC Input
30. Noise suppression condensers
31. Power Transformer
32. Rectifying Valve

TM TYPE LIGHT WIRELESS SET MODIFICATION Nº 2

FIG 1. Front View with Cover Dropped, Forming Operating Table.

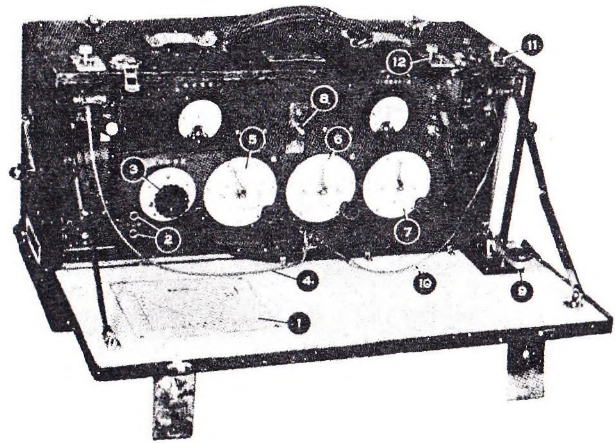
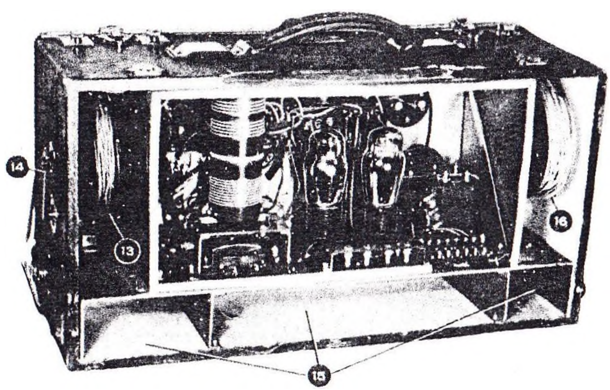


FIG 2. Rear View with Cover Removed.



TM TYPE LIGHT WIRELESS SET
MODIFICATION Nº 2

FIG 3. Rear View - Chassis Removed from Cabinet.
(Note-"Bread-board layout").

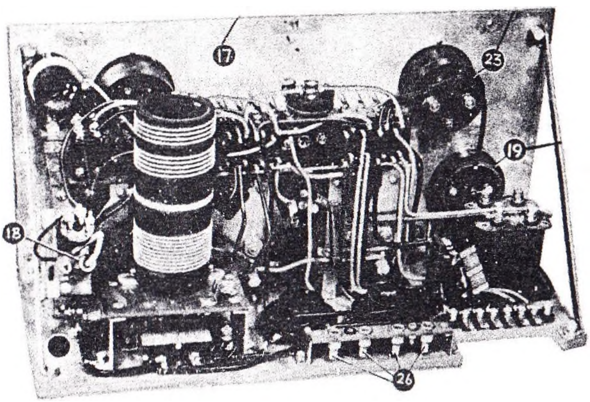
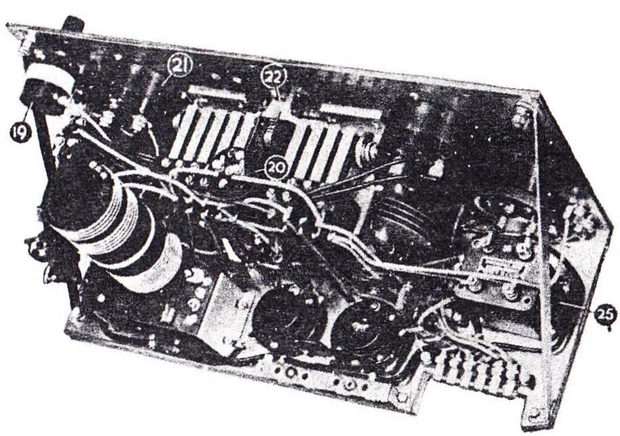
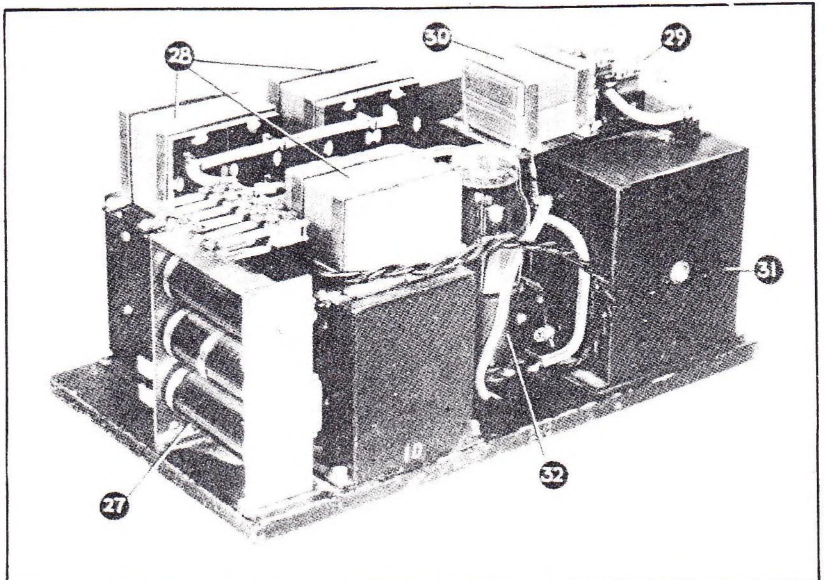


FIG 4. Rear View - Chassis Removed from Cabinet.



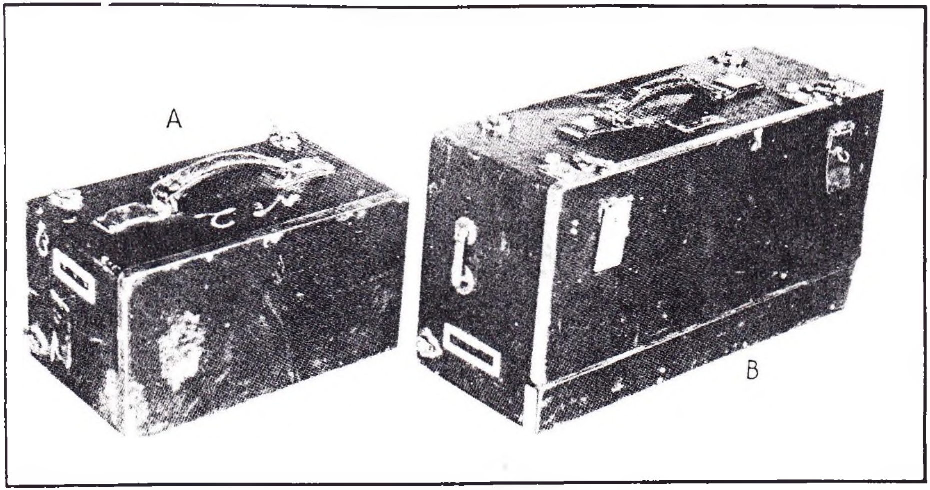
TM TYPE LIGHT WIRELESS SET. MODIFICATION Nº 2

FIG 5 Power Supply Unit Removed from Carrying Case.



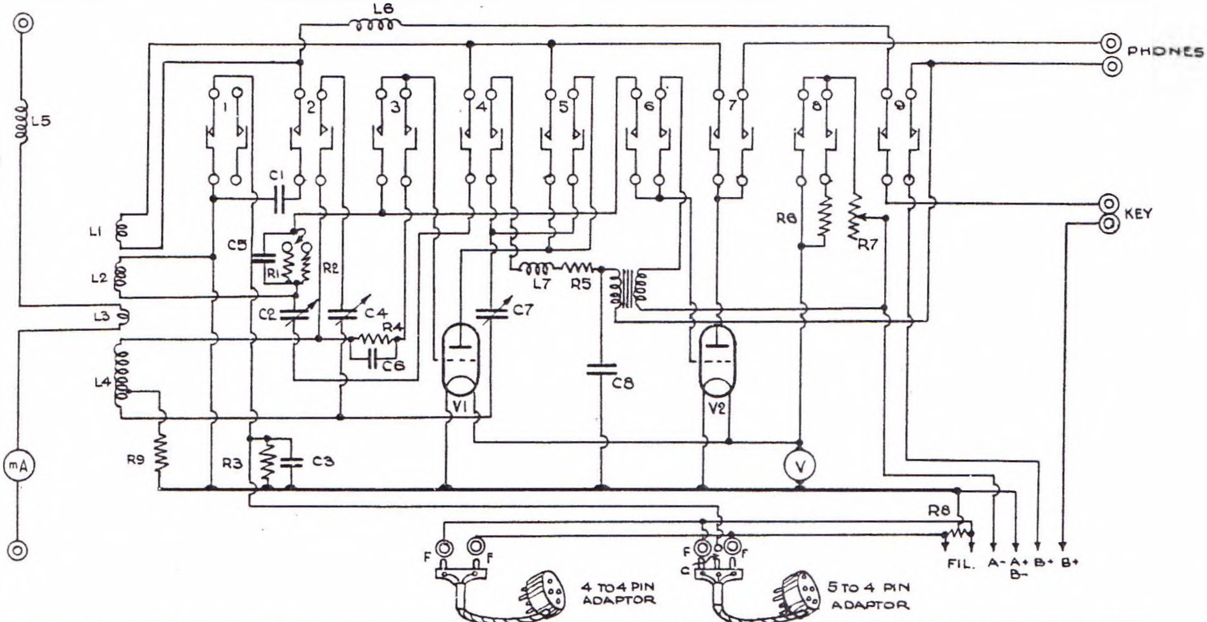
TM TYPE LIGHT WIRELESS SET. MODIFICATION Nº2

FIG 6 (A) A.C.Power Supply. (B) Transmitter and Receiver.



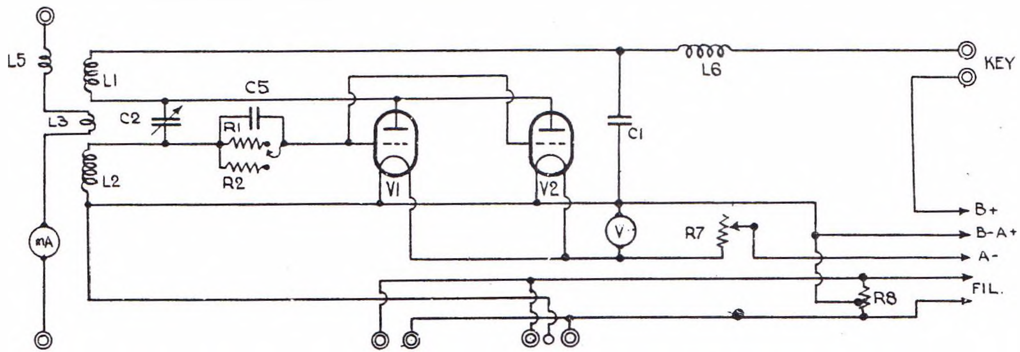
T.M. TYPE LIGHT WIRELESS SET. MODIFICATION Nº 2

FIG 7 Circuit Diagram of Transmitter and Receiver.



T.M. TYPE LIGHT WIRELESS SET. MODIFICATION Nº 2

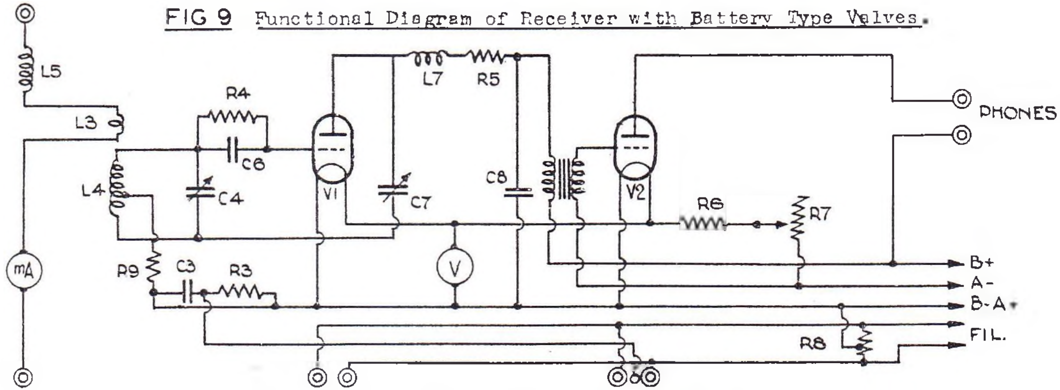
FIG 8 Functional Diagram of Transmitter with Battery Type Valves.



RESISTORS		CAPACITORS		INDUCTANCES	
R1	5000Ω (A.C.)	C1	·01μF	L1	Plate Coil
R2	10000Ω (BAT.)	C2	·00035μF	L2	Grid "
R7	5Ω	C5	·00025μF	L3	Aerial "
R8	20Ω C.T.			L5	Aerial Loading.
				L6	R.F. Choke.

T.M. TYPE LIGHT WIRELESS SET. MODIFICATION No. 2

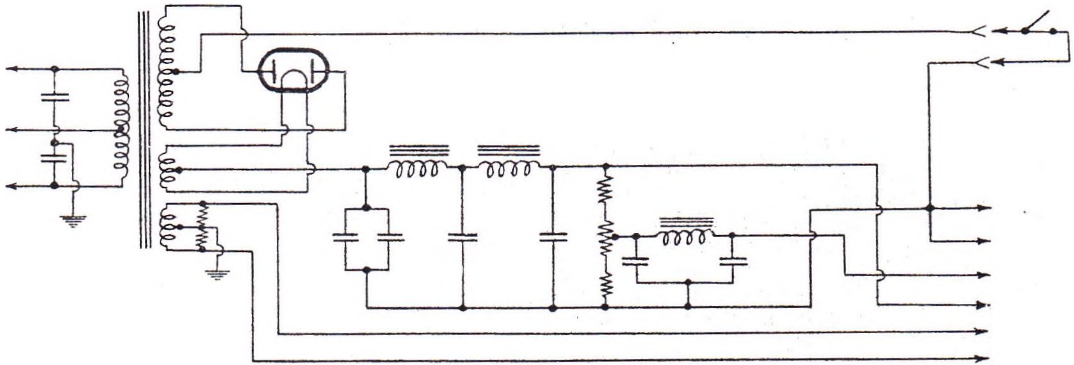
FIG 9 Functional Diagram of Receiver with Battery Type Valves.



RESISTORS		CAPACITORS		INDUCTANCES	
R3	2000Ω	C3	1μF	L3	Aerial.
R4	Missing	C4	·00035μF	L4	Grid Coil.
R5	5000Ω	C6	·00025μF	L5	Loading Coil.
R6	1Ω	C7	·00015μF	L7	R.F.Choke.
R7	5Ω	C8	·00025μF		
R8	20ΩC.T.				
R9	1000Ω				

T.M. TYPE LIGHT WIRELESS SET MODIFICATION Nº 2

FIG 10 Circuit Diagram of Power Supply.

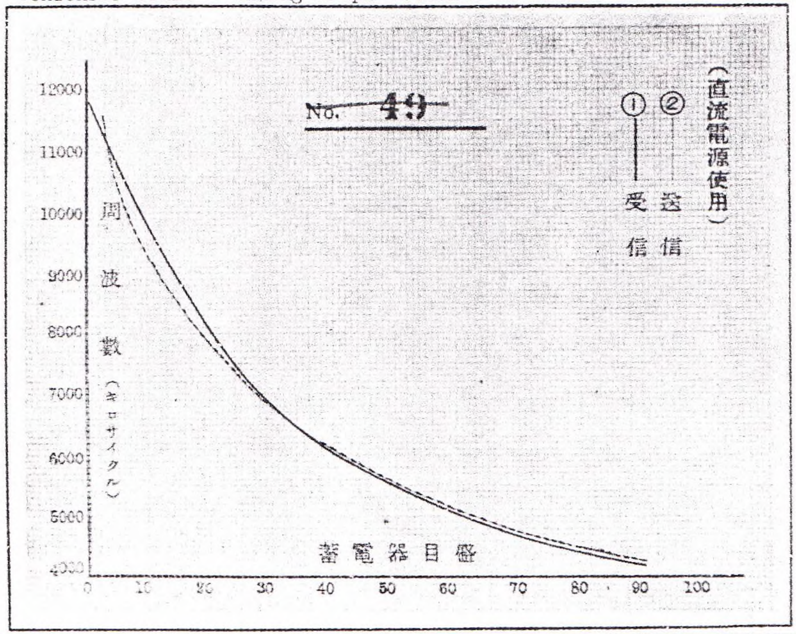


RESISTORS		CAPACITORS		INDUCTANCES	
R1	6000Ω W.W.	C1	2μF x 1000 v	L1	10H, 60mA.
R2	6000Ω W.W.	C2	2μ F x 1000 v	L2	10H, 60mA.
R3	6000Ω W.W.	C3	2μ F x 1000 v	L3	12H, 20mA.
R4	60Ω W.W. CT	C4	2μ F x 1000 v		
		C5	2μ F x 1000 v		
		C6	2μ F x 1000 v		
		C7	·08μF x 1000 v		
		C8	·08μF x 1000 v		

TM TYPE LIGHT WIRELESS SET. MODIFICATION N°2.

GRAPH I. Condenser Scale - Tuning Graph Attached to Inside Cover of Cabinet.

FREQUENCY IN KILOCYCLES



FOR USE WITH D.C. SUPPLY.

1. [BLACK LINE] RECEIVING.
2. [DOTTED LINE] TRANSMITTING.

CHEMICALLY FUSED HAND GRENADE

1. GENERAL

A new type of hand grenade has been recovered in the Philippines, but all packing and markings on the grenade had been destroyed by fire, preventing identification. As this type has not been encountered elsewhere in the Philippines, it seems possible that it may have been manufactured locally, although the grenade is well made compared to most Japanese improvised equipment.

2. DESCRIPTION (Fig 1)

The general construction is shown in the attached sketch. It has a cone shaped cast-iron body which is divided into 48 serrated segments. The upper end of the body is threaded to receive a closing plug $2\frac{3}{4}$ ins in diameter, which is cast integrally with a cylindrical neck extending upward 1 in. This cylindrical neck is cast with a $\frac{1}{2}$ in hole $\frac{3}{4}$ in deep in the top. The threaded flange at the base of this closing plug is also serrated into 7 segments, thus making an overall total of 55 such segments. Fitted into the closing plug well is a cylindrical plug (percussion hammer) slightly less than $\frac{1}{2}$ in in diameter by $\frac{3}{4}$ in long. This plug is held in place by a safety pin and sealed with a black tar material.
Located immediately below this cylindrical plug is a very small glass vial 1/16 in in diameter by $\frac{3}{4}$ in long, filled with a sensitive explosive liquid to form the percussion cap. Two cylindrical ports cast longitudinally at a right angle to the percussion hammer well are provided. These are 1/8 in in diameter and allow for the insertion of the $\frac{3}{4}$ in long percussion cap vial below the percussion hammer, and also form the gas ports. Sealed to a port below the percussion cap is a one inch length of safety fuse connected to a blasting cap extending into the body of the grenade. The filler charge of the grenade is a black granulated powder which appears to be of the Japanese Type 88 explosive. Additional characteristics are as follows:-

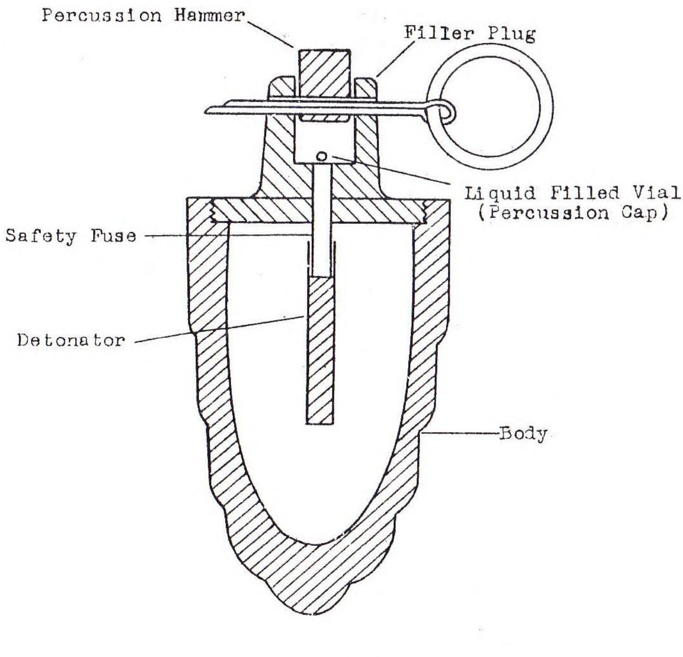
Overall length	4.6 ins
Length of body	3.25 ins
Length of fuse	1 in
Maximum diameter	2.2 ins
Total weight	1 lb (approx)
Weight of filling	60-65 grams

3. OPERATION

To operate this grenade:

(i) Pull the safety pin
(ii) Strike the percussion hammer
(iii) Throw IMMEDIATELY.

(SOURCE: USASOS - SWPA)



Scale - Full

CHEMICALLY FUSED HAND GRENADE

FIG I.

FUSE SETTERS FOR 12 CM AA GUN

1. GENERAL

Four types of fuse setters for the 10 year type 12cm dual purpose gun were found in the Clark Field area, Luzon, Philippine Islands. The setters examined and dates of manufacture are as follows:

Model 89 Type 2	1930
Model 89 Type 4	Nov 43, May 44
Model 89 Type 5	Oct 44
Model 89 Type 5 (Improvement 1)	Aug 44

Of the four fuse setters found, only Type 4 and Type 5 were found installed in the gun batteries. The setters were electrically connected to the Type 2 Model 2 Revision 3 AA Director Junction Box to receive data from the director. The cables were of sufficient length to permit placing the fuse setter in any position in the emplacement.

2. DESCRIPTION (Figs 1 - 4)

(a) Model 89, Type 5: The unit examined was manufactured at Hikari Navy Arsenal, Ordnance Section, and was dated 23 October 1944. The dials and mechanism are contained in steel cases and mounted on a heavily constructed steel platform with four wheels. A vertically supported horizontal handle bar is provided at the rear of the unit. The ammunition support arm is hinged to the steel platform and locks in place for use. For compactness this arm rests on the mechanism box when the fuse setter is not in use. A metal cover is provided for the fuse setter mouth. Data from the director is transmitted electrically to the dials, located at the rear of the fuse setter mechanism box. One dial is graduated from 0 - 45 secs in five second intervals and the other dial is graduated from 0 - 5 secs in one tenth second intervals.
A follow hand wheel located at the rear of the fuse setter operates the pointers on the dial assembly for matching with the pointers operated from the director. The following is a translation of the instruction name plate:

(i) Remove cover from fuse setting mouth.

(ii) Adjust follow hand at fuse time receiver to indicating hand by rotating fuse follow hand wheel. This will cause the fuse setting claw to rotate to its proper place in accordance with the desired fuse time.

(iii) Insert shell nose with fuse attached into setting section (to "stop" position) and hold it there until the setting is finished.

(iv) Rotate fuse setting hand wheel to the direction indicated by arrow (clockwise). In this operation rotate lightly on first stage, and on second stage rotate with more force until it stops. Now the desired fuse time is set.

(v) Pull out shell nose quickly from setting mouth.

Physical data is as follows:

Weight (from nameplate)	475 lbs
Length (overall)	3 ft 9½ ins
Height (overall)	2 ft 6 ins
Width (overall)	1 ft 11 ins

One disadvantage of this fuse setter is that the dial assembly must be in perfect alignment with the fuse setting claw shaft for operation. Movement of the dial assembly may cause disengagement of the fuse setting claw shaft with the dial assembly resulting in failure of the follow hand wheel to operate the pointers on the dial assembly.

(b) Model 89, Type 5 (Improvement 1): This fuse setter is designed very much like the Model 89, Type 5 unit, but is of much lighter construction. The improved unit is equipped with three wheels instead of the four used on the Model 89, Type 5. The operating mechanism is the same as that of the Model 89, Type 5 unit. The lighter design increases the mobility of the unit in the gun pits. The unit examined was manufactured by Aichi Clock and Electrical Instrument Co, Ltd in August 1944.
Physical data is as follows:

Weight (from nameplate)	345 lbs
Length (overall)	3 ft 11 ins
Height (overall)	2 ft 6 ins
Width (overall)	1 ft 8 ins

(c) Model 89, Type 4: The Model 89, Type 4 fuse setter is similar to the Model 89, Type 5 unit in construction and appearance, with the exception of the dial arrangement. This unit has one large dial instead of the two dials used on the Model 89, Type 5 fuse setter. The single dial reads from 0 - 55 secs and is graduated in one fifth second intervals. One complete revolution of the indicator is from 0 to 32 secs. (0 and 32 secs are located at the same point on the dial). The Model 89, Type 4 fuse setter examined was manufactured by Nippon Optical Industrial Co Ltd, in May 1944. Another fuse setter of this type was manufactured by Nippon Kogaku Kogyo Kiki, in November 1943.
The following is a translation of the instruction name plate:

(i) Fix fuse at one second advance at the time with fuse scale setting tool.

(ii) Apply oil to oil holes and sliding surface and see that the parts are in working order.

(iii) Place fuse setting lever to "Fuse Inserting Position".

(iv) Turning fuse follow hand wheel, adjust follow hand of fuse time receiver to indicator hand. This will cause the fuse rotation limiting piece to rotate and set according to the required time.

(v) Insert the shell nose with fuse attached into the fuse setting section until the pilot light lights. In this operation it is essential that the fuse fixing projection coincides with the white line on the fuse inserting section.

(vi) Pull the fuse setting lever back and when it strikes the fuse setting projection hold it, together with the auxiliary piece. As soon as the setting start pilot light lights, pull it toward the direction of arrow to its limit. When the fuse is set to the required time, the setting finish pilot light lights.

(vii) Pull out shell and all the pilot lights will go off.

(viii) Return fuse setting lever to its original position.

Physical data is as follows:

Weight (from nameplate)	506 lbs
Length (overall)	4 ft
Height (overall)	1 ft 11 ins
Width (overall)	2 ft 7 ins

This unit is more complicated in operation than the other units, but the operation depends on the pilot lights to see when the fuse is cut to the desired time, instead of depending on the operator's ability to feel when the fuse setting hand wheel has reached the limit for the desired time setting. The construction of the Type 4 unit is of better quality and sturdier than the other models.

(d) Model 89, Type 2: This model is provided with two setting sections for cutting two fuses simultaneously. The construction is much different from the other models. The fuse setter is mounted on a heavy metal plate which is provided with four carrying handles and a large protective cover. The dial system is identical with that on the Model 89, Type 5 unit. The Model 89, Type 2 fuse setter examined was manufactured by Nippon Optical Industrial Co, Ltd, in 1930. The instruction name plate reads:

(i) Remove cover from fuse setter.

(ii) Remove cover from setting mouth.

(iii) Adjust follow hand of fuse time receiver to indicating hand by rotating fuse follow hand wheel. The fuse setting claws will then rotate to their proper place in accordance with the desired fuse time.

(iv) Insert a fused round in each setting section to "stop" position, and hold in position until setting is finished.

(v) Pull fuse setting lever towards you and when it hits the fuse projection, pull until the lever is brought to a stop. The fuses will then be set for the required time.

(vi) Pull out each fuse as rapidly as possible from the setting mouth.

(vii) Return fuse setting lever to its original position.

Physical data is as follows:

Weight (estimated)	270 lbs
Length (overall)	4 ft 6 ins
Height (overall)	2 ft 1 in
Width (overall)	2 ft 3 ins

The Model 89, Type 2 unit is much more difficult to move around in the gun emplacements than the other models because of lack of wheels. The general design is older and requires more time to put in operation than any of the other models.

3. CONCLUSIONS

The fuse setters generally seem to be satisfactory, and use of a match pointer system provides continuous transmission of data from the director. However, the Model 89, Type 4 fuse setter is limited by the fact that the fuse must be inserted into the setter so that the setting projection on the fuse is in a certain fixed position. Although three of the fuse setters are provided with small wheels, the weight of each fuse setter (345 to 506 lbs) is such that two men are required to wheel it on a concrete surface. As the emplacements all had earth floors, mobility of the fuse setters during operations, especially when the earth is wet, can be considered nil. It is therefore possible that the fuse setter will be on the opposite side of the emplacement from the breech of the gun during firing. This will require the ammunition handlers to carry the 75 lb projectiles across the emplacement, with consequent increase in dead time of the fuse, and with exhaustion of the ammunition handlers during prolonged firing. This condition may also lead to the fuse setter operators working only slightly to the rear of the gun muzzle, with resultant distraction of the operators of the fuse setters.

(SOURCE: USASOS)

FUSE SETTERS FOR 12 CM.AA.GUN

FIG 1. Model 89, Type5 Fuse Setter.

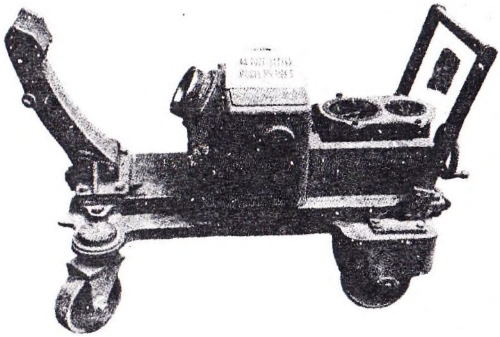
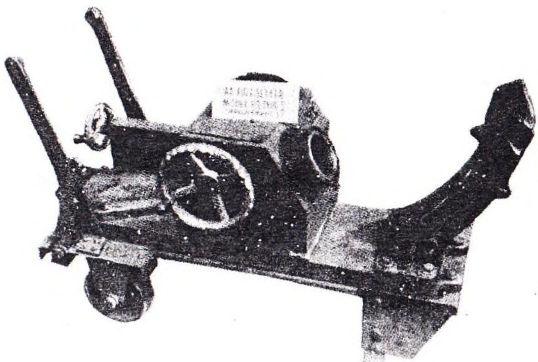


FIG 2. Model 89, Type 5 (Improvement 1)Fuse Setter.



FUSE SETTERS FOR 12 CM. AA. GUN

FIG 3. Model 89, Type 4 Fuse Setter.

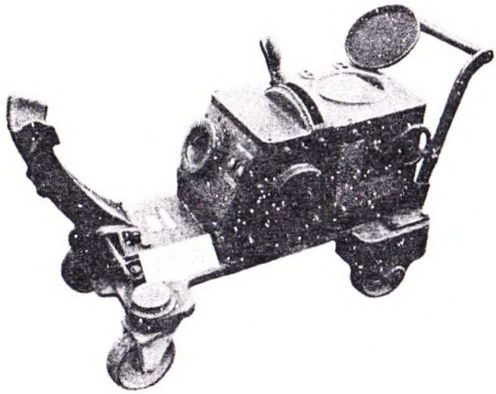
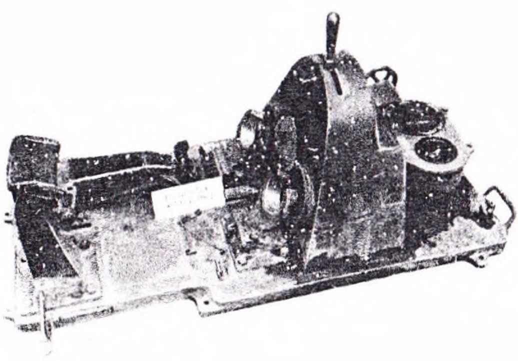


FIG 4. Model 89, Type 2 Fuse Setter.



DEMOLITION CLOCKS

1. GENERAL

During the Luzon operations three new delay clocks were discovered. A 24 hour demolition clock was obtained from a US naval officer on Sangley Point, Cavite, Luzon, who had purchased it from local natives as a souvenir, and a 10½ day clock was recovered by an Army unit in the Lingayen area.

2. DESCRIPTION (Figs 1 - 7)

The three clocks discovered were: (a) 24 Hour, (b) 10½ Day, and (c) 7½ Day.

(a) 24 Hour Clock: This has time settings up to 24 hours in one hour increments and is spring driven. Its dial revolves clockwise, carrying two bridging contact arms which close a circuit on completion of the set run. No case was recovered with this clock, and its Japanese designation is unknown.

(b) 10½ Day Clock: This unit was complete with case but minus the battery. Settings are possible up to 10 days 12 hours, in two hour increments. The clock is electrically wound and spring driven. The clockwork runs off approximately every 4 mins 45 secs, closing a solenoid circuit which rewinds the spring. The dial, calibrated in days and two hour increments, rotates clockwise. At the termination of its set run it allows a tit on the spring loaded bridging arm to drop into a notch on the dial, closing the firing circuit.
Although the battery was not recovered, circuit tests indicate that a six volt battery is used. The dimensions of the battery compartment are 4⅛ x 1½ x 3¼ ins. The Japanese designation is Type 99 Long Delay Clock.

(c) 7½ Day Clock: The clock and firing assembly are contained in one brass case 2-11/16 ins long, 2⅜ ins wide and ⅜ in thick. The edges of one end of the case are bevelled, making the case an irregular polygon. Both sides of the case are covered by thick celluloid plates.
The clock is a finely made 8-day jewelled mechanism, apparently of European design. It is driven by a main spring and has a winding stem protruding through the back cover plate. The clock face is a disc graduated from 0 to 7 days 12 hours in one hour intervals. The figures 1 through 7 and the character 日 (day) are engraved on the disc. An index line for setting the delay is engraved on the case and on the celluloid

face plate. The edge of the disc has a continuous raised lip. A firing slot has been filed out of the lip. A knurled shoulder around the disc is engaged by the setting stem in order to set the clock.
The firing assembly consists of a firing pin, a firing pin retainer, retainer arm, and a release arm. The firing pin has a groove around the after end. The firing pin retainer has a cut away which engages this groove. The retainer arm rests against the release arm. The release arm has a tit protruding from the lower side. This tit rests inside and bears against the lip of the timing disc. When the set time has elapsed, the firing slot allows the tit to pass through. The release arm moves out freeing the retainer arm. The retainer turns freeing the firing pin. The firing pin under spring pressure is driven against the primer. The clock was set in a Japanese dump of 75mm ammunition. Two blocks of picric acid were primed with a short length of safety fuse leading from the clock. The clock and charge were not concealed.

3. COMPARATIVE DETAILS

Following is a comparative summary of the known details of these three demolition clocks, together with data on the 7 day clock, the first recovered Japanese long delay demolition device:

	7 Day	24 Hour	10½ Day	7½ Day
Jap Designation	Type 92	Unknown	Type 99	Unknown
Delay Possible	7 days in 5 minute increments	24 hours in 1 hour increments	10½ days in 2 hour increments	7½ days in 1 hour increments
Drive	Spring	Spring	Electric	Spring
Use	Land mine	Not known	Not known	Demolition
Location Found	Alexis-hafen New Guinea	Sangley Point Luzon	Lingayen area, Luzon	Southern Luzon
Action	Closes circuit. Also may have percussion feature	Closes circuit	Closes circuit	Closes circuit
Counter-measures	Cut or disconnect external leads. Cut or dis-assemble any attached explosive train.	Cut or disconnect external leads.	Cut or disconnect external leads.	Cut or disconnect external leads.

(SOURCE: MEIU NO 1)

DEMOLITION CLOCKS

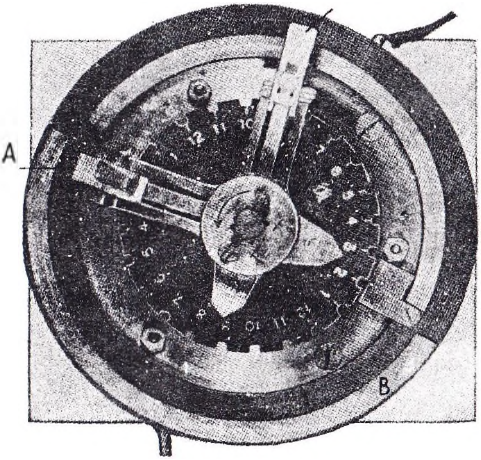


Fig 1 24 Hour Clock

A Bridging Arm B Silver Contacts

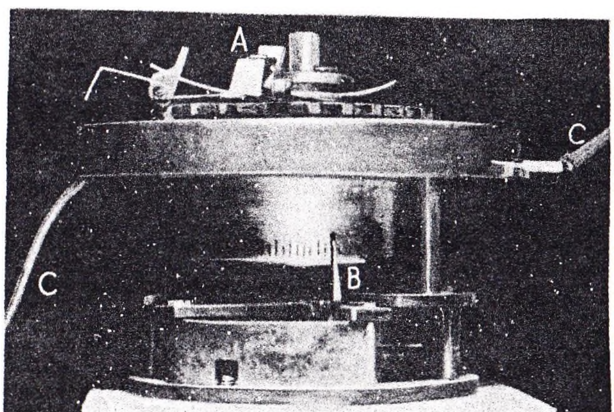
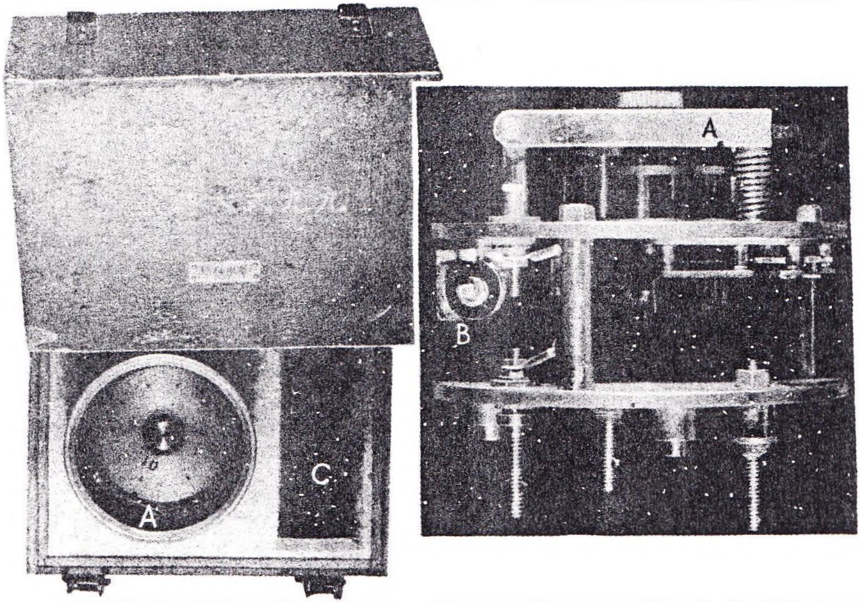


Fig 2 24 Hour Clock - Side view

A Bridging arm
B Slow-fast clock setting
C Electric lead

DEMOLITION CLOCKS

FIG 3 **10½ Day Clock - side view**



A Bridging arm

B Solenoid

C Battery compartment

DEMOLITION CLOCKS

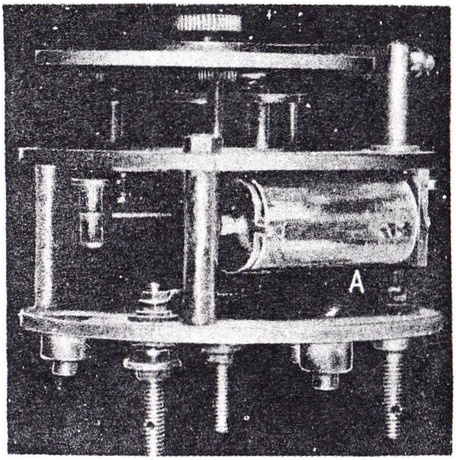
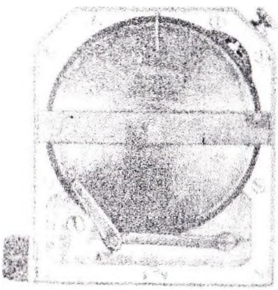


Fig 4 $10\frac{1}{2}$ Day Clock - Side view

A Solenoid



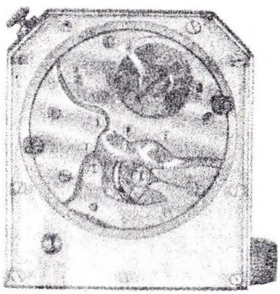
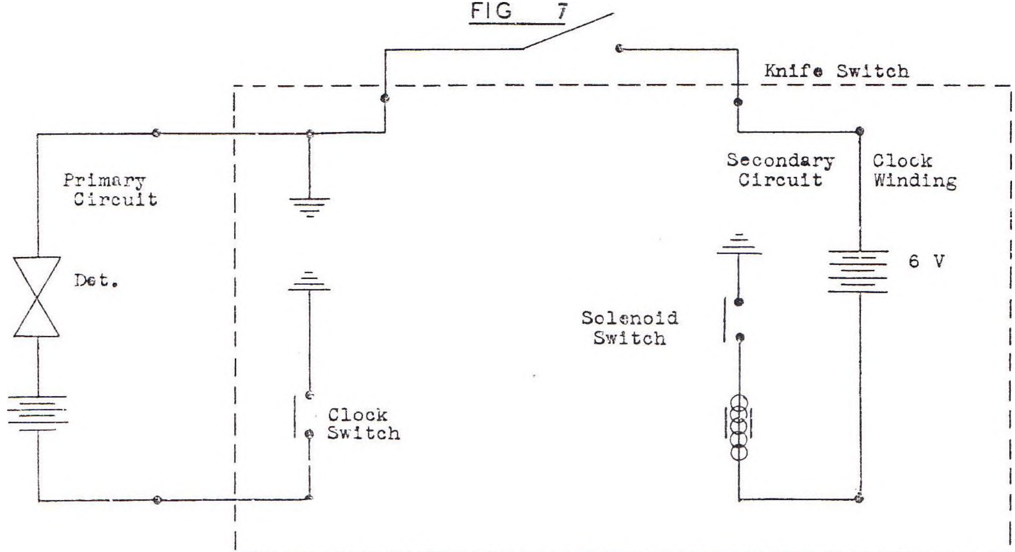


Fig 5 $7\frac{1}{2}$ Day Clock
Front view unfired

Fig 6 $7\frac{1}{2}$ Day Clock
Rear view

DEMOLITION CLOCKS

FIG 7



CIRCUIT DIAGRAM OF $10\frac{1}{2}$ DAYS CLOCK

INDIVIDUAL MOSQUITO BAR

1. GENERAL

This mosquito bar is of a unique design. Although the instruction sheet included with the item indicates that it is experimental, they have been captured in such widespread areas as Burma, Dutch New Guinea and the Philippines. The sample examined was manufactured in 1943 and was captured in Dutch New Guinea in December 1944.

2. DESCRIPTION (Fig 1)

This mosquito bar is novel in that only the upper part of the body is covered. The green netting, which is attached to a water repellant cotton ground cloth, is suspended from above. The body is enclosed in this portion while the legs, properly covered to avoid insect bites, extend to the outside. A piece of blue cotton fabric fastens tightly around the legs to prevent the entry of mosquitoes.
The complete item weighs 1 lb 4¾ ozs, the base measures 36 ins by 36 ins and the height is 18 ins. It is pyramidal in shape.
The cloth front piece forming the opening to the bar is constructed with a draw cord which, when pulled, closes tightly around the occupant's legs. The netting is of very poor construction and has a low breaking strength of 14 x 14 lbs. The warp threads can be readily slipped over the filling; tests indicate that the netting is not mildew proof and, therefore, would be inadequate for use in the Tropics.
The bar is made to accommodate one person and can be suspended, by means of a tie cord, to a tree or vine.
The top, back and two sides are made of cotton netting. The front section consists of a panel of netting 6 ins wide, extending across the width at the top to which is attached a cotton cloth, funnel shape, which extends outwards approximately 20 ins. This section is used as the opening to the bar. The funnel shaped opening is hemmed at the bottom with a ¾ in hem to form a channel in which is inserted a draw cord.
The bottom of the bar is made of cotton fabric and is attached to the netting, back and side panels and cloth funnel, with a double needle, double lapped seam. The netting is joined at the sides and top with a double needle, double seam lapped. The seams are covered with ⅞ in cotton tape and stitched with two needle ⅝ in gauge.
At each corner, on the top of the bar, pieces of cotton cloth, triangular in shape, are caught in the seams as reinforcements.

Tie cords, approximately 12 ins doubled in the middle, are attached to each corner stay piece by a double bartack. There is also a cord attached to the opening of the bar, measuring 54 ins long, which is bartacked to the flat tape.

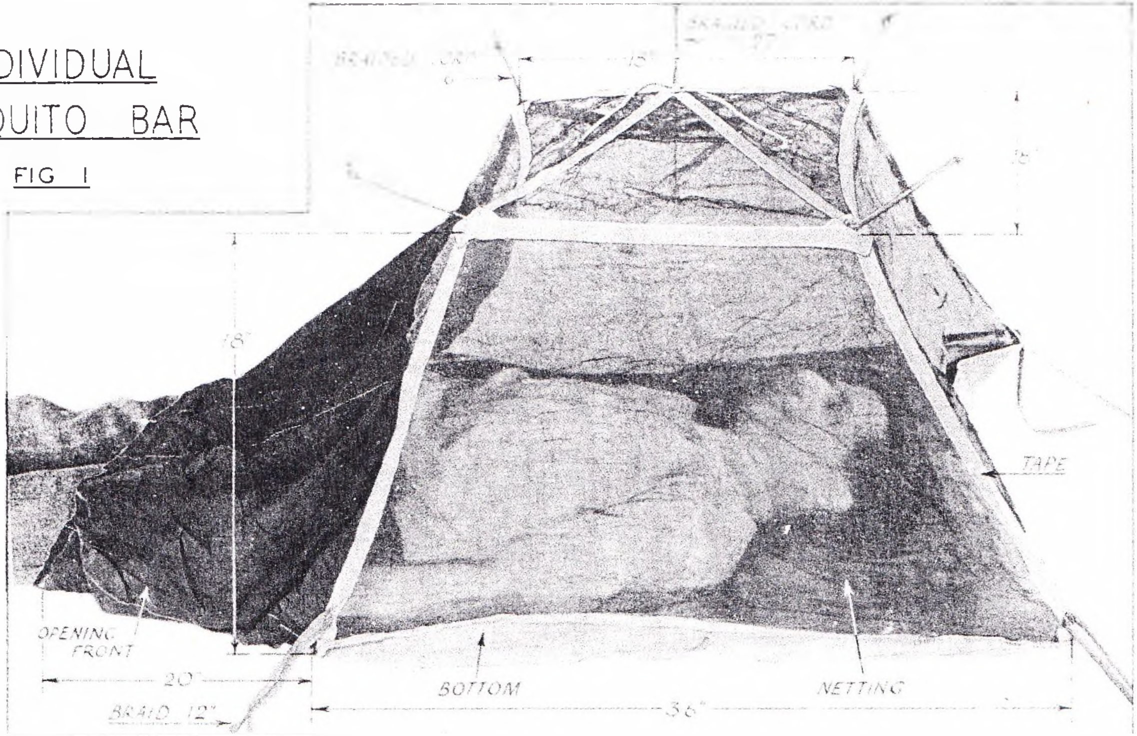
3. REMARKS

Although it is light in weight it could hardly be used under combat conditions since the user would be trapped in case of enemy action. The netting used is poor when considered by American standards. The marquisette construction allows the warp threads to slip along the filling threads. This enlarges some of the holes and reduces the protection given. The strength of the netting is low while its weight is heavy. The lack of mildew-proofing is considered a disadvantage.

(SOURCE: QMG - WASHINGTON)

INDIVIDUAL MOSQUITO BAR

FIG I



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4 TON PRIME MOVER TYPE 98

1. GENERAL

Several vehicles identified as the Type 98, 4 ton prime mover were found on Luzon, Philippine Islands. It appears that the weight designation refers to vehicle weight rather than trailed load weight capacity. This prime mover is probably used primarily to move the 105mm Type 91 Howitzer as one of the vehicles was fastened to a howitzer of this type, which was equipped with a caisson loaded with ammunition. It carries 5 passengers and the driver. The engine develops 73 hp at 1600 rpm and drives the vehicle at a maximum speed of 25 mph with towed load.

2. DESCRIPTION (Figs 1 - 2)

The engine transmits its power through a dry double plate clutch to the four speed forward, one speed reverse spur gear transmission. The transmission has a power takeoff for winch operation. The power goes through the shaft to the rear clutch brake steering mechanism, and then to each of the rear driving sprockets. These drive the steel, centre guided track over a suspension consisting of five bogie wheels. The front bogie wheel is independently sprung while the other four are mounted in pairs on a bell crank type of suspension, the springs of which are mounted inside the chassis frame.

PHYSICAL DATA:

Weight	3.5 tons
Length, overall	12 ft $2\frac{1}{2}$ ins
Width, overall	6 ft 3 ins
Height, overall	7 ft
Track width	10 ins
Ground Contact of track	7 ft 6 ins
Gauge (centre to centre of tracks)	5 ft 4 ins
Clearance	13 ins
Diameter drive sprocket	$20\frac{3}{4}$ ins
Width of drive sprocket	8[illegible] ins
Diameter of front idler	15[illegible] ins
Width of front idler	$5\frac{1}{2}$ ins
Diameter of bogie wheels	$15\frac{1}{4}$ ins
Width of bogie wheels	$6\frac{1}{4}$ ins
Diameter of track return rollers	6 ins
Width of track return rollers	$4\frac{1}{2}$ ins
Ground pressure	4 lbs/sq in
Turning radius (skid turn)	9 ft
Slope operation	30 degrees with towed load

3. PERFORMANCE

When the vehicle was placed in operating condition, considerable trouble was encountered in getting fuel to the carburettor, due to a faulty electric fuel pump. The pump was replaced several times with pumps from the same type vehicle and every one failed to operate correctly. Improvised leather gaskets found in each of the pumps tried, indicated the Japanese had encountered similar trouble. The valve covers and valve guides on each cylinder had persistent oil leaks which were dificult to remedy. Without a towed load the vehicle performed well and the engine ran relatively cool. However, with a trailed load, the engine became very hot and the tracks had a tendency to slip and spin in mud. The prime mover carries five passengers and the driver.

4. CONCLUSIONS

Although the vehicle has sufficient power to perform its assigned mission as an artillery prime mover, the inadequate cooling of the air-cooled V-8 engine limits its operation.
In reference to its track base, the vehicle is very top heavy, hampering its cross country performance under both load and no load conditions. The track design and ground pressure were such that sufficient traction is difficult to obtain in muddy terrain.

(SOURCE: USASOS - SWPA)

4 TON PRIME MOVER TYPE 98

FIG 1. Front View.

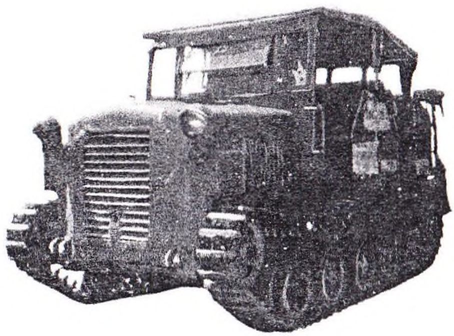

FIG 2. Side View.