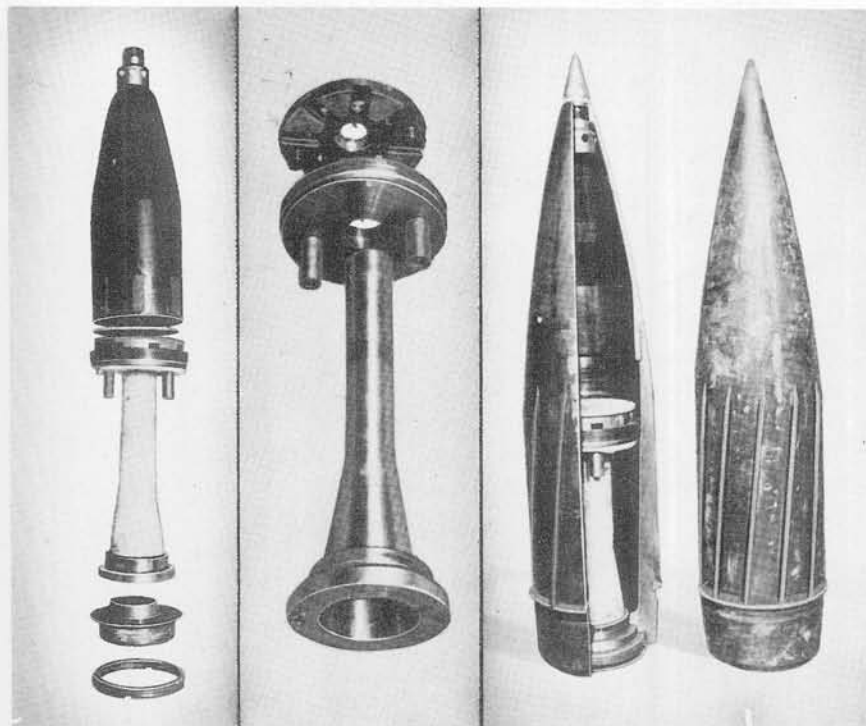


ROCKET ASSISTED PRERIFLED PROJECTILE

GERMAN



28 cm R. Gr. 4331



Top, left, forward body (ogive) and venturi tube; center, venturi assembly without spun glass sleeve; right, forward body assembled to main body, showing prerifling; at right, assembly with cast explosive charge.

This high explosive projectile is fired from the 28 cm K. 5 (E) railway gun, and is prerifled in the same manner as the 28 cm Gr. 35 described on page 312. The outstanding feature of this new projectile is an increase in range from 67,800 yards to 93,100 yards—nearly 53 miles. This increase of 37% over the maximum range for the standard high explosive round is the result of energy supplied to the projectile by the addition of rocket propellant powder which is ignited 19 seconds after leaving the gun. After building up sufficient pressure to shear the lip on the base plug, the rocket propellant located in the ogive of the projectile discharges through a central venturi tube.

On the main body there are 12 steel splines set at the angle of rifling. The forward body (ogive) is threaded externally to screw into the main body and internally at its nose to receive the fuze and a rocket propellant ignition system. The venturi tube which extends from the base of the projectile to its middle section is secured by being screwed into the fuze and venturi adapter. A spun glass sleeve insulates the venturi tube from the explosive charge which is cast on the resulting assembly. A Zt. Z. S/30 time fuze set to operate 19 seconds after the projectile is fired is screwed into the nose of the projectile. Two percussion fuzes, AZ 4331, are located in the venturi adapter. These are armed by the burning of the rocket propelling charge through a powder pellet incorporated in the fuze. The rocket propellant is moulded as one piece, and extending through it are eight longitudinal holes $\frac{3}{4}$ -inch in diameter, located around a circular hole $1\frac{1}{2}$ -inch in diameter.

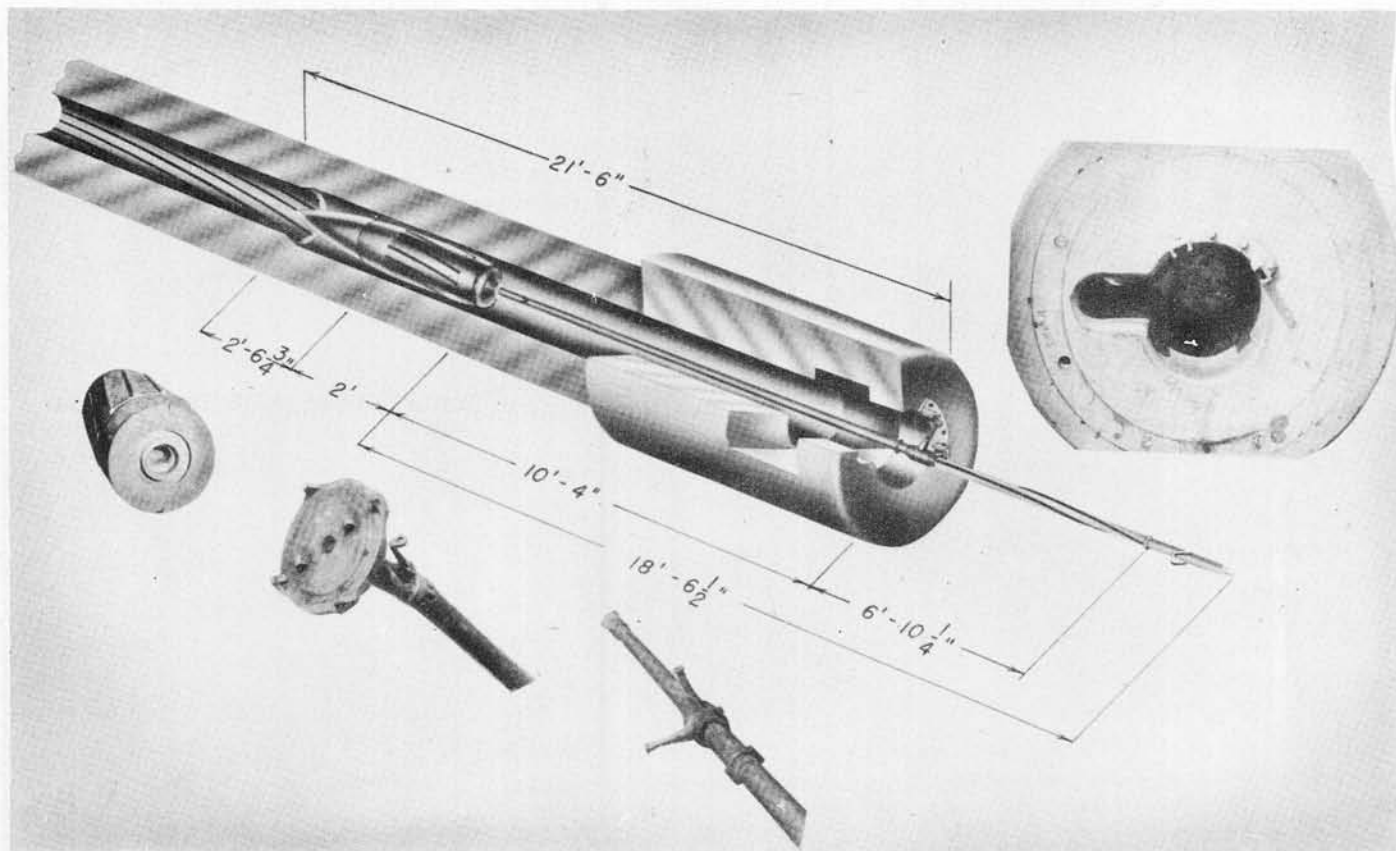


SPECIFICATIONS

| | |
|--|------------------------|
| Length of projectile (less fuze) | 48.79 ins. |
| Diameter of ribs | 11.70 ins. |
| Diameter of rotating band | 11.85 ins. |
| Diameter of body | 11.10 ins. |
| Total weight | 545 $\frac{3}{4}$ lbs. |
| Rocket propellant weight | 43 lbs. |
| Explosive weight | 30 $\frac{3}{4}$ lbs. |
| Maximum range | 93,100 yds. |

METHOD OF RAMMING AND INDEXING SPLINED PROJECTILE

GERMAN 



Indexing and ramming the 28 cm prerifled projectile in the German railway gun, 28 cm K5 (E), is accomplished with the aid of the rammer which, by gripping the base of the shell, allows the projectile to be indexed during its final travel through the powder chamber. Fitted centrally in the flat head of the rammer are two claws, reversed to each other and held outwardly by spring tension. A circular undercut recess in the base of the projectile receives these two claws holding the base of the shell against the face of the rammer. Two keyways milled in the periphery of the base of the shell receive corresponding lugs on the face of the rammer and hold the members in rotation. Four evenly spaced lugs projecting longitudinally from the face of the rammer fit over the sides of the base of the projectile and hold the two in a transverse direction.

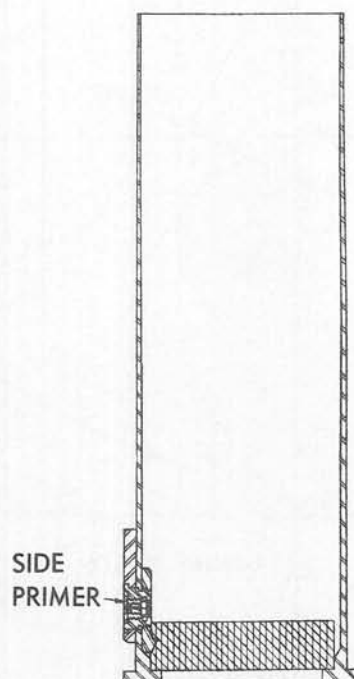
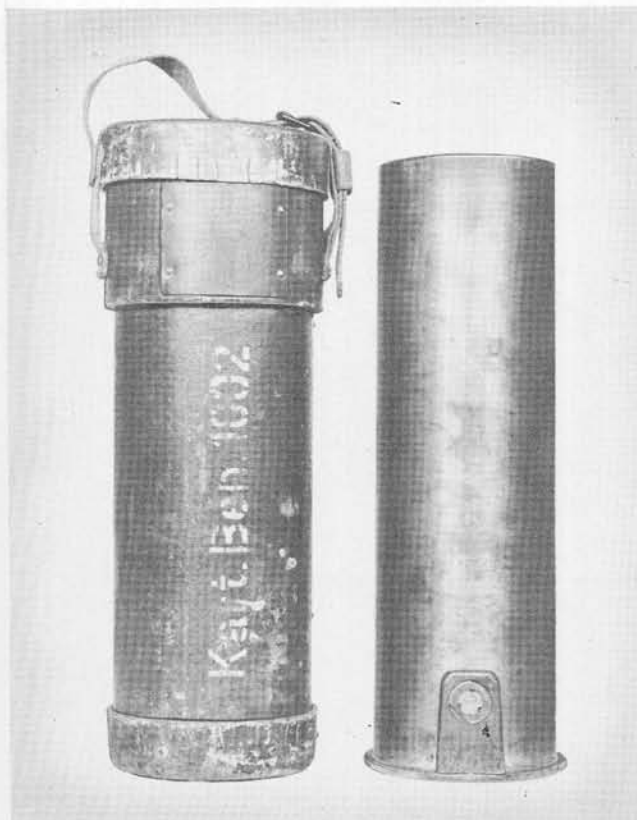
The head is fitted by a universal joint to the rammer, the front portion of which is a plain two-inch shaft approximately ten feet long and the rear portion machined with four longitudinal splines set at the same angle as the rifling of the tube. Over the splined portion of the rammer, which is 6 feet, 10 1/4 inches long, slides a collar fitted with two radially projecting horns set at approximately 75 degrees. The last 16 1/4 inches of the rammer are not splined and the extremity threaded, in all proba-

bility to receive a transverse handle. A lever which depresses the claws to release the head from the base of the projectile is fitted to the rear portion of the shaft.

A bracket bolted in the rear face of the breech ring has the function of receiving in two longitudinal keyways, the extremities of the two radial horns of the sliding collar.

In operation, the rammer is held securely to the base of the projectile and the shell is rammed through the powder chamber until the two horns of the sliding collar, in its forward position along the splines, engage in the two matching keyways of the bracket fitted to the rear of the breech ring. At this point, the shell, which still has approximately 2 feet, 6 3/4 inches to travel before the leading edge of the splines engage in the grooves of the rifling, is indexed and during the remaining forward travel of ramming remains indexed by virtue of the sliding collar which being held against rotation causes the rammer sliding through it to rotate at the same twist as the rifling.

The position of the two horns can be adjusted in relation to the body of the collar and once set for a particular gun, no further adjustments are necessary. A scale etched on the spline portion of the rammer indicates the depth of ramming from 2,850 to 4,050 centimeters for the 28 cm K5 (E).

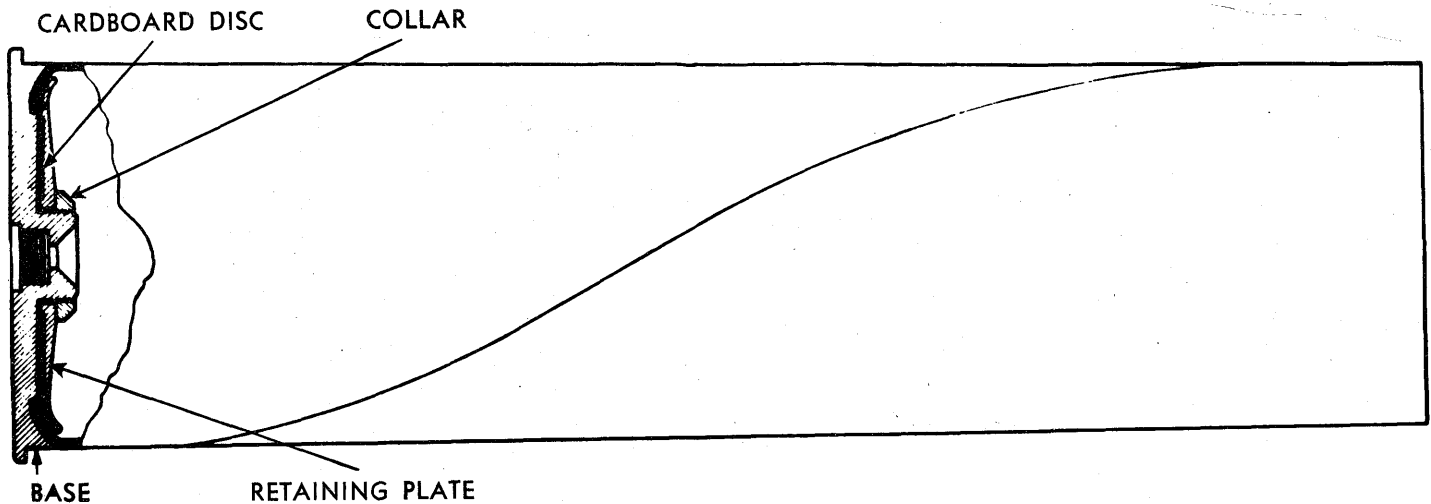


The German Recoilless Gun, versions of which are described on pages 110 and 119, operates without a recoil or counterrecoil mechanism. This is made possible by a design which allows the propelling gases to escape to the rear when the weapon is fired. This unusual design of brass coated steel cartridge case, which makes possible an unexpectedly long range for such a weapon, is provided with a primer in its side and a plastic base insert. This plastic base insert, 1.12 inch thick, momentarily withstands the pressure of the ignited propellant and then disintegrates, being blown out the rear of the weapon along with the released propellant gases.

The propelling charge and igniter are made up to suit side ignition. The propellant is contained in a cylindrical bag; the igniter bag is in the form of a cap, and fits over the end of the propellant bag. The igniter composition is contained in pockets formed between the outer fabric and the lining by quilting the bag. There are twelve pockets around the side and six in the end. The propellant is a flashless composition of the normal "Gudol" type and the igniter composition is the normal porous chopped cord.

SPECIFICATIONS

| | |
|-----------------------------------|-------------------------------|
| Propellant weight | 6.9 lbs. |
| Propellant analysis | |
| Nitrocellulose (N-12.34%) | 34.47% |
| Nitroguanidine | 33.81% |
| Diethylene Glycol dinitrate | 30.22% |
| Graphite | 0.14% |
| Potassium Sulphate | 1.36% |
| Propellant bag | Viscose rayon |
| Cartridge case..... | Brass coated, 1010 type steel |
| Thickness of brass coating | 0.0001 in. |
| Base insert | Phenol-formaldehyde resin |



This is a large caliber steel cartridge case of different design from those customarily used by the Germans. The body is a wound cylinder made of 0.084 inch thick sheet steel three and four turns thick and turned under at the base to fit into a base assembly. The base assembly is provided with a retaining plate, screwed collar, and a disc which seals the cartridge case and prevents the escape of gases through the base. The disc is of cardboard; all the other parts are of steel.

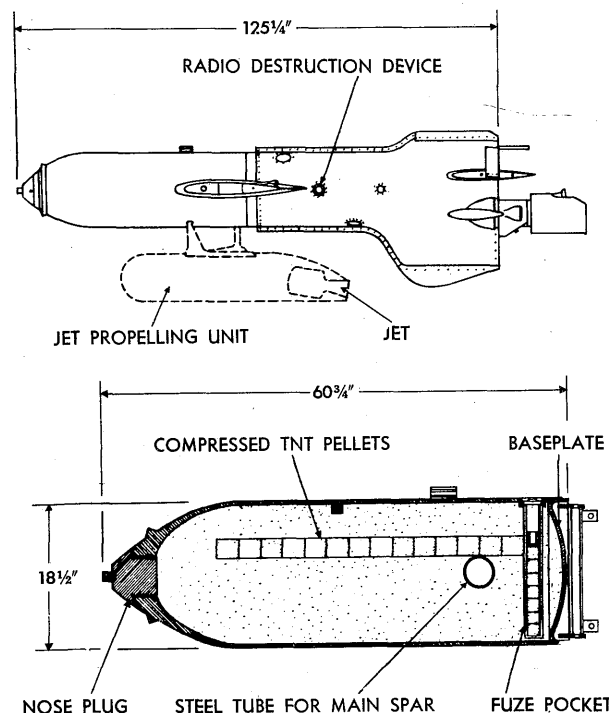
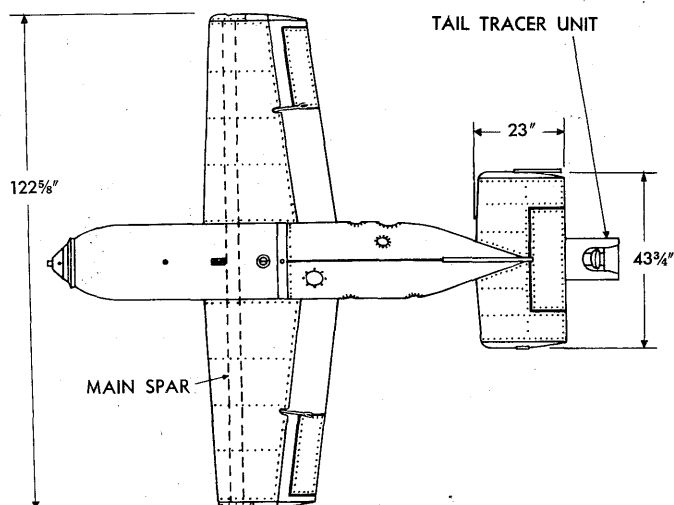
A shallow spiral groove, about 0.003 inch deep and .23 inch wide, is rolled into the inner surface of the body under such pressure as to show the marks of the groove on the outer surface of the case. A layer of black wax is used between the overlapping coils of the body to assist waterproofing. The upper surface of the cardboard disc is also covered with black wax. It appears that this case is manufactured by coiling the sheet approximately to shape, placing the body in a die and rolling to shape with an internal roller. The base, retaining plate, and screwed collar have completely machined surfaces. All the parts have a thin surface film of oxide for protection from corrosion. This is not completely effective.

The Vickers Diamond Hardness of the body increases from about 105 near the base to 133 near the mouth. It is approximately 222 across the base except in the primer boss where it is about 280. On the retaining plate the V. D. H. varies from 160 at the center to 172 on the rim. The screwed collar is 175 V. D. H.

RADIO-CONTROLLED GLIDER BOMB

GERMAN 

H. s. 293



The German high explosive bomb, H. s. 293, is a radio-controlled, jet-propelled glider, designed primarily for use against merchant ships and naval craft. It is usually released when the plane is in level flight at an altitude of from 3,000 to 5,000 feet, and at a distance of from 3 to 5 miles from the target. However, the bomb is not launched directly at the target, but is released during flight on a course parallel to that of the target. Upon release, the jet propulsion automatically goes into action, and thereafter the flight of the bomb is controlled from the airplane by radio. It is apparently aimed by eye alone and, as an aid to visibility, the tail is provided with flares and an electric lamp for night use.

H. s. 293 is made up of six main parts: the bomb which forms the forward part of the fuselage; the rear portion of the fuselage containing the radio control unit, a gyro, and a destructor; the jet propulsion unit (slung from the base of the bomb); the wings, or planes; the tail plane; and the tail tracer unit. The bomb case is of forged steel and is filled with approximately 600 pounds of 60/40 poured Amatol. A cylinder of compressed T.N.T. pellets lies in this filling, running forward from the fuze pocket. The control unit consists of a radio receiver, a motor generator, and a relay unit. A radio destruction device is located directly under the radio receiver and consists of a small charge with a clockwork fuze.

Propulsion is accomplished by means of a bi-liquid rocket unit. Wings and tail planes are of aerofoil section and the skin is of thin sheet alloy. Ailerons are provided for lateral control, and an elevator is concealed in the tail plane. Five flare candles burning consecutively make up the tail tracer unit.

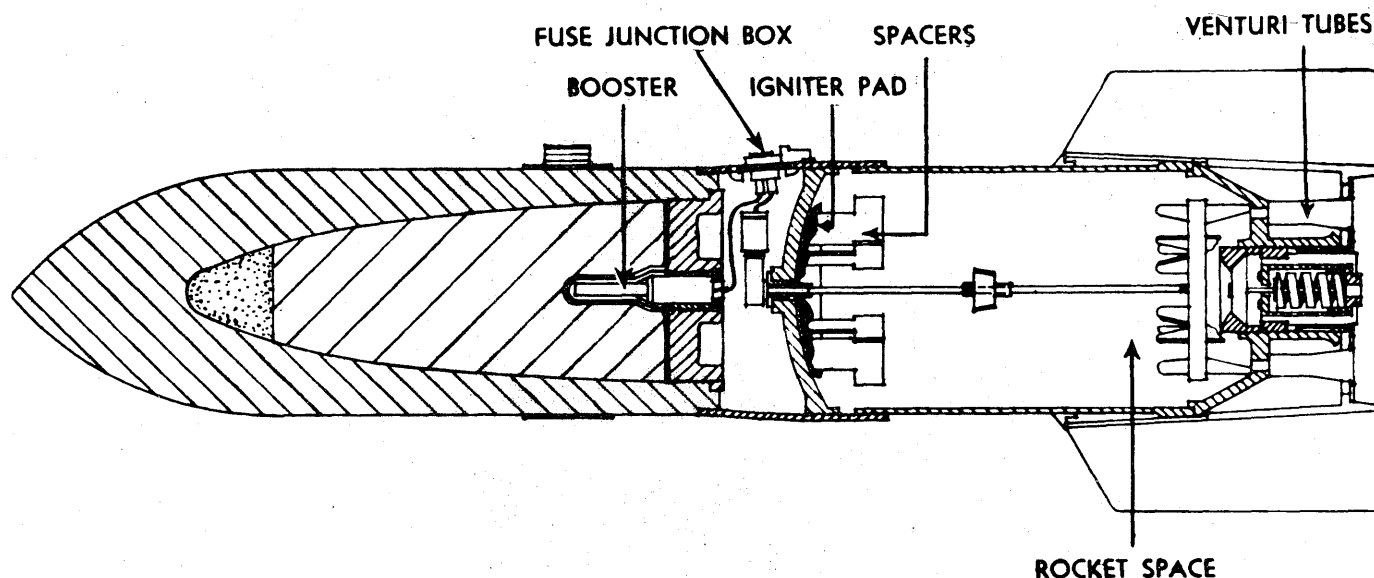
SPECIFICATIONS

| | |
|---|--------------|
| Overall length | 148 ins. |
| Length of bomb | 60 3/4 ins. |
| Diameter of bomb | 18 1/2 ins. |
| Total weight (approx.) | 1,980 lbs. |
| Span of mainplanes | 122 5/8 ins. |
| Span of tailplanes | 43 3/4 ins. |
| Diameter of jet-propulsion unit (approx.).. | 12 ins. |
| Weight of bomb (approx.) | 1,320 lbs. |
| Color | Sky-blue |

ROCKET-PROPELLED BOMB

PC 1000 Rs

GERMAN



The German 1,000 kg. (actual wt. 2,176 lb.) armor-piercing bomb (PC 1000 Rs) is a rocket-propelled type designed primarily for use against ships or similar targets. The rocket, which is used to increase terminal velocity and armor penetration qualities of the bomb, consist of 19 sticks of propellant contained in a separate compartment at the base of the bomb. Gases generated by the propellant escape from the rocket container through six propulsion venturi tubes which are sealed with pitch until combustion is effected. The compartment is provided with a spring-loaded pressure release valve at the base. It is reported that the minimum height for release is 4,000 ft., and that the rocket burns for approximately three seconds after ignition, leaving a trail of flame 150 ft. long.

The bomb which is filled with alternate layers of good and poor quality TNT, and a very pure cast TNT in an aluminum container in the nose, is fuze through the baseplate. A charging head, located in a distance piece between the bomb and the rocket container, has a junction box with connections leading to a pyrotechnic and an impact fuze through two pin plugs. These plugs are colored black and red respectively. The pyrotechnic fuze has a 2½-second delay, and consists of an igniter bridge (which functions when an electrical impulse from the charging plate is received at the time of the bomb's release), and a pyrotechnic train calculated to give a safe interval between the time of release and ignition of the rocket element.

The bomb fuze, of the electrical impact type, is also armed by the electrical impulse from the charging head.

There are three other bombs of the same general type: PC 500 Rs; a lighter version of the PC 1000 Rs; PC 1000 Rs Ex, for practice or experimental use (it has no main filling, no baseplate or bomb fuze and the weight is made up by the extra thickness of the bomb casing); and the PC 1800 Rs.

SPECIFICATIONS

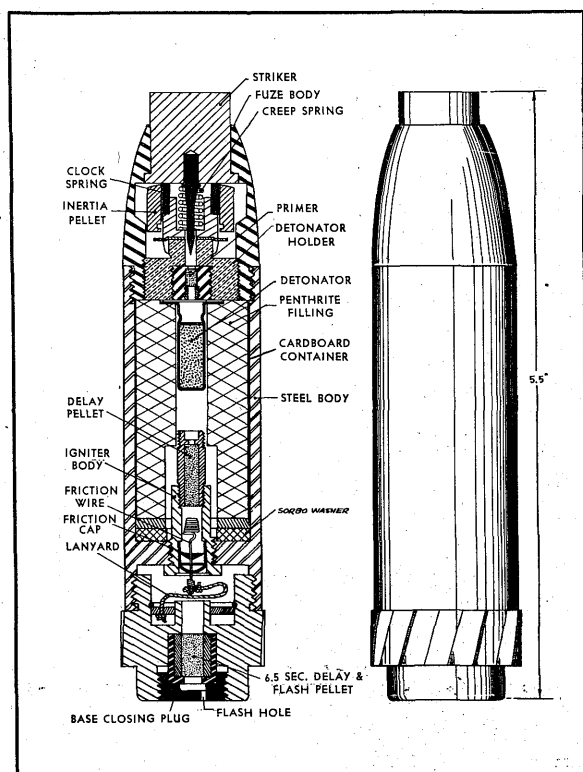
| | |
|---------------------------|---------------------------------------|
| Total weight | 2,176 lbs. |
| Weight of case | 1,470 lbs. |
| Weight of explosive | 119 lbs. |
| Overall length | 7 ft., 2¾ ins. |
| Length of bomb | 3 ft., 9 ins. |
| Diameter of bomb | 1 ft., 3½ ins. |
| Diameter of tail fins | |
| Large | 2 ft., 4 ins. |
| Small | 1 ft., 10 ins. |
| Dimensions of Propellant | |
| 6..... | 22½ ins. long x 2 15/16 ins. diameter |
| 12..... | 20¾ ins. long x 2 15/16 ins. diameter |
| 1..... | 11¼ ins. long x 2 15/16 ins. diameter |
| Filling | T.N.T. |
| Color | Sky-blue |

ANTIPERSONNEL RIFLE OR HAND GRENADE

GERMAN



Gewehr-Sprenggranate



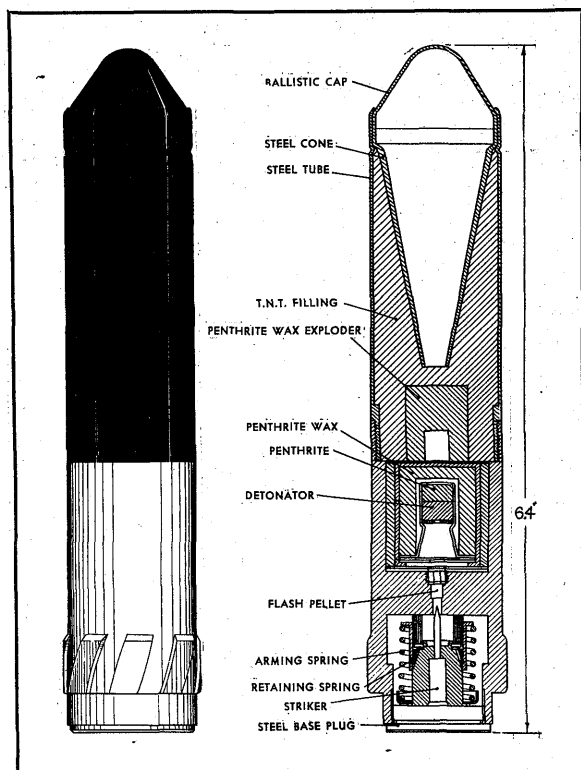
This grenade consists of a tubular steel body containing an explosive filler of penthrate wax, a detonator, a direct action nose fuze, a delay friction igniter, and a base assembly containing a self-destroying system. A diaphragm near the bottom of the grenade is threaded centrally to receive the friction igniter. The fuze and base assemblies are not integral parts of the grenade, but are screwed into the nose and base respectively. If the nose fuze does not function properly, the grenade is self-destructive. On firing, the flash from the propelling cartridge enters a hole in the base closing plug and ignites a 6.5 second delay pellet contained in a brass holder. This fires the friction igniter which gives an additional delay of 4.5 seconds before setting off the detonator. The grenade may also be used as a hand grenade by removing the base assembly and pulling a cord attached to the friction igniter.

Overall length 5.5 ins.
Maximum diameter 1.2 ins.
Color.....Black body; aluminium fuze and base
Total weight 9 ozs.

Explosive fillerPETN/Wax
Weight of filler 1.1 oz.
Maximum range 550 yds.
DelaySelf-destroying—11 sec.
Friction igniter—4.5 sec.
Impact—no delay

ANTITANK RIFLE GRENADE

Gewehr Panzergranate



The Gewehr Panzergranate is constructed in two parts, the head and the stem. The head, a seamless steel tube fitted with a light ballistic cap, contains a hollow charge cone and an explosive filling of T.N.T. A cavity is provided in the rear portion of the main filling to take an exploder of penthrate wax. The stem of light alloy or aluminum is screwed onto the head of the grenade. It is divided into two compartments. The upper portion contains the booster which consists of a detonator surrounded by a penthrate wax filling contained in a light alloy case. The percussion type fuze is located in the lower part of the stem. In the septum is a small flash pellet held in place by a perforated screw plug. A pre-engraved driving band is formed on the outside of the grenade approximately $\frac{1}{4}$ inch from the base. The entire assembly is closed by a base plug which positions the fuze by a stem which fits into a recess in the rear of the striker body.

Overall length 6.4 ins.
Maximum diameter 1 3/16 ins.
Color....Black body; aluminum stem
Total weight 8.8 ozs.

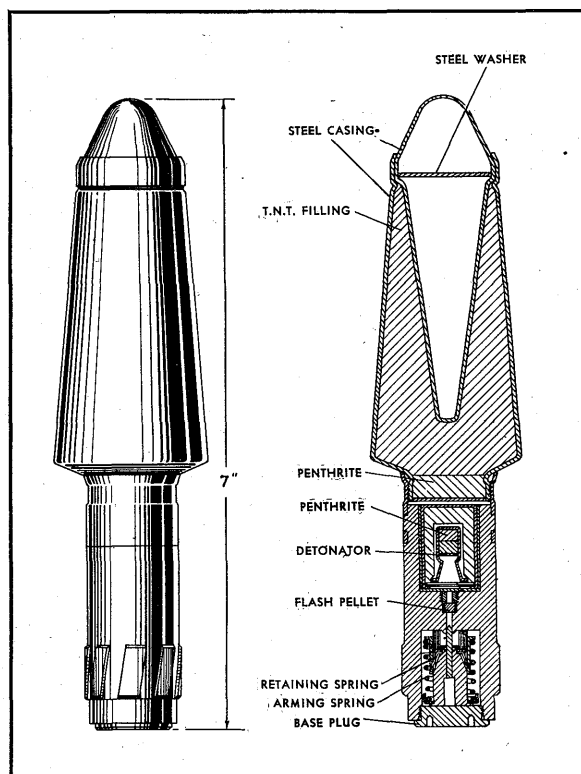
FillerT.N.T./Cyclonite
Weight of filler..... 1.75 ozs.
Range 50 yds.

H.E.A.T. (Hollow Charge) RIFLE GRENADE

GERMAN



Gross Gewehr Panzergranate

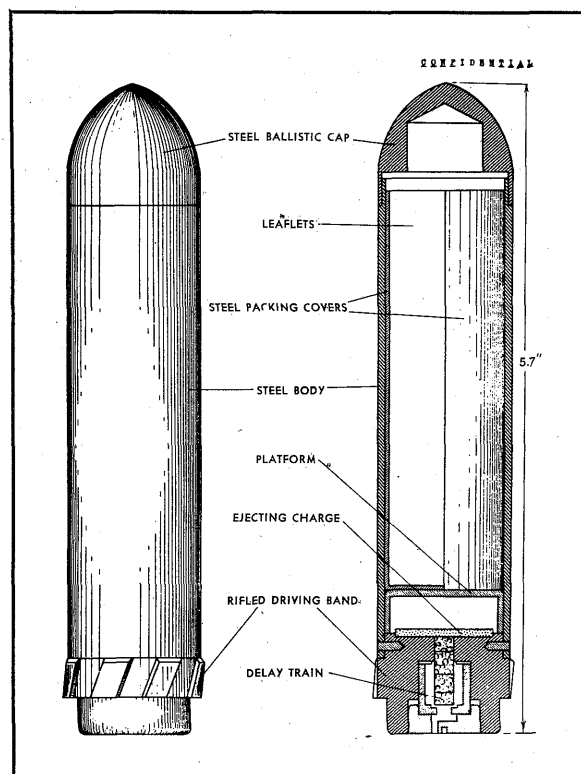


This grenade, while larger and of slightly different contour than that described on the preceding page, is basically the same in construction and operation. The body of pressed steel contains a steel cone around which the T.N.T. filler is cast, and at the bottom of the filler is an exploder pellet of penthrite wax. Two types of stem may be used, one entirely of light alloy and the other of plastic with a steel shank by which it is screwed onto the body. The booster assembly and the percussion type fuze are both located in the stem divided by a perforated septum which contains a small flash pellet. At the base of the stem is a rifled band which corresponds to the rifling on the discharger. The assembly is closed by a base plug.

| | | | |
|------------------------|---------------|-----------------------|------------------|
| Overall length | 7 ins. | Weight of filler..... | 4½ ozs. |
| Maximum diameter | 1¾ ins. | Filler | T.N.T./Cyclonite |
| Color | Black overall | Range (maximum) | 100 yds. |
| Total weight | 13½ ozs. | | |

PROPAGANDA RIFLE GRENADE

Gewehr Propaganda Granate



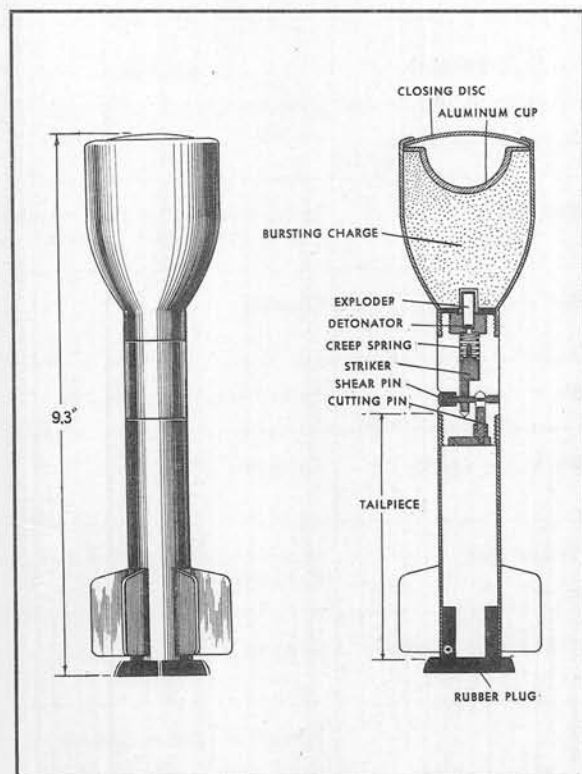
This grenade which is used for propaganda purposes consists of a cylindrical steel body with a pre-rifled base and a removable ballistic cap. The base of the grenade contains a 9-second delay fuze and an ejecting charge covered by a cardboard disc to prevent moisture from causing deterioration. Leaflets are inserted in two steel packing covers held loosely inside the case, and then the case and cap are varnished to protect them from rust. On firing, the flash from the propelling cartridge ignites the fuze and approximately 9 seconds later the ejecting charge explodes, blowing off the cap and forcing the leaflets out of the nose of the projectile.

| | | | |
|------------------------------|----------|-------------|----------|
| Overall length | 5.7 ins. | Delay | 9 sec. |
| Total weight | 8 ozs. | Range | 500 yds. |
| Weight without leaflets..... | 7 ozs. | | |

H.E.A.T. (Hollow Charge) GRENADE



Schuss Gr. P-40

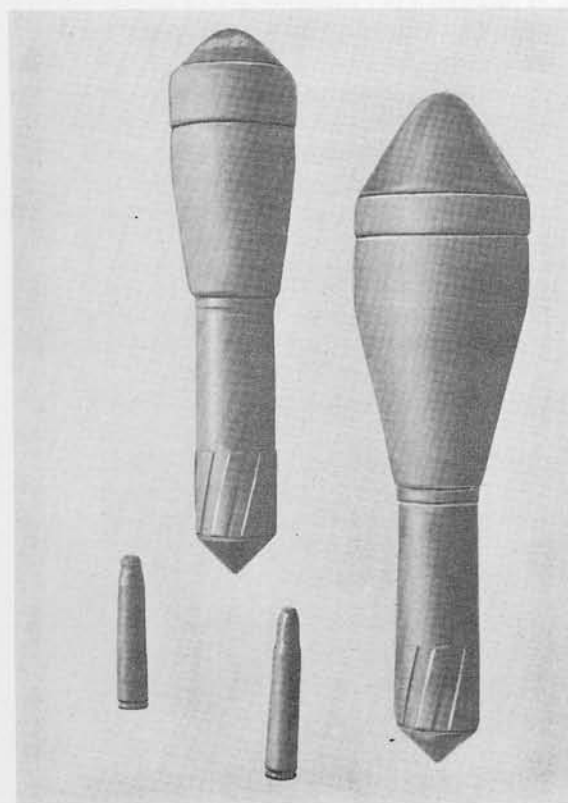


This grenade consists of a bell-shaped body of thin steel with a slightly convex aluminum closing disc, a graze fuze which screws into a cylindrical projection welded to the base of the body, and a finned tail unit. The bursting charge of cyclonite wax is cast around an aluminum hollow charge liner which is hemispherical in shape. A detonator and intermediary exploder are contained in an aluminum magazine which fits into the base of the main explosive cavity. The tail unit screws onto the base of the fuze housing and consists of a drawn-steel tube with six vanes formed in pairs. The cartridge is of the 7.92 mm small arm type with an undyed hollow wooden bullet.

| | | | |
|------------------------|-------------|----------------------|--|
| Overall length | 9.3 ins. | Markings..... | Blue band round projection at base of body |
| Maximum diameter | 2.4 ins. | Length of body | 3.1 ins. |
| Color | Olive green | Filler | Cyclonite/Wax |

H.E.A.T. (Hollow Charge) RIFLE GRENADE

Gross Panzergranate 61 and 46



Two additional H.E.A.T. (hollow charge) armor piercing rifle grenades have recently been recovered and are illustrated herewith. They bear the designations G. Pz. Gr. 61 and G. Pz. Gr. 46. The numerals "61" and "46" refer to the diameter of the explosive head in millimeters. The maximum range of the "61" is 218 yards. Static fired at normal, the "61" is reported to penetrate to 4.96 inches of homogeneous armor plate; the "46" is reported to penetrate 3.54 inches of the same plate.

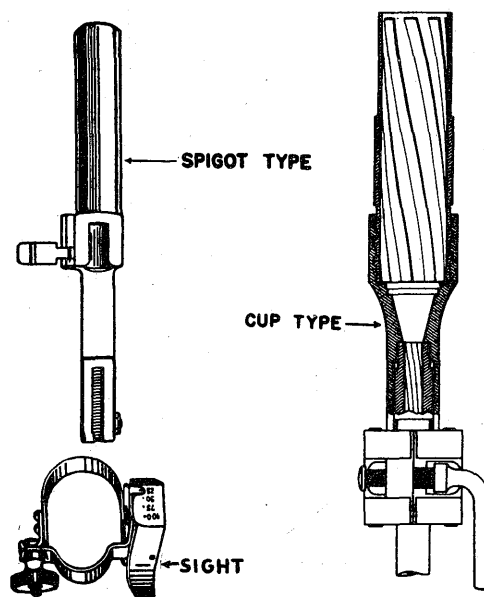
| "61" | "46" |
|---|---|
| Total weight .....1 lb., 4.25 ozs. | Total weight 14.65 ozs. |
| Weight of H. E. filling..... 8.69 ozs. | Weight of H. E. filling.... 5.16 ozs. |
| Weight of booster explosive .24 oz. | Weight of booster explosive .24 oz. |
| Weight of propelling cartridge powder 27 grains | Weight of propelling cartridge powder 27 grains |



| Cartridge for | German Name | Powder Filling Nz. T. P. (1.4:2:0.5/0:25) grams | Markings | Remarks |
|----------------------------------|-------------------------------------|--|----------------------|--|
| Large A. P. Grenade | G. Treib. Patr. für Gr. G. Pzgr. | 1.9 | Black wooden bullet | |
| Propaganda Grenade | G. Kart. für G. Propgr. | 1.7 | Red ring | In the future to be used only for Rifle Propaganda Grenade |
| Propaganda Grenade (Old Type) | G. Kart. (Alter Art) für G. Propgr. | 1.7 | Red ring | Obsolete |
| Small A. P. Grenade | G. Kart. für G. Pzgr. | 1.1 | Black ring | Packed attached to grenade |
| Small A. P. Grenade | G. Kart. (Alter Art) für G. Pzgr. | 1.1 | Black ring (partly) | Obsolete |
| H. E. Grenade | G. Kart. für G. Sprgr. | 1.0 | Yellow ring | In the future to be used only for H. E. grenade |
| H. E. Grenade | G. Kart. (Alter Art) für G. Sprgr. | 1.0 | Yellow ring (partly) | Obsolete |
| H. E. Grenade (Old Type) | G. Kart. (Alter Art) für G. Sprgr. | 0.85 | | Packed attached to grenade |

RIFLE DISCHARGERS

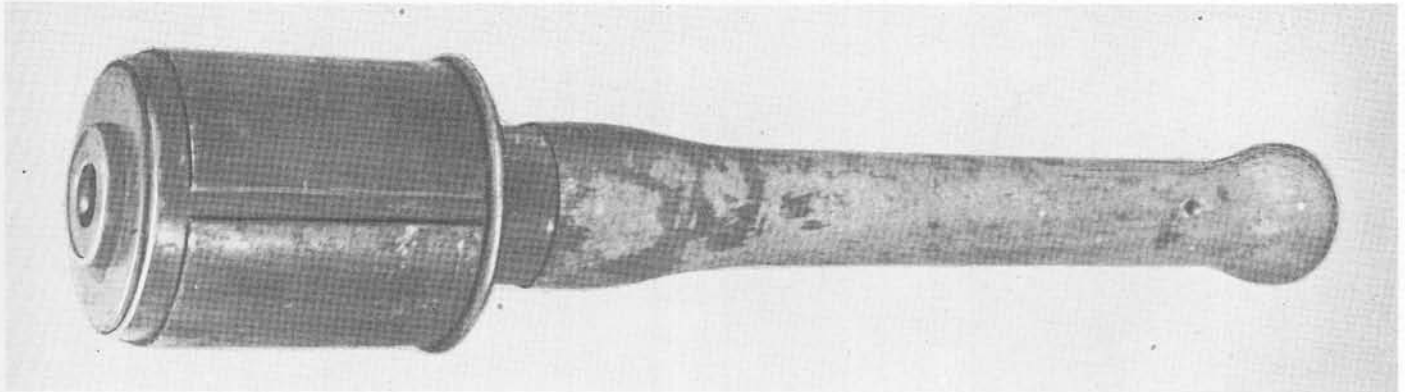
The two standard German rifle dischargers are the cup type (Schiebsbecher) and the spigot type. The former is made of steel and consists of a rifled barrel which screws into a holder fitted with a clamp for attaching it to the rifle barrel. There are no gas ports, and varying ranges are obtained by altering the elevation of the rifle by the aid of the sighting attachment. The latter type consists of a hollow tubular spigot about one inch in diameter, terminating in a part resembling the hilt of a bayonet. It is fitted to the rifle in the same manner as a bayonet, and is locked in position by a spring-loaded bolt. The hollow tailpiece of the grenade is fitted over the spigot, and on firing the propelling cartridge, the gasses pass out of the barrel of the rifle through the spigot and into the hollow tailpiece to propel the grenade. Both a swing-over blade front sight and a rear sight are provided.



NEW TYPE STICK HAND GRENADE



Stielhandgranate 43

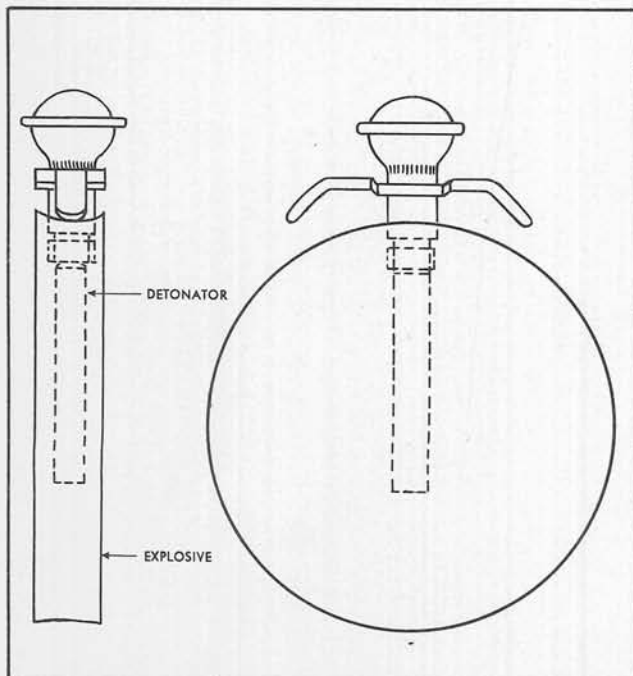


The new type German Stick Grenade, consisting of a head filled with TNT, a smooth fragmentation sleeve, fitted over the head, and a detachable wooden handle, is a modification of the standard Stielhandgranate 24 described on page 321.

The later model, however, does not have a friction

igniter operated by a cord running through the handle. Instead, the detonator and 4½-second delay igniter similar to that used with the egg grenade, are screwed into the top of the explosive head. The grenade may be thrown with or without the handle. Arming and priming are the same as for the egg grenade.

OFFENSIVE DISC TYPE GRENADE



This grenade, a new type of offensive weapon, has no outer casing or cover, but consists merely of a disc cut from a pre-cast or pressed pellet of explosive, and an igniter. The disc, which is believed to be R.D.X./wax, is 3 5/16 inches in diameter and 17/32 inches thick. It is drilled to receive the igniter and detonator.

A standard friction igniter with a delay of approximately six seconds, and a detonator (Sprengkapsel 08) are used.

SPECIFICATIONS

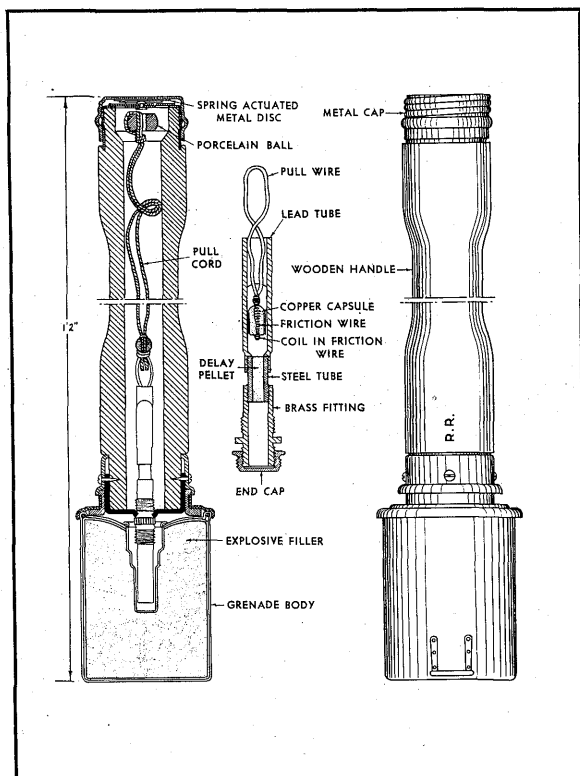
| | |
|-------------------------|-------------|
| Diameter of disc | 3 5/16 ins. |
| Thickness of disc | 17/32 in. |
| Explosive | R.D.X./wax |
| Color | Chocolate |

STICK HAND GRENADE MODELS 24 AND 39

GERMAN



Stielhandgranaten 24 u. 39



The head of this grenade is a thin steel casing containing the explosive filler. This is screwed onto a hollow wooden handle through the center of which runs a double length of cord. This cord connects at the forward end to a friction pull igniter (B. Z. 24) and at the rear to a porcelain ball in a metal cap. In operation, the cap is removed, the porcelain ball pulled, and the missile thrown to detonate after a 4-5 second delay.

MODEL 24

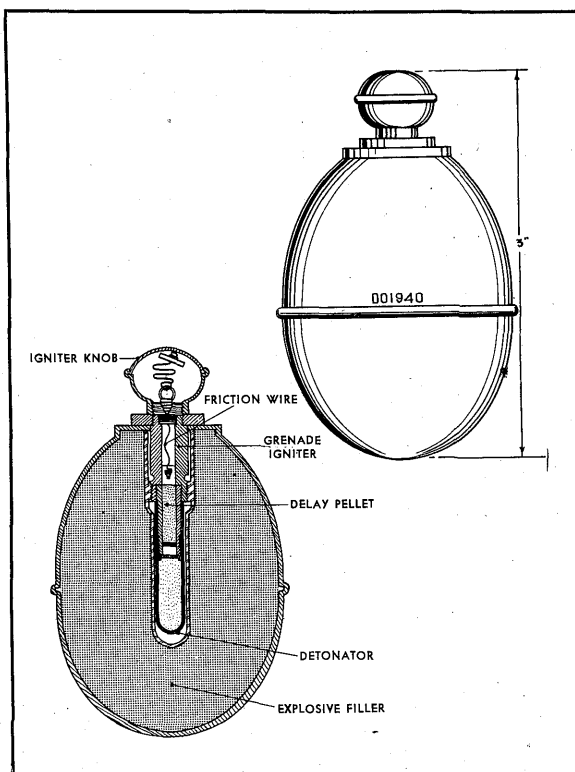
Overall length 1 ft., 2 ins.
Diameter of body 2 3/4 ins.
Color of body Olive drab
Weight 1 lb., 5 oz.
Weight of explosive filler.... 6 ozs.
Explosive filler T.N.T.
Igniter B. Z. 24
Delay 4-5 sec.

MODEL 39

Overall length 1 ft., 4 ins.
Color Olive drab
Weight 1 lb., 6 ozs.
Weight of explosive filler.... 7 ozs.
Igniter B. Z. 24
Delay 4-5 sec.

EGG-TYPE HAND GRENADE MODEL 39

Eierhandgranate 39



This grenade consists of a thin egg-shaped case filled with an explosive charge, and a friction type igniter with a delay pellet. The upper end of the friction wire in the igniter is attached to a disc in the head which screws on to the top of the body. In operation, the head is unscrewed and pulled, drawing the wire through the friction composition and igniting the delay pellet. After a delay of from 4 to 5 seconds the pellet initiates the detonator which in turn sets off the explosive filler.

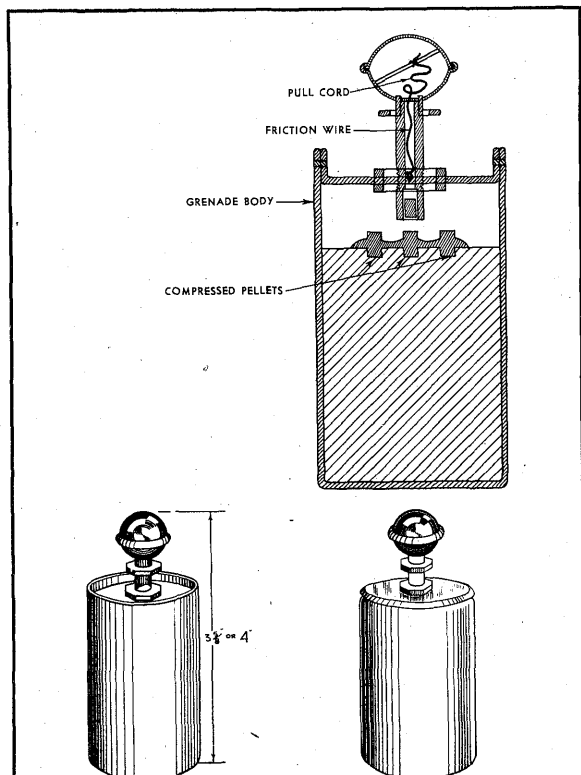
This type hand grenade has been used as a booby trap by fitting a non-delay friction igniter which can be identified by its left-hand threads.

Overall length 3 ins.
Maximum diameter 2 ins.
Color.....Black body with
blue igniter head

Weight of explosive filler 3.85 oz.
Weight 12 ozs.
Igniter B. Z. 39
Delay 4-5 sec.

SHAVING STICK GRENADE

GERMAN 

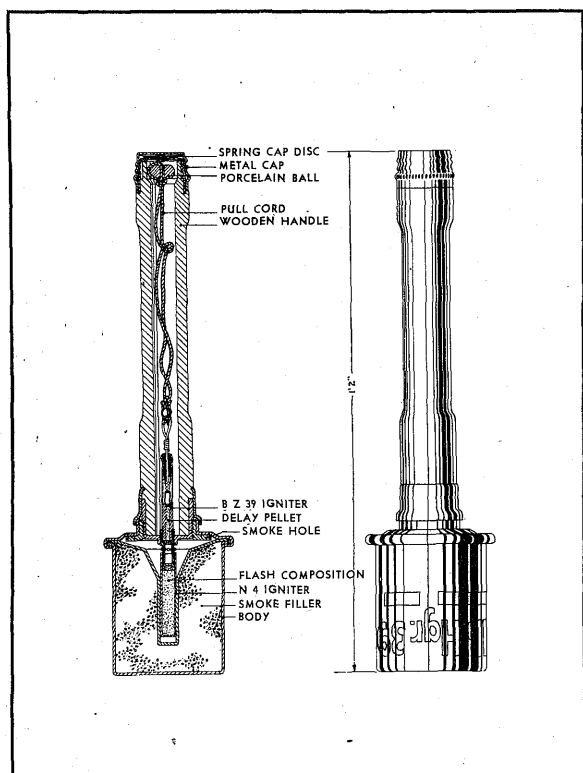


This is a thin-cased offensive type grenade with a B. Z. E. friction igniter screwed into the top. The cylindrical body is made of aluminum and painted yellow. There are two models of this grenade, one 3 $\frac{3}{8}$ inches long and the other 4 inches long. This grenade may also be used as a booby trap by the insertion of a D. Z. 35 Pressure Igniter. To operate the grenade, the head of the igniter is unscrewed and pulled, drawing the wire through the friction composition and igniting the delay pellet. The grenade is then thrown and after a 4-5 second delay, the delay element initiates the detonator.

| | | | |
|---------------------|------------------------------------|------------------------|----------|
| Overall length..... | 3 $\frac{3}{8}$ or 4 ins. | Maximum diameter | 2 ins. |
| Color..... | Yellow body with blue igniter head | Igniter | B. Z. E. |
| | | Delay | 4-5 sec. |

SMOKE HAND GRENADE 39

Nebelhandgranate 39



This grenade closely resembles the high explosive stick grenade 24 in external form and size. However, instead of the high explosive filling this grenade is filled with a smoke mixture. There are eight holes in the base of the head through which the smoke escapes. The handle has three horizontal corrugations at the screw cap end to assist in differentiation by touch. Upon activation, smoke is emitted for a period of two minutes, forming an effective screen for machine gun nests and pillboxes.

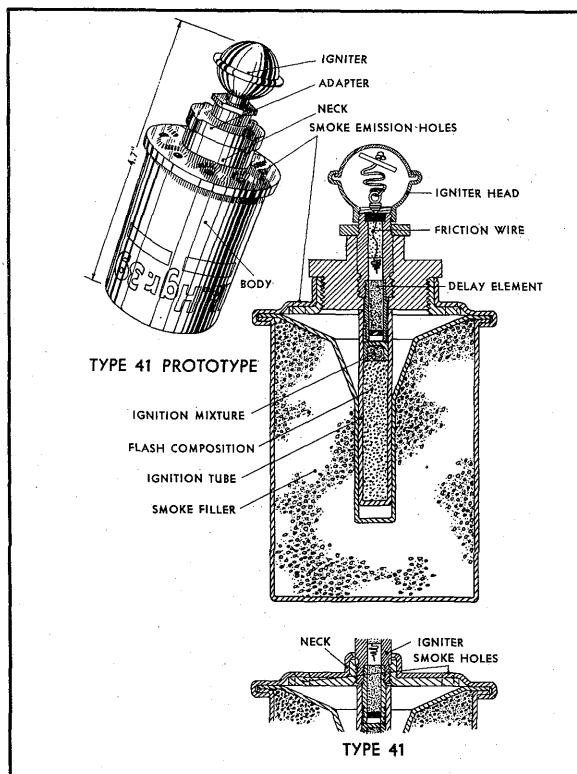
| | | | |
|-------------------------|---------------------------------------|---------------|---|
| Total weight | 1 lb., 14 ozs. | Color | Olive drab |
| Overall length | 14 ins. | Markings..... | White band 8 inches wide around center of handle and lettering Nb. Hgr. 39 stencilled in white around the body above a broken white band. |
| Igniter | B. Z. 39 | | |
| Delay | | | |
| N 4 ignition tube | 7 sec. | | |
| Filling..... | (HC) mixture zinc and hexachlorethane | | |

SMOKE HAND GRENADE 41 AND PROTOTYPE

GERMAN



Nebelhandgranate 41



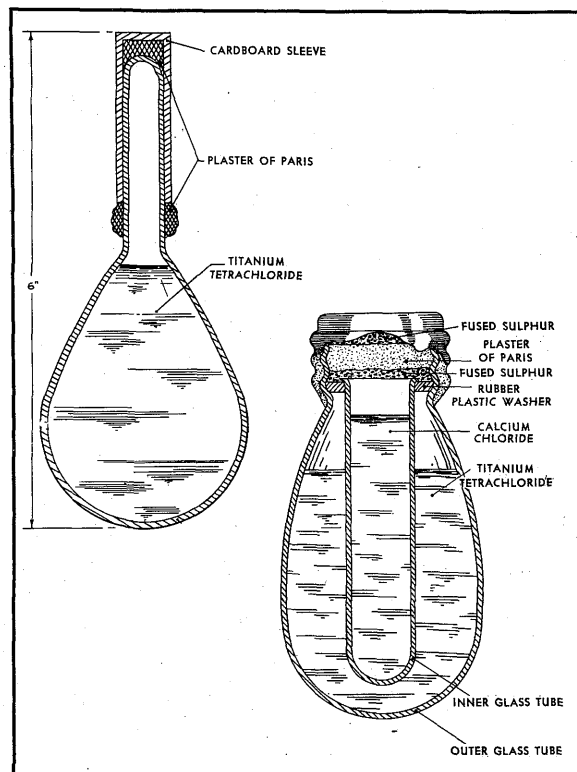
The prototype of this grenade is comprised of the body of the smoke hand grenade 39 with a synthetic resin adapter to hold the B. Z. E. igniter. The Model 41 is of similar construction but the body has been modified so that the igniter fits into a small central neck without the use of an adapter. There are only two smoke holes instead of eight. The friction igniter operates with a 4-5 second delay, setting off a 2-minute smoke discharge.

Overall length 4.7 ins.
Maximum diameter 2.3 ins.
Color Olive drab
Total weight 21 ozs.

Filling.....(HC) type mixture. Zinc and Hexachlorethane
Igniter B. Z. E.
Delay
N4 Ignition tube 4-5 sec.

SMOKE GRENADES

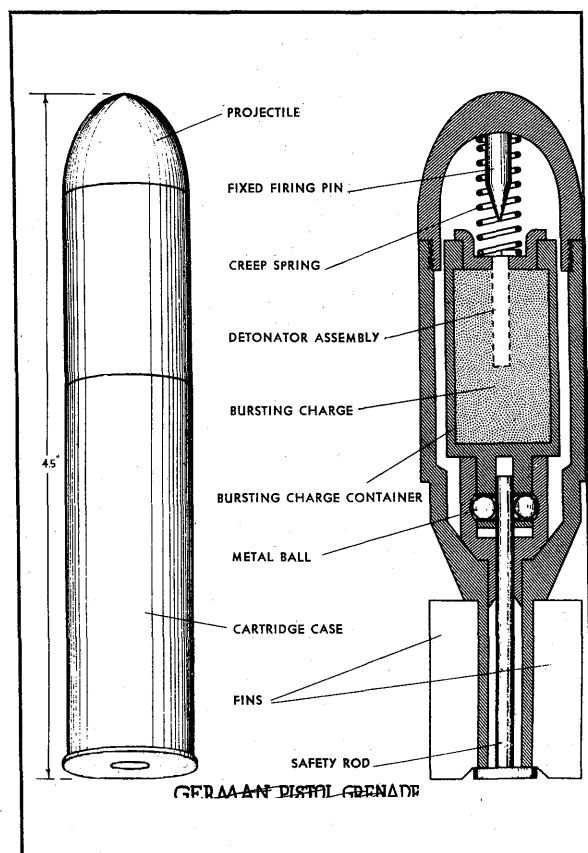
Blendkörper 1H u. 2H



These grenades are made in the form of glass flasks. Model 1H is a single container; Model 2H includes an inner glass tube filled with a solution of calcium chloride. The body of each grenade is filled with titanium tetrachloride which vaporizes upon contact with the air. The calcium chloride permits the second model to operate at low relative humidity, whereas the first model produces a thin fog unless the air is quite moist. Both models discharge upon impact with any hard object.

1H
Overall length 6 ins.
Maximum diameter 2½ ins.
Total weight 13.2 ozs.
Filling.....(FM) Titanium Tetrachloride
Weight of filling..... 10.6 ozs.

2H
Overall length 4.8 ins.
Maximum diameter 2½ ins.
Total weight 17 ozs.
Filling & filling weight
Outer flask..... 10 oz. titanium tetrachloride
Inner flask....1.3 oz. aqueous solution of calcium chloride



PISTOL GRENADE

26 mm Wurfgranate Patrone 326 Leuchtpistole

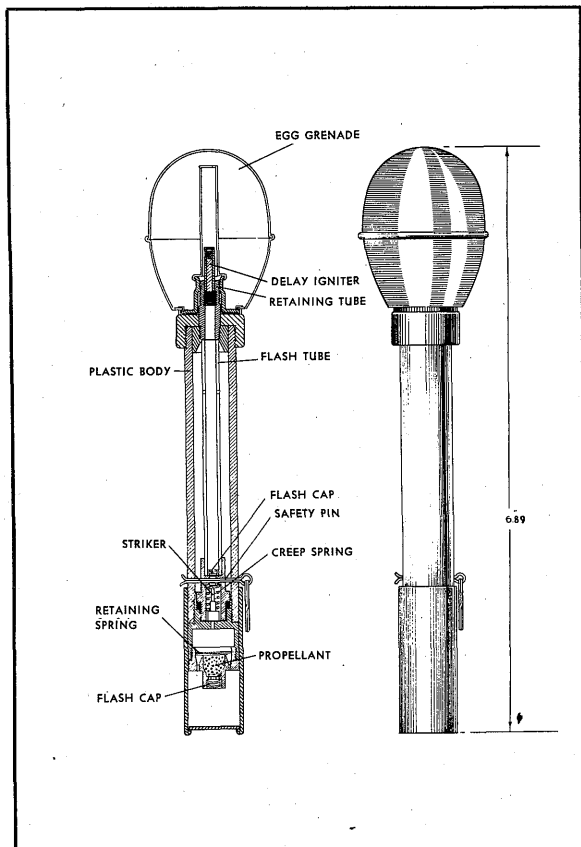
This grenade, consisting of a rounded nose cap screwed to a cylindrical body, is equipped with four fins which are fixed to the base of the body. A brass or aluminum cartridge crimped to the grenade completes the assembly. A case containing the detonator and main filling is separated from a fixed firing pin in the nose of the grenade by a creep spring. The case is prevented from moving forward before firing by two metal balls in the base of the carrier. An arming rod inserted between the two balls prevents them from moving. This is forced out of the base by setback about ten or twelve yards after the grenade leaves the muzzle of the gun. The balls then slide out of their grooves and the case is free to move against the firing pin, exploding the grenade on impact.

| | | | |
|-----------------------------------|----------|---------------------------|----------|
| Overall length | 4.5 ins. | Weight of projectile..... | 3.2 ozs. |
| Maximum diameter | 1 in. | Filler | T.N.T. |
| Color | Yellow | Weight of filler | 0.25 oz. |
| Weight of complete round 4.2 ozs. | | | |

PISTOL GRENADE

Wurfkörper Leuchtpistole

This pistol grenade is formed by adding to the egg-type hand grenade (Eierhandgranate 39) a plastic stem to which it is attached by a retaining tube. The tube contains the delay igniter at the forward end inside the grenade. An alloy flash tube connects this to the fuze which is located in the base of the stem. The fuze is separated from the primer by a safety pin which is pulled out before the grenade is placed in the pistol barrel. Upon firing, the firing pin strikes the primer which sets off the delay igniter, detonating the explosive charge after a delay of 4.5 seconds.



| | | | |
|------------------------|-------------|-------------|----------|
| Overall length | 6.89 ins. | Delay | 4.5 sec. |
| Maximum diameter | 3 ins. | Range | 80 yds. |
| Color | Olive green | | |



27 mm MULTI-STAR SIGNAL CARTRIDGE

The cartridge consists of a light alloy outer container complete with the propelling charge and an inner container in which there are six star units. Running through the center of the star units is an assembly of two brass tubes with selector holes for the six choices of settings. The inner tube contains gunpowder and is closed by a plug which contains a delay pellet. In firing, the inner container is propelled and after the delay pellet has burned through, the flash passes immediately along the whole length of the inner tube, igniting and ejecting the stars in accordance with the setting.

Overall length 5 3/4 ins. Filling.....Propellant & pyrotechnic

Maximum diameter 1.06 ins.

Star combinations and dial settings:

| | | | | | |
|---------|---------|---------|---------|---------|---------|
| 3 red | 1 red | 3 red | 1 red | 2 red | 2 red |
| 3 green | 2 green | 1 green | 3 green | 2 green | 1 green |
| (0-2) | (7-8) | (14-15) | (21-22) | (27-29) | (34-35) |

H. E. CARTRIDGE FOR 27 mm GRENADE PISTOL

Sprengpatrone für Kampfpistole

This grenade consists of a die cast aluminum container which encases a steel tube containing the explosive charge. Into the steel tube is screwed a direct action nose fuze with a protruding striker head. The striker is held away from the detonator by six steel balls kept in position by a steel collar supported on three aluminum pins. The creep spring separates the striker and primer beneath which is a booster separated from the main filling by an empty air space. The black powder propelling charge is contained in a cup with a lead Styphnate primer. The grenade has grooves on the aluminum body fitting the rifling of the Kampfpistole from which it is discharged.

Overall length 3 ins.

ColorUnpainted aluminum

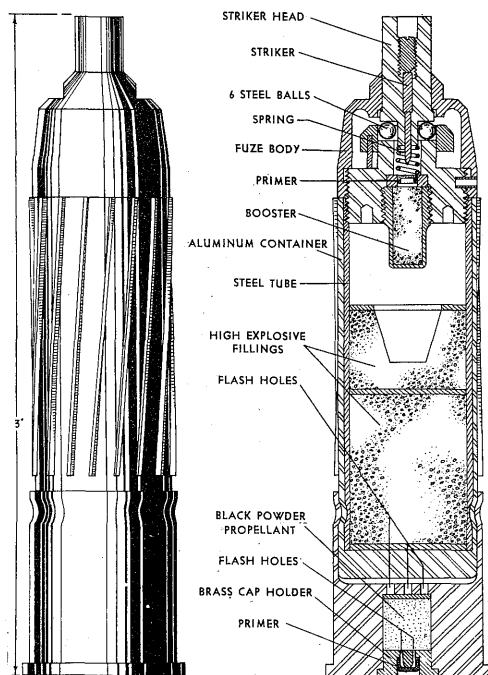
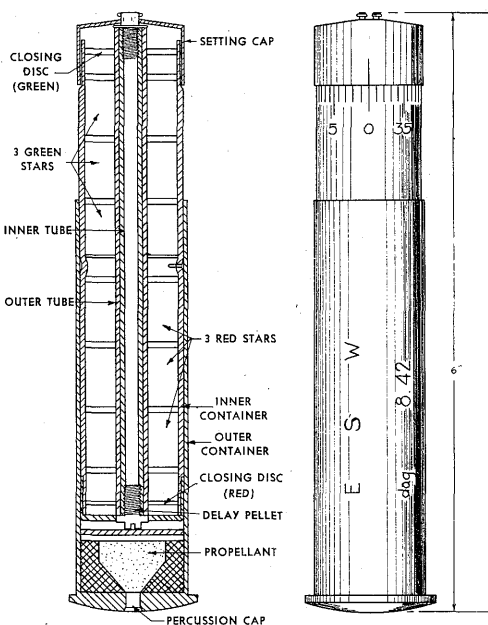
Weight of complete round.... 5 ozs.

Weight of projectile 3 1/2 ozs.

FillerPETN/Wax

Weight of filler77 oz.

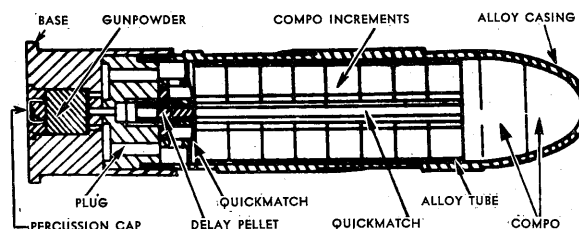
Propellant..Graphited black powder



SMOKE

Nebelpatrone für Kampfpistole

This grenade is similar in appearance and construction to the high explosive grenade except that it contains a smoke generator instead of an explosive filler. It is fitted with a percussion type nose fuze which has a charge of gunpowder located just below the flash cap instead of a detonator. The projectile functions on impact and the gunpowder, ignited by the flash cap, ejects the smoke generator from the body of the grenade and at the same time ignites it. The projectile may be recognized by the following stencilled marking on the base of the cartridge case: NEBEL. Z.



INDICATOR

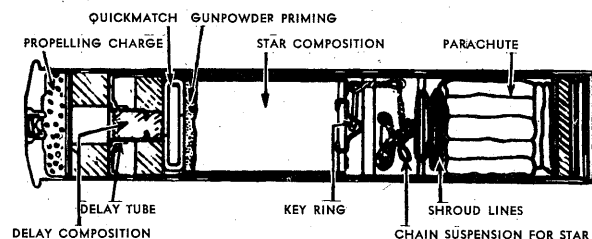
Deutpatrone für Kampfpistole

The indicator grenade is similar externally to the smoke and high explosive grenades except for the head which is parabolic. There is no fuze. The smoke train, a puff of red-dish-brown smoke, is fired by the flash from the propellant. The indicator system begins to function when the projectile has been in flight for about two seconds. The weight of the complete round is 4.5 ounces; that of the grenade itself, 3 ounces. The marking on the base of the cartridge case is: DEUT. Z.

ILLUMINATING STAR ON PARACHUTE

Fallschirm Leuchtpatrone für Kampfpistole

This type grenade has the same general contours as the two others previously described. It has a black bakelite head and a screwed-on base plug which is perforated to hold a gunpowder pellet. Inside the grenade, directly above the plug is an illuminating star to which a parachute is attached. On firing, the flash from the propellant ignites the gunpowder pellet, which, after a brief delay, ignites the star. The bakelite head is blown off, and the star ejected. The grenade may be identified by the stencilling "F. Leucht. Z." on the base of the cartridge case.



ROCKET PROJECTOR

28/32 cm Nebelwerfer 41

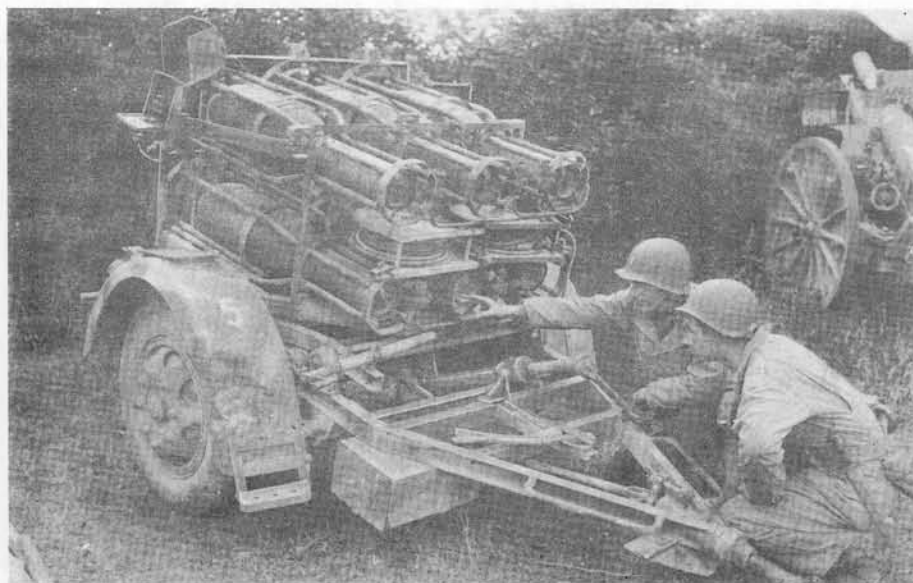
GERMAN



This rocket projector fires the 28 cm high explosive rocket (page 354) and the 32 cm incendiary rocket (page 353). Ranges are given below.

This device, which functionally does not differ from the 15 cm and 21 cm Nebelwerfers, consists of six projectors grouped in two tiers of three each, mounted on a two-wheel trailer. The cages are constructed of round steel bars shaped to the outside contours of the 32 cm rocket. Detachable liners for the forward end of the projectors permit the use of 28 cm rockets. The portion of the projector holding the propelling chamber remains the same for both rounds.

The firing mechanism is electric. Traverse (approximately 30°) and elevation (from 0 to 45°) are by means of cranks.



The piece is fired from its mounting and is held in position by two jacks in front and a small spadelike

arrangement in the rear.

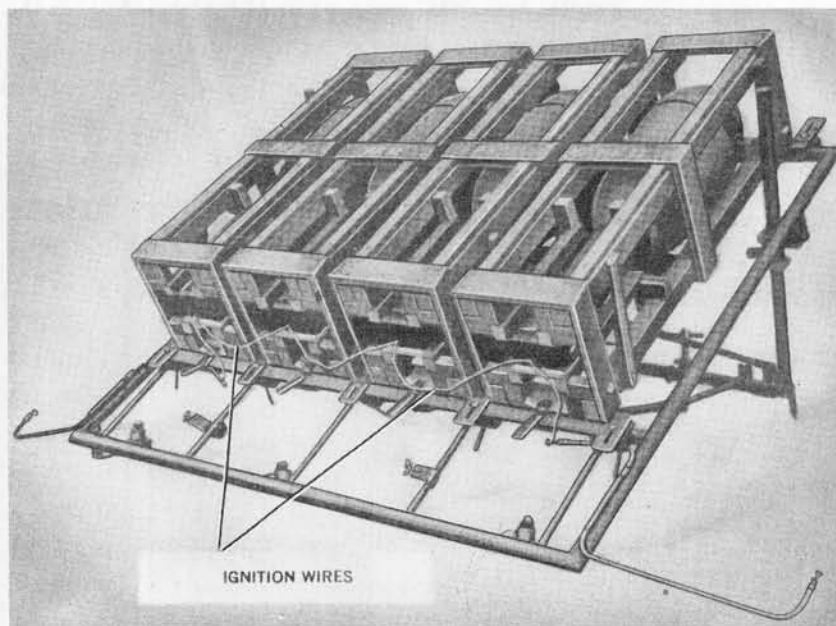
The equipment weighs approximately 2,460 lbs.

TRANSPORTABLE ROCKET PROJECTORS

28/32 cm schweres Wurfgerät 40 and 41

These two rocket projectors, or ramps, differ from each other only in construction details and in the material used. The Schweres Wurfgerät 40 is made of wood and weighs 115 pounds; the 41 model is of metal, weighing 243 pounds. Each is designed to carry four crates of the 32 cm incendiary rocket (page 353) or the 28 cm high explosive rocket (page 354).

Either model is adjustable for elevation. Firing is accomplished by the hand electric firing system pro-



vided for the crates themselves. Maximum ranges for these projectors are identical: 2,106 yards for

the 28cm Wurfkörper Spr. and 2,406 yards for the 32 cm Wurfkörper M. Fl. 50.

ROCKET PROJECTORS ON SEMITRACK VEHICLES

Schweres Wurfrahmen 40

GERMAN



This rocket projector is designed for use on half-tracked armored personnel carriers. The principal feature of the device is the carrier plate, three of which are mounted on each side of the half-track. Each is adjustable for elevation of 5° to 45°, and is believed to be equipped with an elevating scale. The actual projector consists of the crate in which the 28 cm or 32 cm rocket is packed, and which may be secured to the plates. Reports indicate that each vehicle carries six rounds, five of which are 28 cm high explosive and one 32 cm incendiary. Range figures are identical to those applying to the



Schweres Wurfgerät 40 and 41 and the 28/32 cm Nebelwerfer 41.

The photos above show the 3-ton

armored semi-track (m. gp. Zgkw.) fitted with rocket projectors as described above.

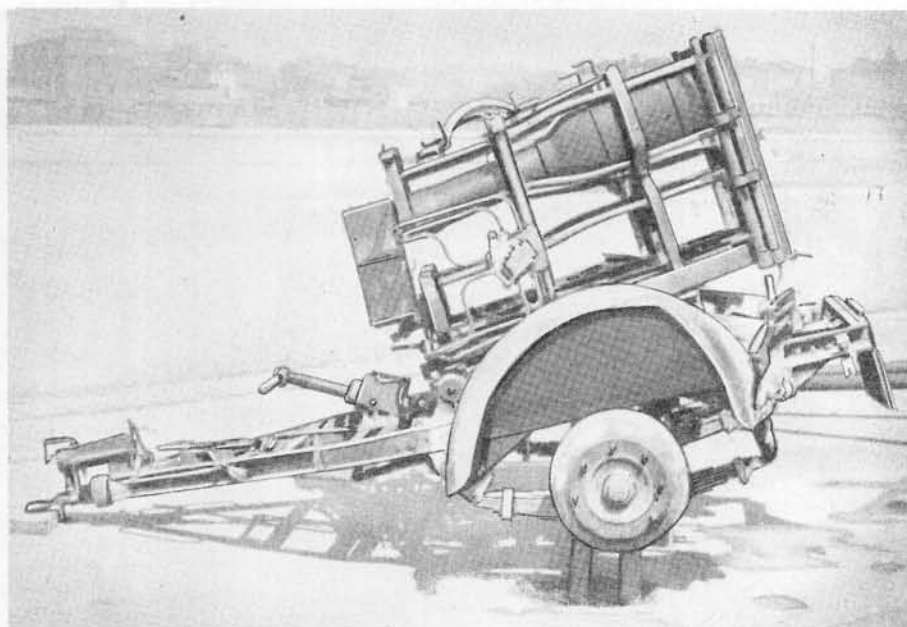
ROCKET PROJECTOR

30 cm Nebelwerfer 42

This rocket projector very closely resembles the 28/32 cm Nebelwerfer 41. The individual projectors are of similar construction, each one being shaped to the contours of the standard 30 cm rocket ammunition. The rear portion, however, is considerably larger than that of the 28/32 cm projector to accommodate the larger propelling chamber of the 30 cm rocket. As a result of the heavier charge, this rocket achieves a range of 4,976 yards.

Both traversing and elevating mechanisms are identical with those of the 28/32 cm piece. Total traverse is 30 degrees, and elevation is 45 degrees. The firing mechanism is electric with a contact box located at the right side of the piece.

A sight bracket is located at the



rear of the framework.

There is a small spade under the frame in the rear, but no other evi-

dence of supports.

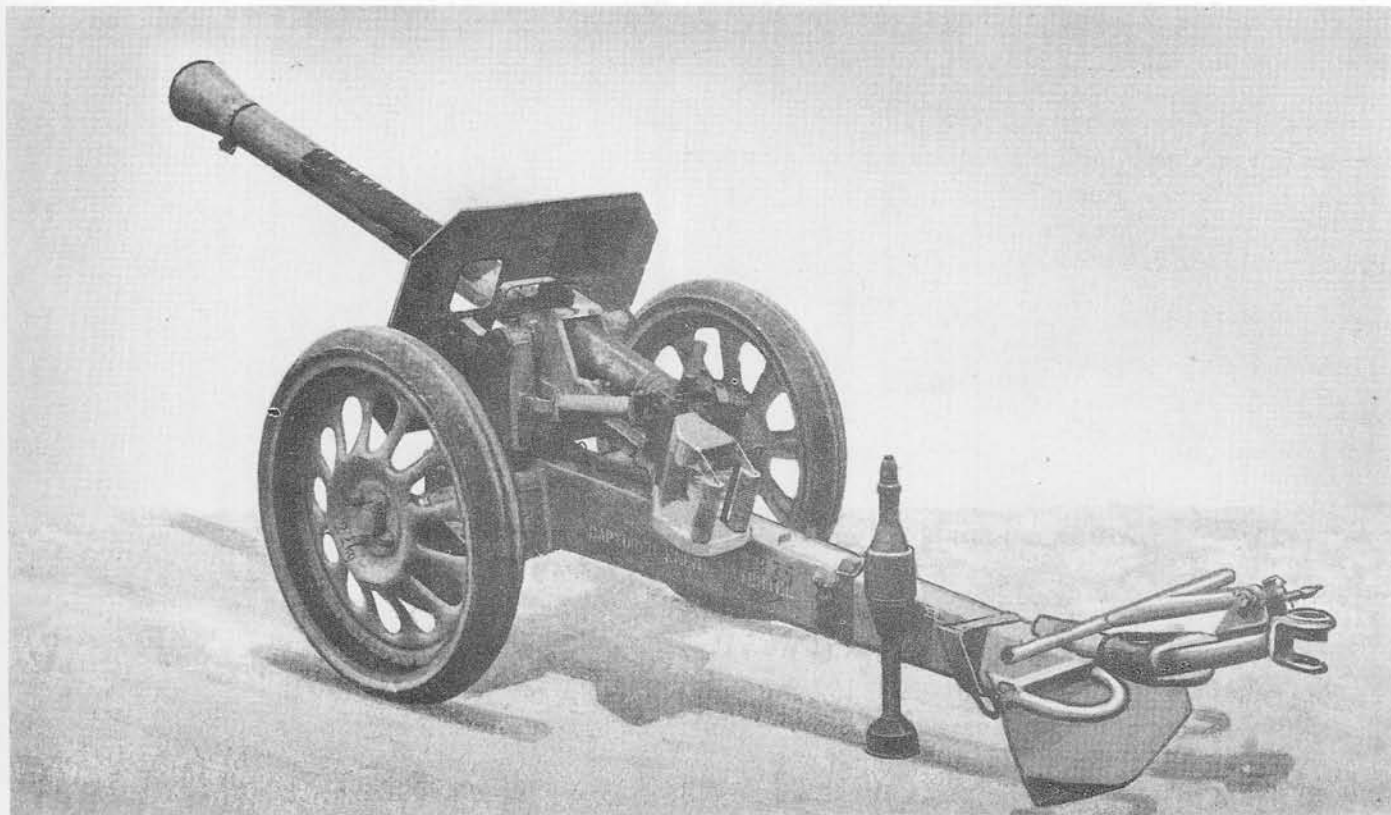
The ammunition for this projector is described on page 354.1.

ROCKET LAUNCHER

GERMAN



8.8 cm Raketenwerfer 43 ("Püppchen")



This weapon is a closed breech rocket launcher which fires a rocket projectile. It is transported on a two-wheeled carriage, and may be fired from the carriage or from firing segments to lower the silhouette. If necessary, it may be readily disassembled into seven loads for transport. A cone-shaped gas deflector is fitted over but does not protrude beyond the muzzle.

The piece is aimed by grasping two handles fitted to the left rear of the cradle and aligning the open sights on the target. The rear sight is adjustable from 180 to 700 meters.

The launcher fires from a closed breech which is operated by a handle on top of the breech ring. Opening of the breech cocks the hammer which is held in firing position by a sear. When the projectile has been inserted and the breech closed, a squeeze of the right handle depresses the sear, releasing the hammer. A safety device fitted to the left of the firing pin in the center of the breechblock must be turned to "F" position before the launcher can be fired. An additional safety feature prevents the hammer from striking the firing pin unless the breech is fully closed. The small shock of recoil developed by the rocket gases against the closed breech is transmitted directly to the spade.

Ammunition used with the rocket launcher is a modified version of the 8.8 cm rocket projectile, having a percussion primer instead of the electric type. The rocket is fitted with a base plate with a protruding rim to seat the round in the tube. The base plate and primer are the only parts of the round which are extracted after firing.

SPECIFICATIONS

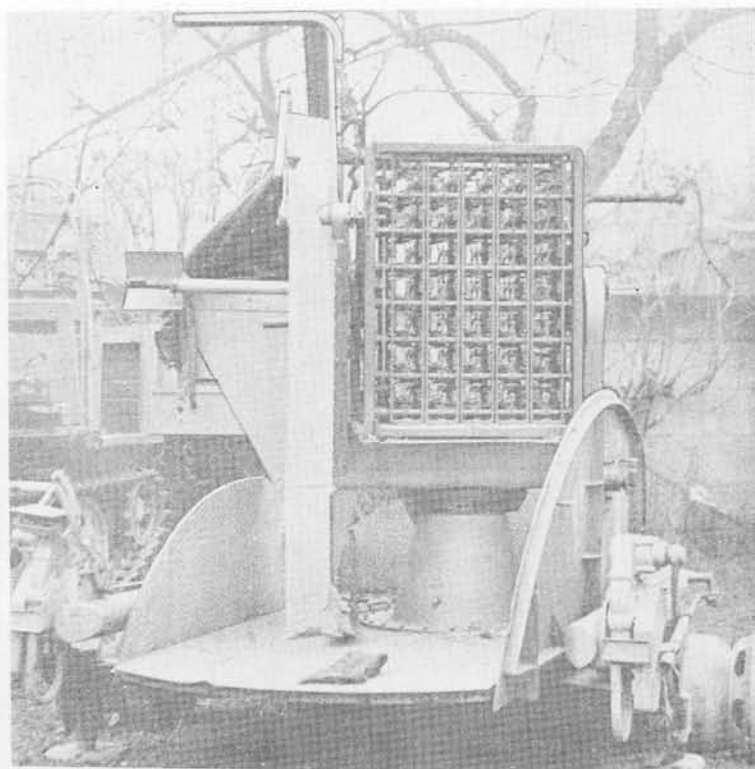
| | |
|--|---------------------------|
| Caliber | 88 mm (3.46 ins.) |
| Weight (firing position) | 315 lbs. |
| Length of weapon (overall) | 9 ft., 9 ins. |
| Length of barrel | 63 ins. |
| Height (traveling position)..... | 2 ft., 11 ins. |
| Height (on segments) | 1 ft., 7 1/8 ins. |
| Width (overall) | 3 ft., 4 ins. |
| Length of bore | }Smooth bore |
| No. of grooves | |
| Width of grooves | |
| Depth of grooves | |
| Width of lands | } |
| Muzzle velocity | 460 f/s* |
| Max. range (horizontal) (limited by sight) | 765 yds. |
| Rate of fire ..... | ..... |
| Traverse on wheels: Right (max.)..... | 28° |
| Left (max.) | 28° |
| Traverse on firing segments | 360° |
| Elevation | 23° |
| Depression | 14° |
| Length of recoil | none |
| Ammunition | 8.8 cm R. Pz. B. Gr. 4312 |
| Wt. of projectile | 5 lbs., 13 ozs. |

*Not verified.

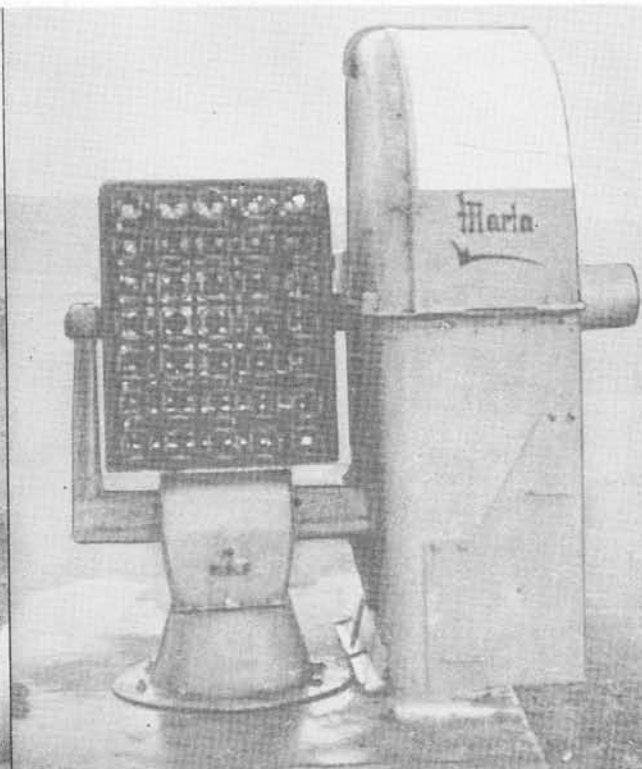
MULTIPLE ROCKET LAUNCHER

GERMAN 

7.3 cm "Föhn"



MOBILE TYPE MOUNT



FIXED TYPE MOUNT

This multiple rocket launcher, used for antiaircraft barrage purposes and known as the "Föhn" is of different design from any other weapon of its type used by the Germans. Launching sites were located along river fronts, indicating the use of this weapon against river crossings. There are 35 individual launchers, each 31 inches long and approximately 7.3 cm square, assembled in 5 horizontal and 7 vertical rows. The rockets are fired by hammer type firing pins mounted on horizontal shafts. All 35 of the pins are actuated by a single trigger. The whole assembly measures 32 inches from top to bottom, and 23 inches from side to side. A simple clamp at the rear of the racks holds the rockets in position until firing takes place. The frame of the assembly is made of 3/16-inch metal.

A trunnion, set in each side of this framework, rests upon arms extending up from the pedestal base. The weapon, with its pedestal base, is used with either a mobile or fixed mount. When used as a mobile mount, the launcher is fitted with a circular metal folding platform mounted on a 2-wheeled trailer. The fixed launchers are not provided with the folding platform, and it is believed that they are normally set up more or less permanently on sheet iron platforms.

The sight, trigger mechanism, and elevating and traversing mechanisms are mounted on the inside of a metal protective shield located on the left side of the launcher. Elevation is from -10° to 90° . The upper part of the front wall of the shield is made of transparent plastic for sighting purposes.

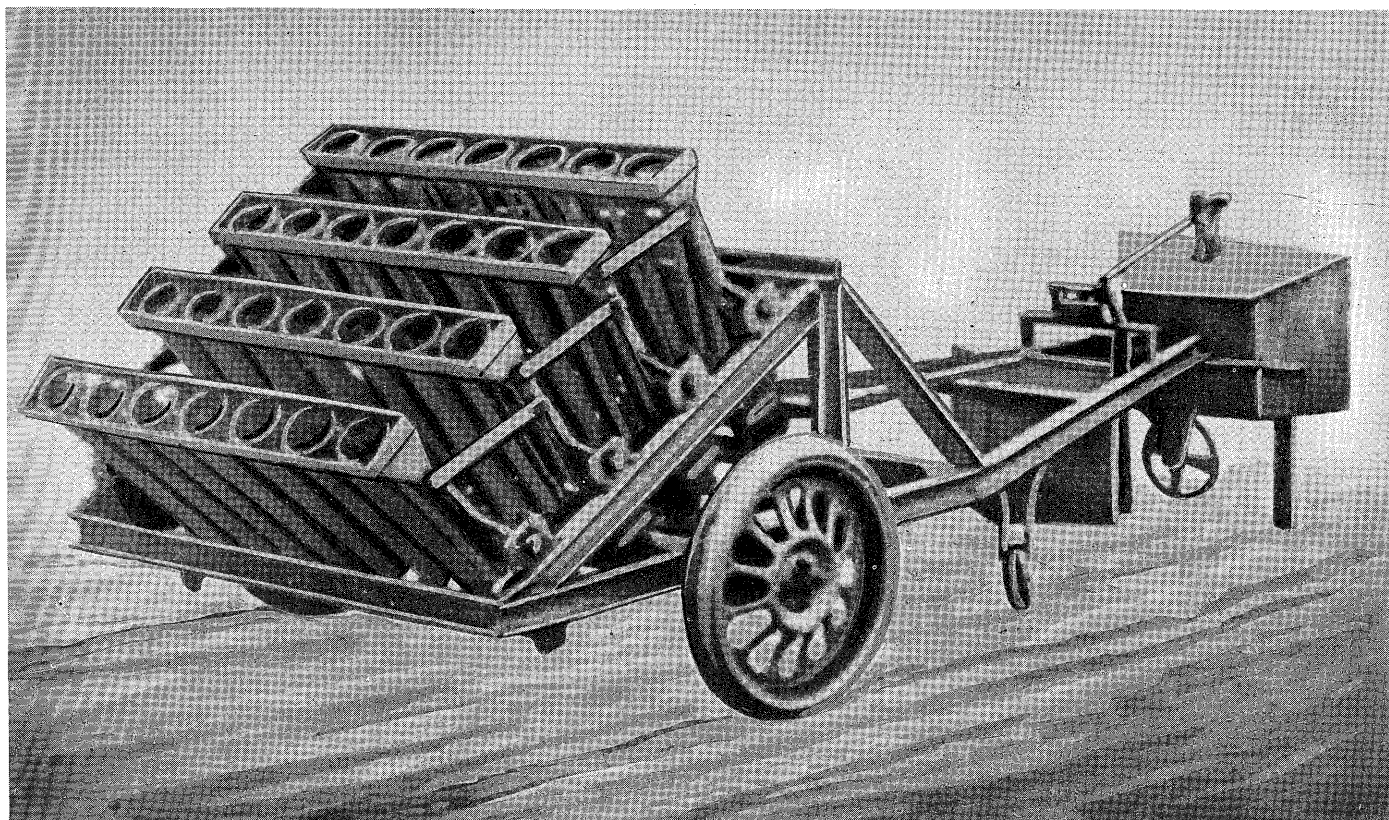
The 7.3 cm Raketen Sprenggranate, used with the launcher, is a spin stabilized rocket fitted with a nose percussion fuze and a self-destroying delay element ignited by the burning propellant.

SPECIFICATIONS

| | |
|------------------|------|
| Traverse | 360° |
| Elevation | 90° |
| Depression | -10° |

Ammunition

| | |
|----------------------------------|----------|
| 7.3 cm R. Sprgr. (H.E.) | |
| Weight of complete round | 6 lbs. |
| Weight of propellant | 1.19 lb. |
| Weight of explosive charge | 0.62 lb. |
| Type of explosive | "95" |
| (RDX/TNT/WAX = 55/40/5) | |



This projector consists of 28 projector rails mounted in four rows of seven each, at the forward end of a long, low carriage. The projectors are constructed of welded T-section steel bar. Each row is a separate assembly, and is bolted to an inclined welded steel superstructure built above the carriage. The projectors are displaced from the center both for line and elevation to give dispersement of fire. Each row is fired as a unit by means of a bar provided with a firing hammer and striker for each projector. Each of the four bars may be separately cocked, and all may be fired by one pull of the firing cable from the central point.

The carriage consists of a framework of U-section steel extended well to the rear, where it terminates in a protected control point containing the elevating handwheel, the firing cable, and two handgrips for traverse. A 1 cm thick (0.39 inches) protection shield is provided. There are two metal-rimmed, rubber sprung detachable wheels 27 inches in diameter. The equipment can be traversed about a fixed center pivot or about its wheels. The center pivot is locked into a bracket welded to the center of the axle-tree and rear support is provided by two steel rollers welded on the under side of the carriage.

Each row of projectors is independently trunnioned and all four are elevated together by means of a linkage through a chain drive from the handwheel.

SPECIFICATIONS

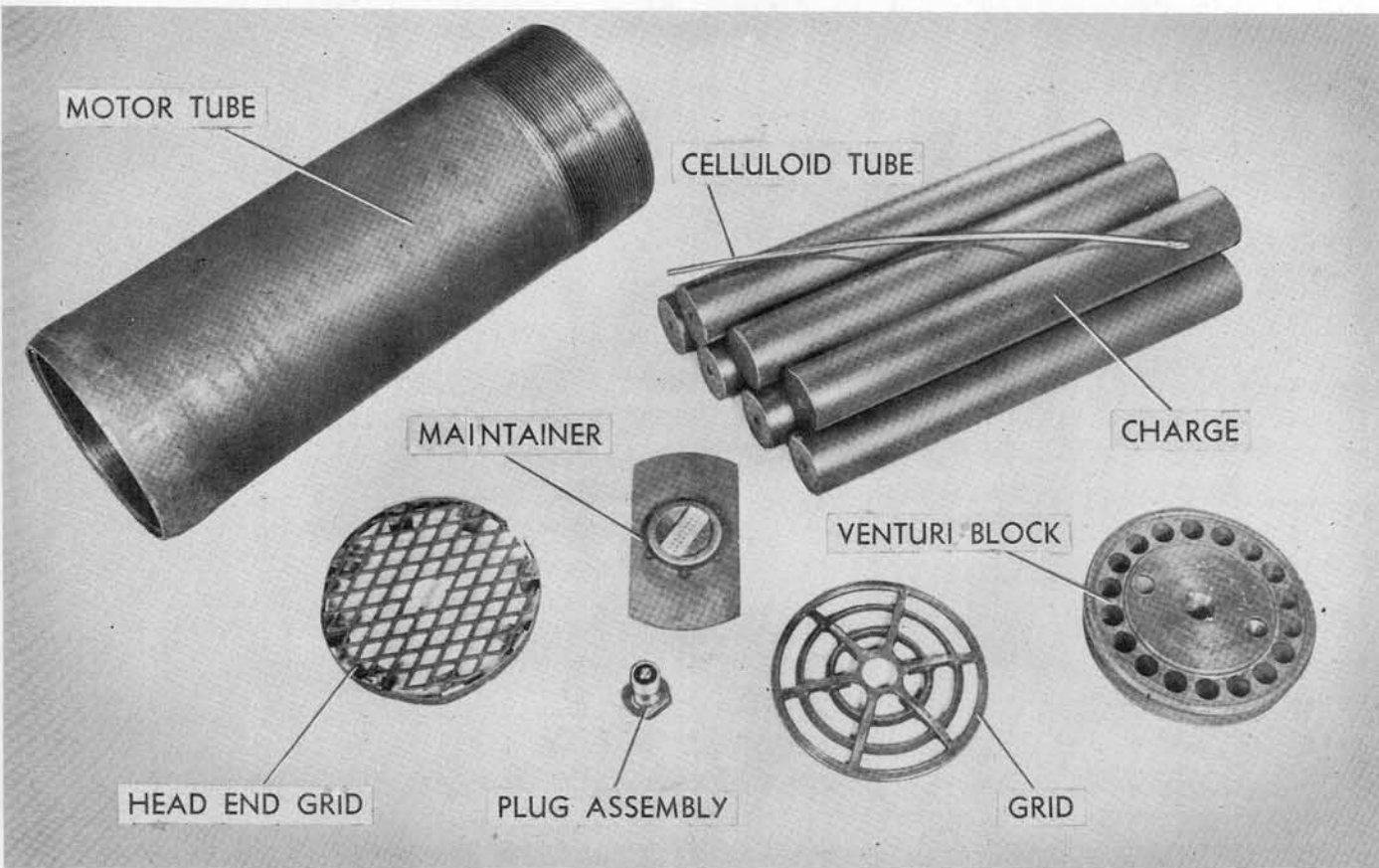
| | |
|--|-----------------------------|
| Overall length (approx.) | 14 ft. |
| Overall width | 5 ft., 11 ins. |
| Track (wheel center to center)..... | 5 ft., 7 $\frac{7}{8}$ ins. |
| Width of each projector frame | 49 ins. |
| Depth of each projector frame | 5 $\frac{3}{4}$ ins. |
| Maximum height (above center pivot platform) | 3 ft., 4 ins. |
| Maximum height (on road wheels)..... | 4 ft., 5 ins. |
| Elevation (approx.) | 55° |
| Depression (approx.) | 4° |

30 cm ROCKET

GERMAN



30 cm Wurfkörper 42 Spreng



This rocket is packed in a wooden crate from which it may be fired in the same manner as the 28 cm rocket described on page 354. It is also fired from a rocket projector consisting of six welded metal frames mounted on a two-wheeled, split trailed carriage described on page 350.

This model has been selected to illustrate the construction of the motor assembly of a typical rotating rocket. The motor tube is 0.43 inch thick, closed at one end, and threaded inside to take the venturi block. Eighteen venturis are drilled in this solid block. The throat diameter of each venturi is 0.365 inch with an exit section of approximately 0.82 inch in diameter. The axes of the venturis are inclined at an angle of $12^{\circ} 42'$ so that the effluent gases cause the round to rotate. A threaded hole in the center takes the primer unit.

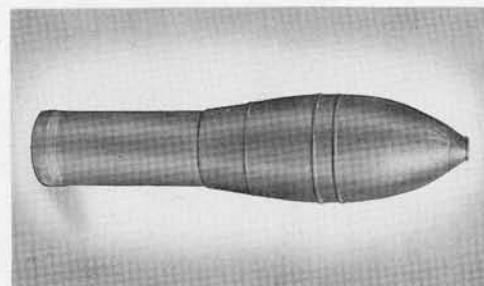
Seven tubular sticks make up the propellant charge composed of nitrocellulose and diglycol dinitrate.

The sticks are supported at the venturi end on a grid. The center stick contains a length of quickmatch in a celluloid tube, and ending in a primed maintainer pellet. A small primer unit screwed into the steel venturi plug flashes directly on to the gun powder pellet at the end of the celluloid tube.

This motor unit is similar to that of the 15 cm Wurfgranaat. However, because of the heavier charge in the 30 cm ammunition, the metal mesh has been introduced to prevent the maintainer pellet from being crushed by the central stick of the propellant charge if the rocket is dropped.

SPECIFICATIONS

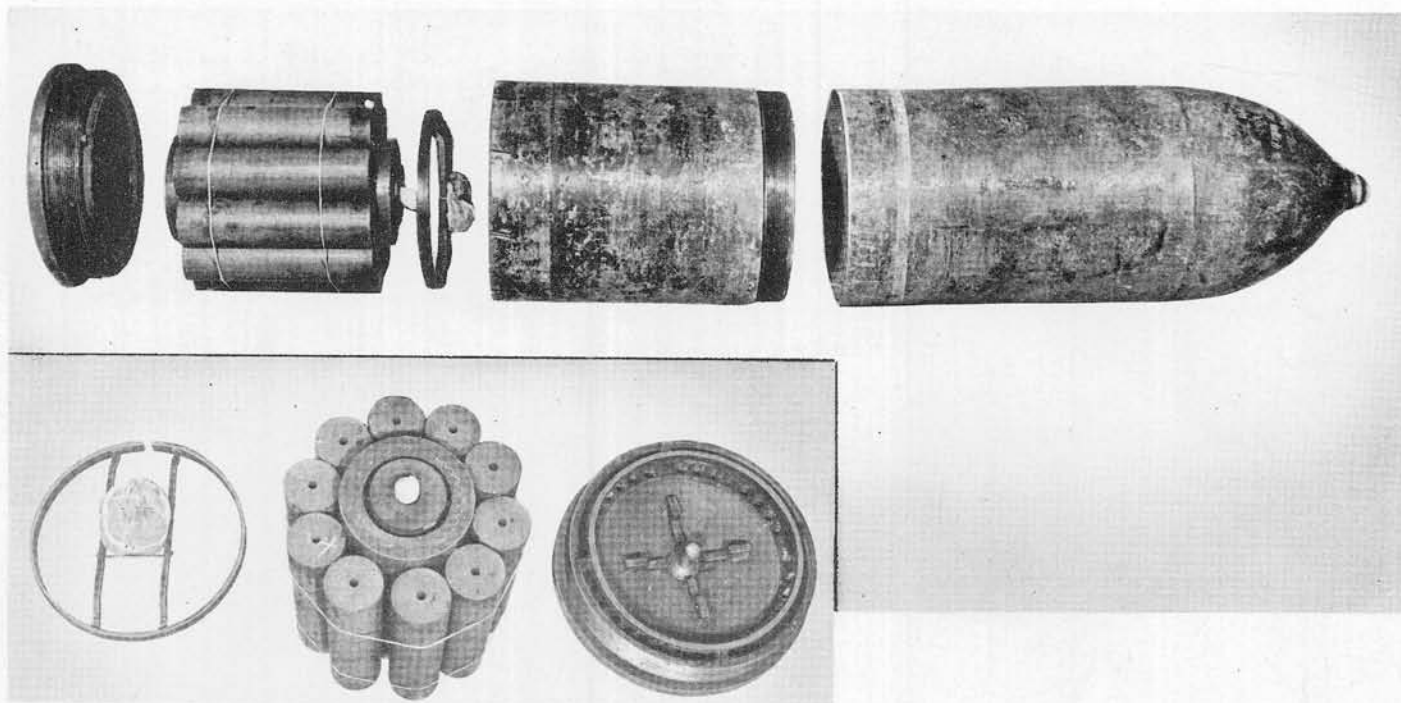
| | |
|---------------------------------------|---------------------|
| Weight of filled motor unit..... | 129 lbs., 10 ozs. |
| Weight of filled bomb..... | 146 lbs., 4 ozs. |
| Weight of propellant charge.... | 33 lbs., 3 3/4 ozs. |
| Length (overall) | 47 ins. |
| Length of bomb | 28.5 ins. |
| Length of motor tube | 22.5 ins. |
| Diameter of bomb | 11.8 ins. |
| External diameter of motor tube | 8.56 ins. |
| Length of propellant charge | 18.4 ins. |
| Burnt velocity | 754 f/s |
| Range, maximum | 4,976 yds. |



ROCKET PROJECTILE FOR RAKETENWERFER 61

GERMAN 

38 cm R. Sprgr. 4581



This projectile is fired from the Raketenwerfer 61 (see pages 38.3 and 38.4). It shows a radical departure from standard spin-stabilized rocket design by the use of insert splines at the after end of the motor body. These splines, fitting into the rifling of the projector liner, aid in giving an initial spin to the projectile.

The rocket consists of three main assemblies: the high explosive body, motor body, and nozzle assembly.

The high explosive body of two-piece welded construction is threaded internally at its after end to receive the motor body. The booster pocket and fuze adapter assembly is welded in position at the nose of the high explosive body. The bourrelet is located just behind the welded junction of the ogive and the cylindrical section.

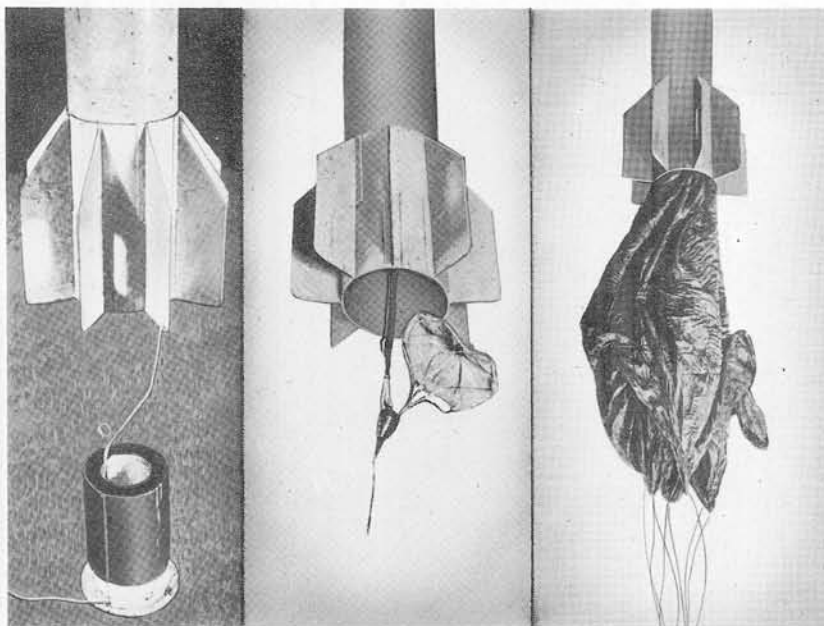
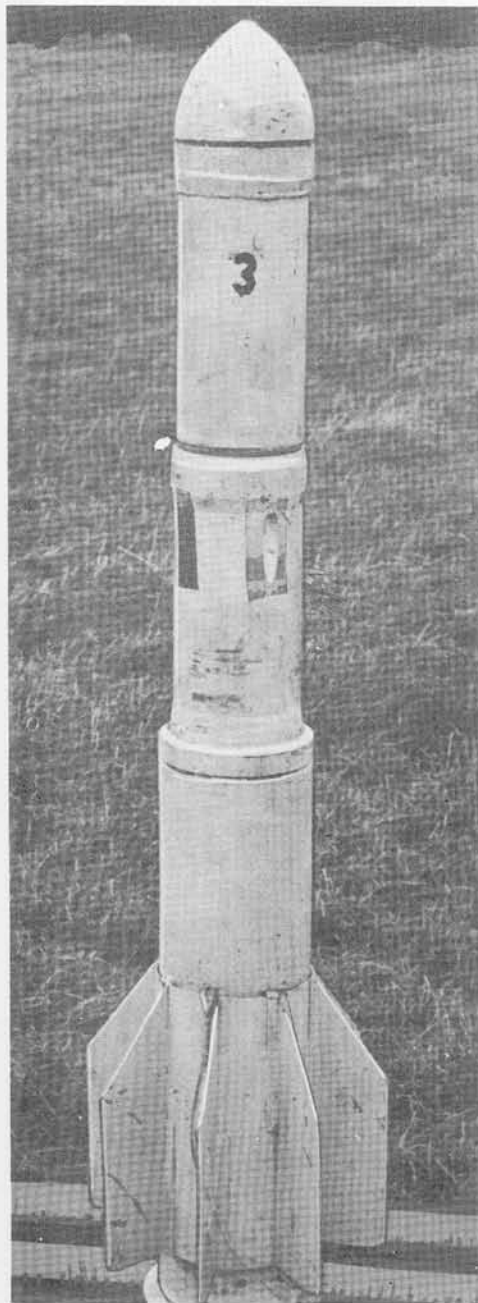
The motor body is threaded externally to screw into the high explosive body and internally to receive the nozzle assembly. Both the explosive body and nozzle assembly are secured by means of two diametrically opposed set screws. Nine grooves for the splines are machined into the base of the periphery of the motor body. The high explosive body is filled with 270 pounds of the German explosive charge 13A, which is 50/50 poured amatol.

The 32 venturi holes in the nozzle plate are set at an angle of 14° to the axis of the rocket. In the center of the nozzle plate there is a threaded hole to receive the igniter primer for the rocket propellant.

A rear spacer ring welded to the nozzle plate aids in the positioning of the outer row of propellant charges.

SPECIFICATIONS

| | |
|--|-------------------------|
| Caliber | 38 cm (15 ins. approx.) |
| Total weight of rocket | 761 lbs. |
| Overall length (not including fuze)..... | 56.68 ins. |
| Diameter of bourrelet | 14.94 ins. |
| Maximum range | 6,179 yds. |
| Weight of explosive charge | 270 lbs. |
| Weight of propellant charge | 88.5 lbs. |
| Fuze | Point detonating |
| Weapon from which fired | Raketenwerfer 61 |



This is an antiaircraft rocket projectile containing a parachute to which is attached a length of cable, designed for use in large numbers to form a barrage against low flying aircraft. The projectile consists of four parts: nose piece, propellant chamber, parachute housing, and cable housing and tail unit.

The nose piece is ogival in shape and screws onto the forward end of the propellant chamber. It contains a TNT destructive charge, weighing approximately 2.3 pounds, and initiated by means of a delay fuze connected to the propellant chamber.

This is a steel cylinder closed at the forward end and threaded externally at the rear end to fit into the parachute housing. Four drillings in the forward end of the parachute housing form the venturi through which the propelling gases escape.

At the forward end of the parachute housing is a TNT charge, weighing approximately 2 pounds. Below this charge are located the main and pilot parachutes which are attached to the forward end of the cable. The cable housing is constructed in two parts, the lower of which remains on the ground when the rocket is launched. The upper portion has a finned tail unit which fits over the lower portion of the cable housing. The $\frac{1}{8}$ -inch cable, attached at its forward end to the parachute, is coiled the length of the cable housing and passes through a hole in the lower portion to a ground anchor.

After launching, the projectile continues upwards until the whole of the cable has been uncoiled; the parachute is then pulled out of the parachute housing and remains suspended in the air until dragged to earth by the weight of the cable. The rocket casing continues in flight until a delay igniter initiates the destructive charge in the nose of the projectile.

SPECIFICATIONS

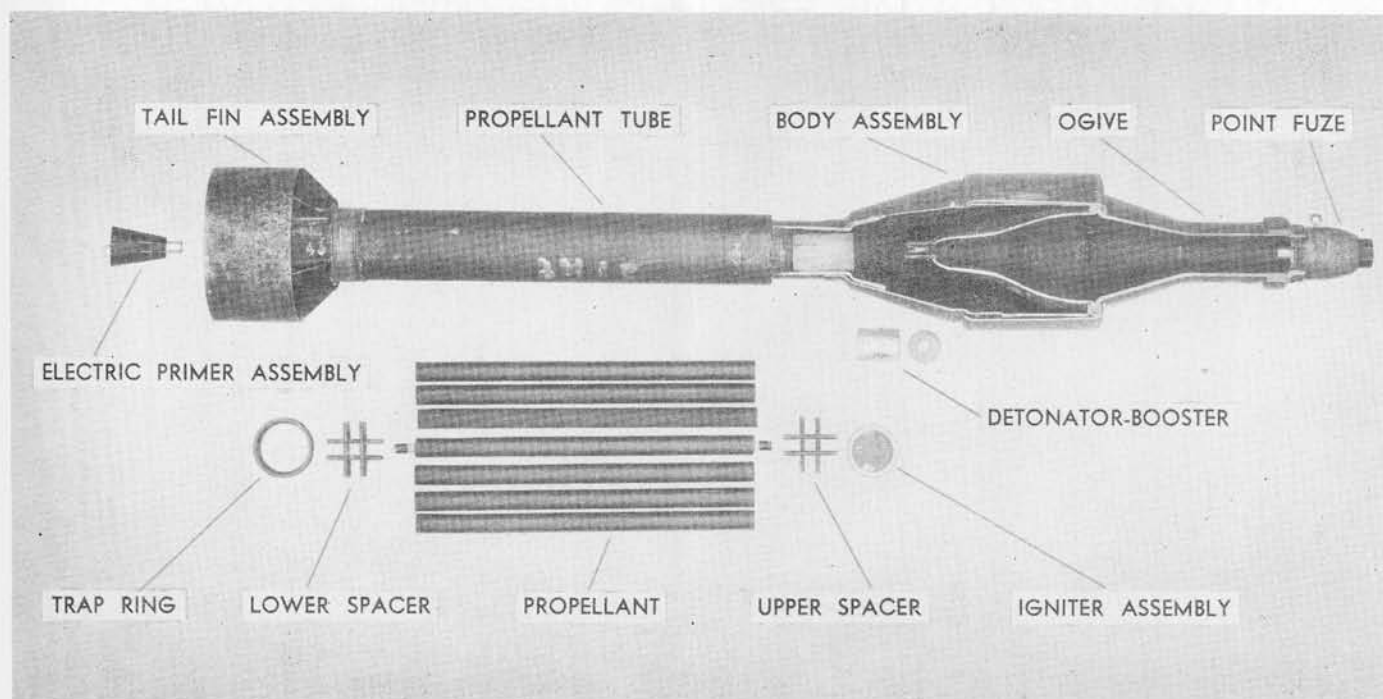
| | |
|---|------------------|
| Total weight (approx.) | 150 lbs. |
| Weight of parachute housing (containing parachutes and H.E. charge).... | 28 lbs., 1 oz. |
| Weight of fins and cable housing | 90 lbs., 4 ozs. |
| Weight of nose (containing H.E. charge) | 4 lbs., 12 ozs. |
| Weight of rocket motor unit | 27 lbs., 11 ozs. |
| Weight of propellant charge | 11 lbs., 10 ozs. |
| Length of projectile (overall) | 58.2 ins. |
| External diameter (maximum) | 7.09 ins. |
| External diameter of motor tube | 5.51 ins. |
| Internal diameter of motor tube | 5.2 ins. |
| Length of propellant charge | 11.7 ins. |
| Length of cable (approx.) | 950 yds. |
| Diameter of main parachute | 11 ft. |
| Diameter of pilot parachute | 6 ins. |

HIGH EXPLOSIVE-ANTITANK ROCKET GRENADE

GERMAN



8.8 cm R. Pz. B. Gr. 4322



This fin stabilized rocket projectile is fired from the German counterpart of the U. S. "Bazooka" (see page 217) and has a maximum effective range of 165 yards. Eight and one-half-inch armor penetration has been obtained in static tests with a standoff of approximately 6½ inches.

The complete round consists of a point fuze high explosive, hollow charge loaded projectile assembled to a steel tube with a venturi and stabilizer assembly attached, containing an igniter, propellant and electric primer. The AZ 5095 fuze is of the point detonating type which in tests gave an approximate fuze functioning time of 0.0002 seconds (impact to detonation). The projectile assembly consists of the following stamped sheet steel parts: a body which contains the bursting charge, an adapter, a collar, a band, and a slightly heavier sheet steel nose. A detonator-booster of the German Kl. Zdlg. 34 NP type is embedded in the bursting charge to the rear of the flash tube. The bursting charge is cyclotol (41.2% TNT, 58.8% cyclonite) weighing 1 lb., 7.2 ozs. The propellant and tube assembly consists of the propellant tube and the seven propellant grains and igniter assembly, located in the forward end which it holds. The seven propellant powder grains are approximately 7.6 inches in length x .45 inch outside diameter, and have a central perforation .22 inch in diameter throughout their length. The composition is 64½% nitrocellulose and 34½% DEGN, with a small percentage of stabilizer.

A new type of ammunition, the R. Pz. B. Gr. 4999 is reported to give good performance up to a range of 220 yards, 25° C. (77° F.).

SPECIFICATIONS

| | |
|--|-------------------------|
| Weight (complete, rocket as fired)..... | 7.26 lbs. |
| Weight of high explosive filler | 1.47 lbs. |
| Weight of fuze assembly | .175 lb. |
| Weight of igniter assembly | .021 lb. |
| Weight of propellant charge | .382 lb. |
| Length (overall) | 25.56 ins. |
| Diameter (external) | 3.437 in. |
| Burnt velocity at 50° F. (approx.) | 340 f/s* |
| Burning distance (approx.) | 7 ft.* |
| Fuze functioning time (approx.)..... | .0002 seconds |
| Maximum pressure | 6,910 lbs. per sq. in.* |
| Maximum thrust | 1,716 lbs.* |
| Impulse | 87 lbs. second** |
| Maximum effective range | 165 yds. |

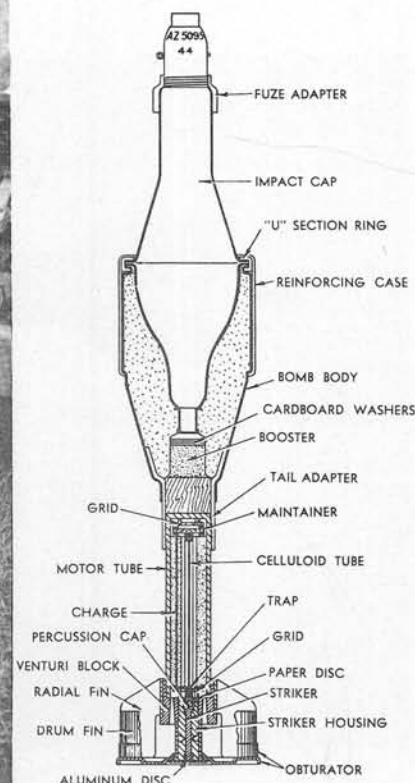
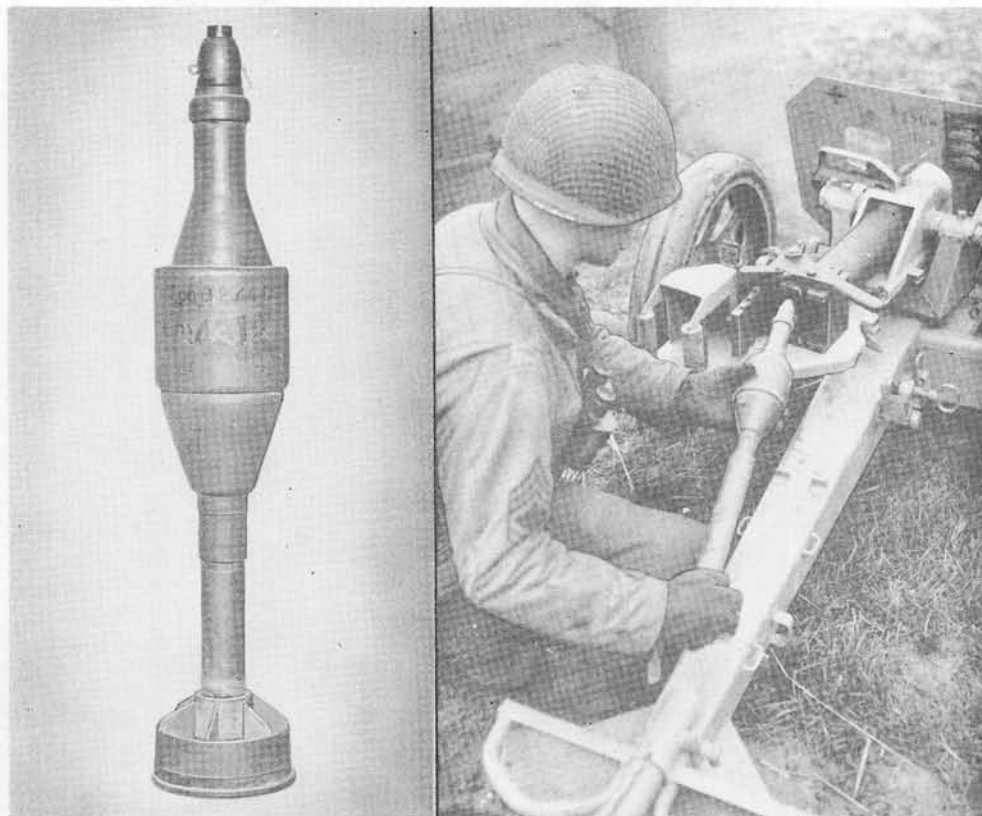
* These figures are from firing a single round.

** These values doubtful; only one rocket motor was statically tested with propellant temperature 41° F.

ANTITANK ROCKET GRENADE

GERMAN 

8.8 cm R. Pz. B. Gr. 4312



This projectile is fired from the German 8.8 cm Raketenwerfer 43 (Püppchen—see page 352.1). From this weapon, as limited by the sight, a maximum effective range of 700 meters (765 yards) is obtained. The explosive head is identical to that of the rocket fired from the German counterpart of the "Bazooka" (page 357).

The fuze (AZ 5095) functions as follows: the force of set back causes the set-back ring to move rearward, bending the two prongs of the stirrup spring. These prongs, by engaging in the inside groove of the set-back ring prevent the ring from returning forward. Meanwhile, the striker needle is held away from the primer detonator by a flat, coiled clock spring inside the set-back ring. The clock spring unwinds, expanding against the inside of the fuze body, thus providing a slight delay in the arming of the fuze.

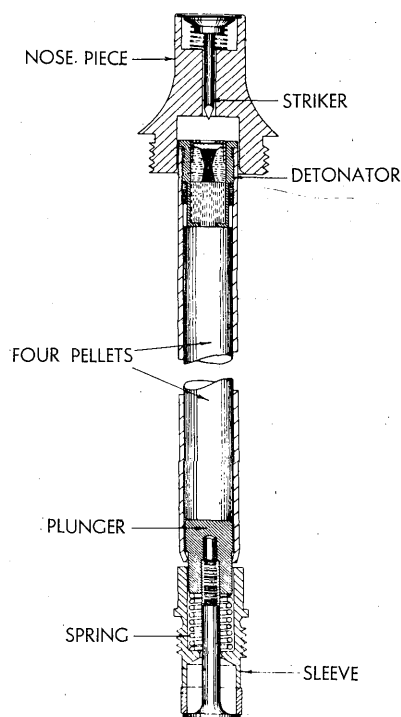
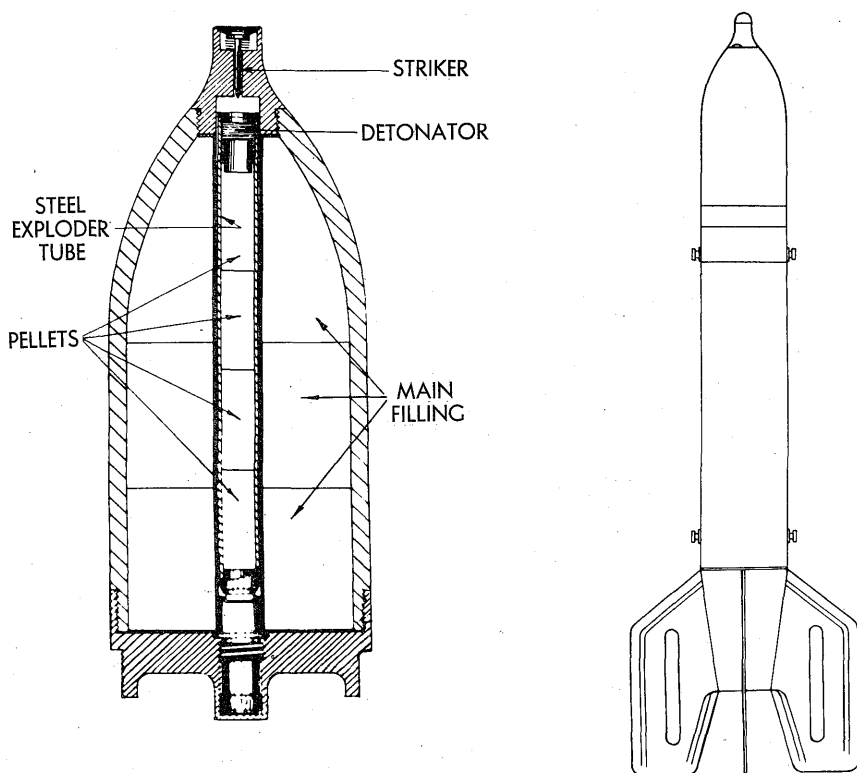
The propellant is a double base powder in the form of a single grain with 14 perforations. There is a hole .364 inch in diameter through the center of the grain. Three lands on the outside of the grain insure an outside burning surface. A triangular-shaped spacer holds the head igniter firmly against the quickmatch. The quickmatch fits in a slight indentation in the head igniter. The primer used in the "Püppchen" rocket is the standard No. 26 percussion primer found in many German artillery fuzes.

SPECIFICATIONS

| | |
|-------------------------------------|--------------------|
| Weight (complete, as fired)..... | 5 lbs., 13.06 ozs. |
| Weight of H.E. filler | 1 lb., 7¼ ozs. |
| Weight of fuze with detonator | 3.15 ozs. |
| Weight of motor and tail assembly.. | 1 lb., 8.5 ozs. |
| Weight of propellant | 1.63 ozs. |
| Overall length | 19.64 ins. |
| Length of propellant grain | 4.95 ins. |
| Diameter of propellant grain | .85 ins. |
| External diameter | 3.494 ins. |

H. E. UNROTATED ROCKET

8 cm Raketen Sprenggranate



H. E. WARHEAD

This rocket is actually 78 mm in diameter. Two features distinguish it from other German rockets: the use of tail fins to secure stability in flight without rotation, and the employment of a novel fuze arming device.

The complete round weighs 15.19 pounds and is nearly 28 inches long. Its two principal components are the nose fuze high explosive war head and the rocket motor tube. The shell is attached by means of an adaptor ring and the motor tube is closed by a cone-shaped assembly carrying the fins and containing the venturi and propellant supporting grid. Six tubular sticks of cordite form the propellant ignited by a circular gun powder igniter set off by a wire ignition bridge. The launcher used is the Mantelrohr.

The nose fuze consists of a steel nose piece housing a light alloy striker held by a light spring, a percussion detonator, a magazine containing four pressed pellets, and a thermal arming device. When the rocket is fired, the heat of the propellant gases melts a ring of fusable metal, permitting the detonator and magazine to approach the striker. The main filling of the high explosive head is pressed flake TNT.

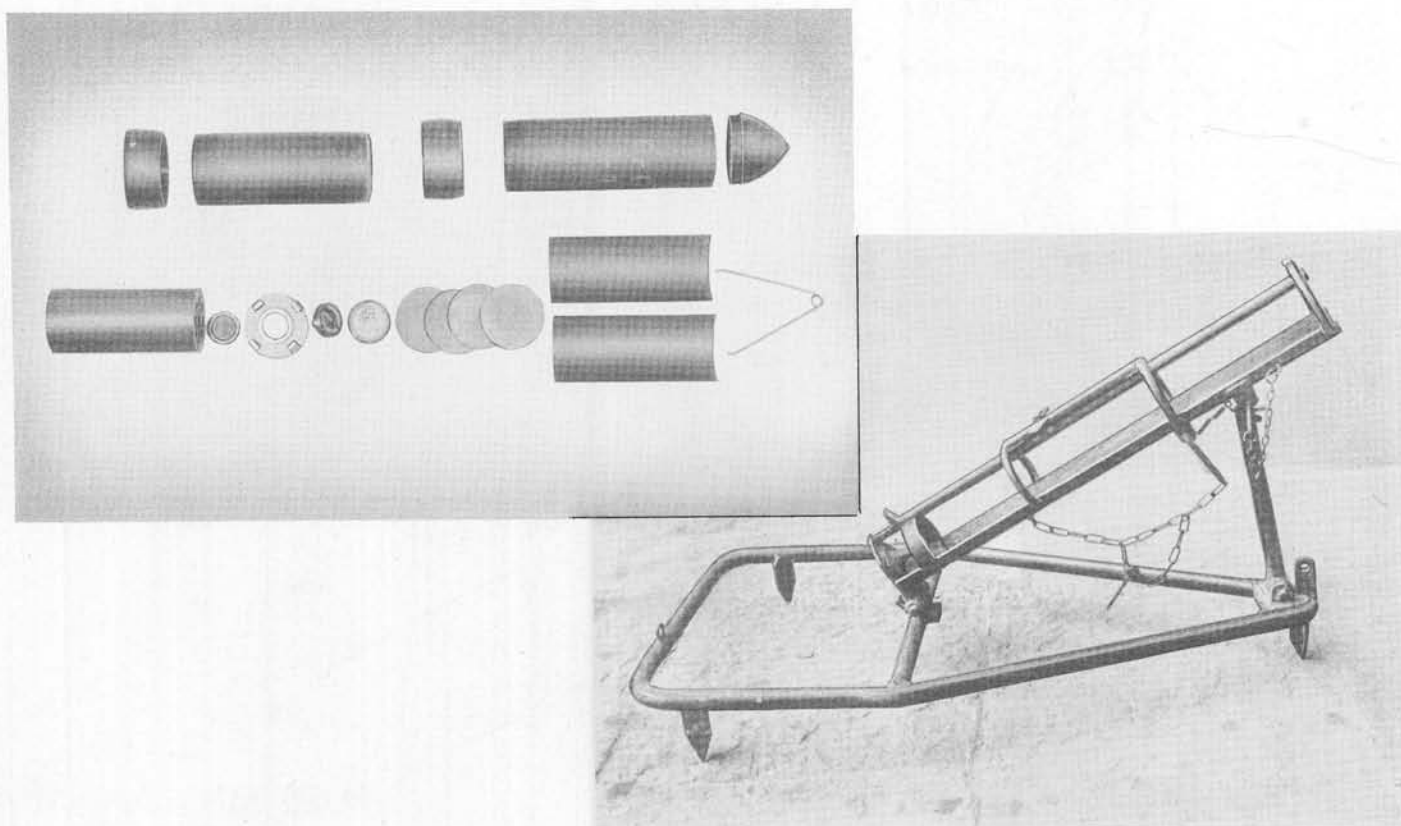
FUZE MECHANISM

SPECIFICATIONS

| | |
|--|----------------|
| Weight of complete round | 15 lbs., 3 oz. |
| Weight of motor unit with central adaptor.. | 10 lbs. |
| Weight of high explosive head with central adaptor | 6 lbs., 5 oz. |
| Weight of high explosive filling..... | 1 lb., 5½ oz. |
| Weight of fuze (approx.) | 4 oz. |
| Weight of propellant sticks | 2 lbs., 3 oz. |
| Length of rocket | 27.7 ins. |
| Ground range (estimated) | 6,300 yds. |

7.3 cm PROPAGANDA ROCKET PROJECTILE AND LAUNCHER

GERMAN 



This is a rocket projectile of conventional design, but having instead of the usual high explosive filling a number of propaganda leaflets in the forward compartment. The projectile consists basically of two steel tubes screwed into a central sleeve. The upper tube carries the propaganda leaflets and is closed at the forward end by a bakelite ballistic cap; a small bursting charge in the sleeve serves to expel the leaflets. The lower tube contains the propellant and is closed at the lower end by a screwed-in base plug.

The leaflets are wrapped around a steel spring and are in turn inclosed in a light metal cylinder split horizontally. The ejection charge for the leaflets is fired by an igniter and a delay train when the split cylinder containing the leaflets is ejected; the spring around which the leaflets are wrapped forces apart the two halves of the cylinder and scatters the leaflets.

The projector used for launching the rocket is of simple design and construction. The base frame is formed of 1¼-inch tubular steel with three spades welded on the underside. A crosspiece of the same tubular steel acts as a brace and also forms a base for the elevation pivot of the rocket guide. This guide consists of a length of 1¾-inch angle iron 29½ inches long.

The launcher is operated on the mortar principle, that is, the rocket is placed on the trough and is held about twenty inches above the striker (which corresponds to the firing pin of a mortar) by a release lever. A cord which the operator may pull from a safe distance leads from the release lever, thereby permitting the rocket to slide down against the striker.

SPECIFICATIONS

ROCKET

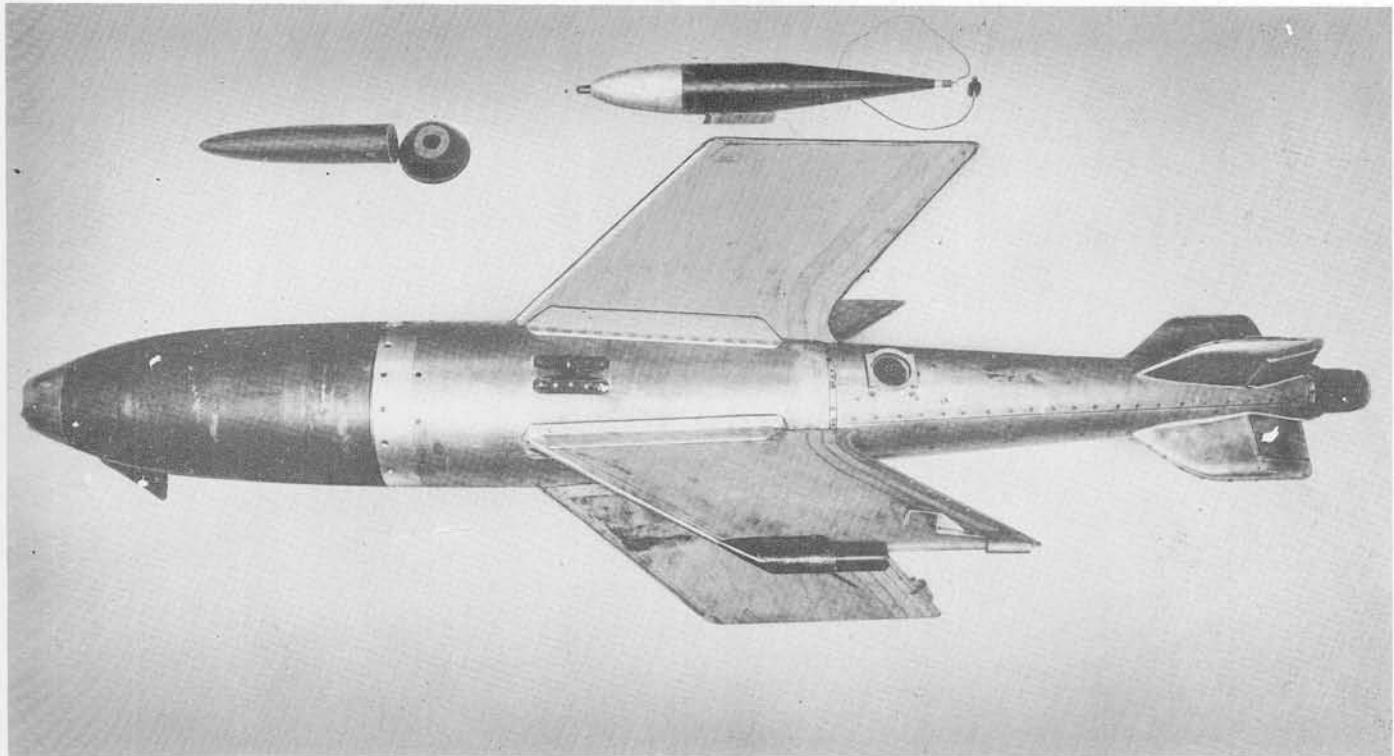
| | |
|---------------------------------------|----------------|
| Overall length of complete round..... | 16 3/32 ins. |
| Length of plastic cap | 2.21 ins. |
| Length of message body | 6.87 ins. |
| Length of propellant chamber | 4.70 ins. |
| Length of nozzle assembly | 1.30 ins. |
| Length of stick powder | 5.234 ins. |
| Diameter of stick powder | 2.308 ins. |
| Weight of complete round | 6 lbs., 10 oz. |
| Weight of propellant | 1 lb. |

LAUNCHER

| | |
|--|-----------|
| Overall length | 45.7 ins. |
| Overall width | 19.7 ins. |
| Length of guide | 29.5 ins. |
| Overall height with guide at 45° | 28 ins. |
| Weight | 27 lbs. |



X 4



The X 4 is an anti-aircraft rocket designed by the Germans to be launched from planes. It was manufactured and reported to have been successfully tested, but never reached the point of combat operation. It is a wire-controlled, rocket-propelled, fin-stabilized missile fitted with a proximity fuze warhead. The propulsion system is a bi-fuel rocket. Stabilization is achieved by means of four large fins fitted to the body of the rocket, and four smaller fins fitted to the tail. The smaller fins bear solenoid-operated control surfaces through which two-dimensional directional control is achieved. These are operated from the parent aircraft by means of a control unit and two insulated wires leading to the rocket. These wires are about 3¼ miles long.

Precise information about the warhead and fuzing system has not so far been recovered. The warhead consists of an uncased moulded grain of dinitroglycol-based explosive which depends on high blast effect. The fuze is a combination of acoustic proximity, impact, and self-destructing type. The proximity feature is functioned by aircraft propeller noises and a delay of 1/50-second is provided to enable the missile to approach the target after the acoustic impulse initiates the fuze. The body of the rocket houses the helical aluminum tube fuel tanks and combined two-compartment steel air bottle. The venturi protrudes from the tail portion. The rocket is made to rotate about its axis at the rate of one rotation per second. This permits stabilization in line of flight by a single gyro. The missile is carried on the parent aircraft on a conventional bomb carrier modified for this special purpose.

SPECIFICATIONS *

| | |
|-------------------------------------|--|
| Length (overall) | 200 cm (6 ft., 6¾ ins.) |
| Length of warhead | 45 cm (1 ft., 5¾ ins.) |
| Diameter of warhead (at base) | 22 cm (8.675 ins.) |
| Total weight before launching | 60 kg. (132.3 lbs.) |
| Weight of warhead | 20 kg. (44.1 lbs.) |
| Fuel..... | 4.5 liters (approx.) 98-100% nitric acid |
| | 2 liters (approx.) 57% crude m-xylidine 43% triethylamine |
| Thrust..... | Initial 270 lbs. to 315 lbs. falling off progressively to 45 to 68 lbs. after 30 seconds. |

*Not verified.

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The Model 97 Special Medium Tank was first placed in operation in the early spring of 1942. It is a modification of the Model 2597 Medium Tank (see page 9) with a modified turret to accommodate the 47 mm Model 1 (1941) tank gun instead of the normal short-barreled 57 mm gun.

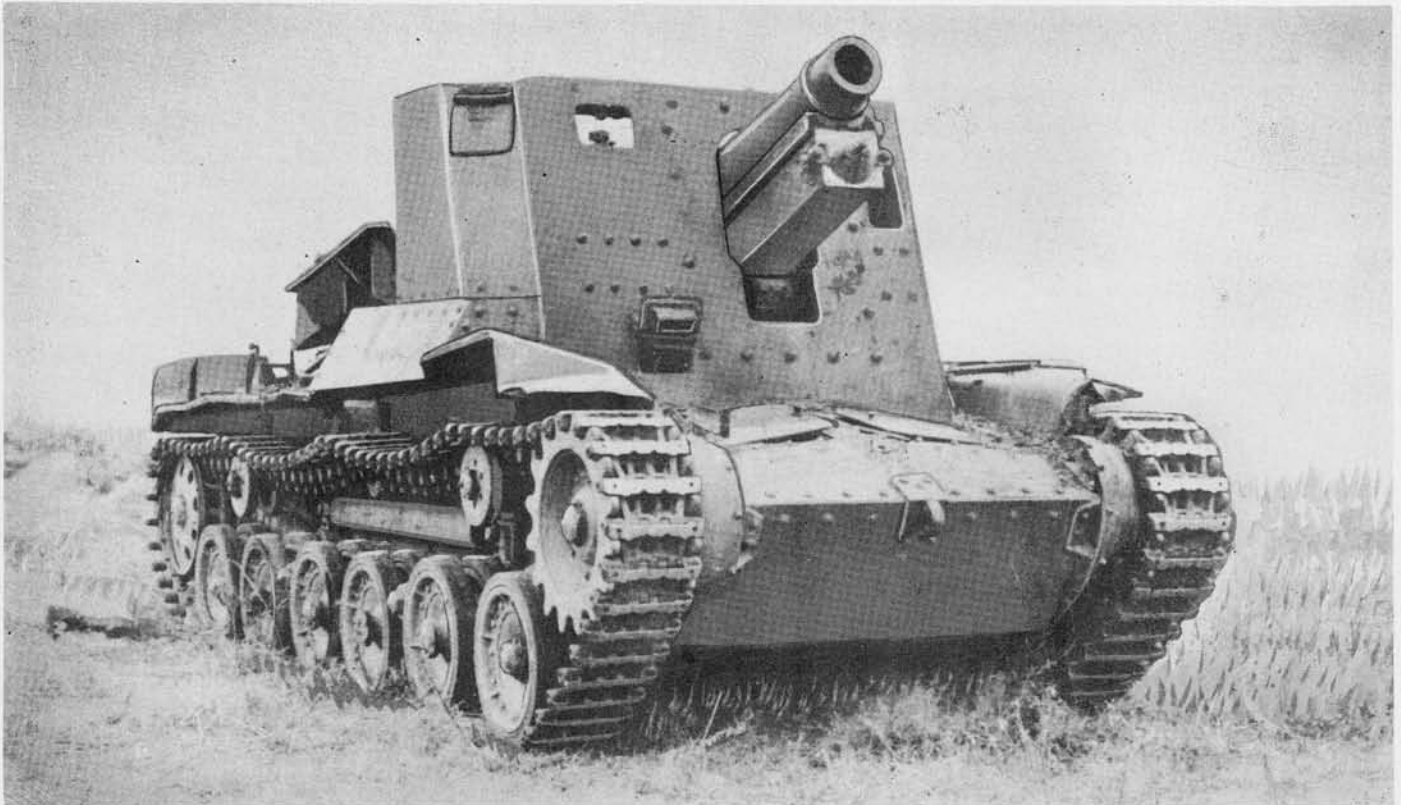
The 47 mm tank gun conforms to the 47 mm Model 1 (1941) antitank gun (page 106) in the dimensions of chamber, caliber, and rifling and its performance is similar. The tank gun, however, has a vertical sliding breechblock, while the antitank gun has the horizontal type. The tank gun has a total traverse of 22° with an elevation from -11° to +17°. It is shoulder-controlled, with geared elevation and depression. However, free movement can be obtained, if desired. Penetration tests on the antitank gun indicate a penetration of 2½ inches of homogeneous plate at normal at a range of 1,050 yards.

The Special Tank is readily recognized by its elongated turret, slightly offset to the right. This turret measures six feet from front to rear and three feet across the rear bulge. There is a door 19" x 16" in the turret back plate, an exit hatch 23" x 16" in the turret top plate, and an observation hatch 25" in diameter in the cupola with a vision port 4" in diameter in the cupola top plate. The gun mantlet of 30 mm thickness, sloped at 10° to the vertical, is bolted to the turret front. A 7.7 mm Model 97 L.M.G. is mounted at the turret rear. Another is mounted in the superstructure front plate at the left of the driver.

The armor plate thickness of the Special Tank is essentially the same as that of its predecessor except that the hull side plates of the former have been increased in thickness to 35 mm.

SPECIFICATIONS

| | |
|--|-------------------------------|
| Weight (approx.) | 15 tons |
| Length | 18 ft., 1 in. |
| Width | 7 ft., 8 ins. |
| Height | 7 ft., 11 ins. |
| Ground clearance | 14 ins. |
| Tread centers | 6 ft., 7 ins. |
| Ground contact | 11 ft., 7 ins. |
| Width of track | 13 ins. |
| Pitch of track | 4¾ ins. |
| Track links | 96 |
| Fording depth | 3 ft., 3 ins. |
| Theoretical radius of action | |
| Roads | 100 miles |
| Cross country | |
| Armor | |
| Turret front | 25 mm at 10° to vertical |
| Gun mantlet | 30 mm cast at 10° to vertical |
| Front vertical plate | 25 mm at 10° to vertical |
| Glacis plate | 17 mm at 80° to vertical |
| Nose plate | 15 mm at 62° to vertical |
| Side superstructure | 20 mm at 40° to vertical |
| Side hull plates | 35 mm |
| Top rear plate | 12 mm |
| Armament | |
| One 47 mm model 1 (194) tank gun; two type 97 light machine guns. | |
| Ammunition (Rds.) | |
| 104 rounds of 47 mm ammunition; 2,575 rounds of small arms ammunition. | |
| Engine | |
| Air-cooled, V-12 diesel. | |
| Transmission | |
| Main gear box—4 speeds forward, 1 reverse—high and low ratios. | |
| Steering | Clutch brake |
| Crew | 5 |



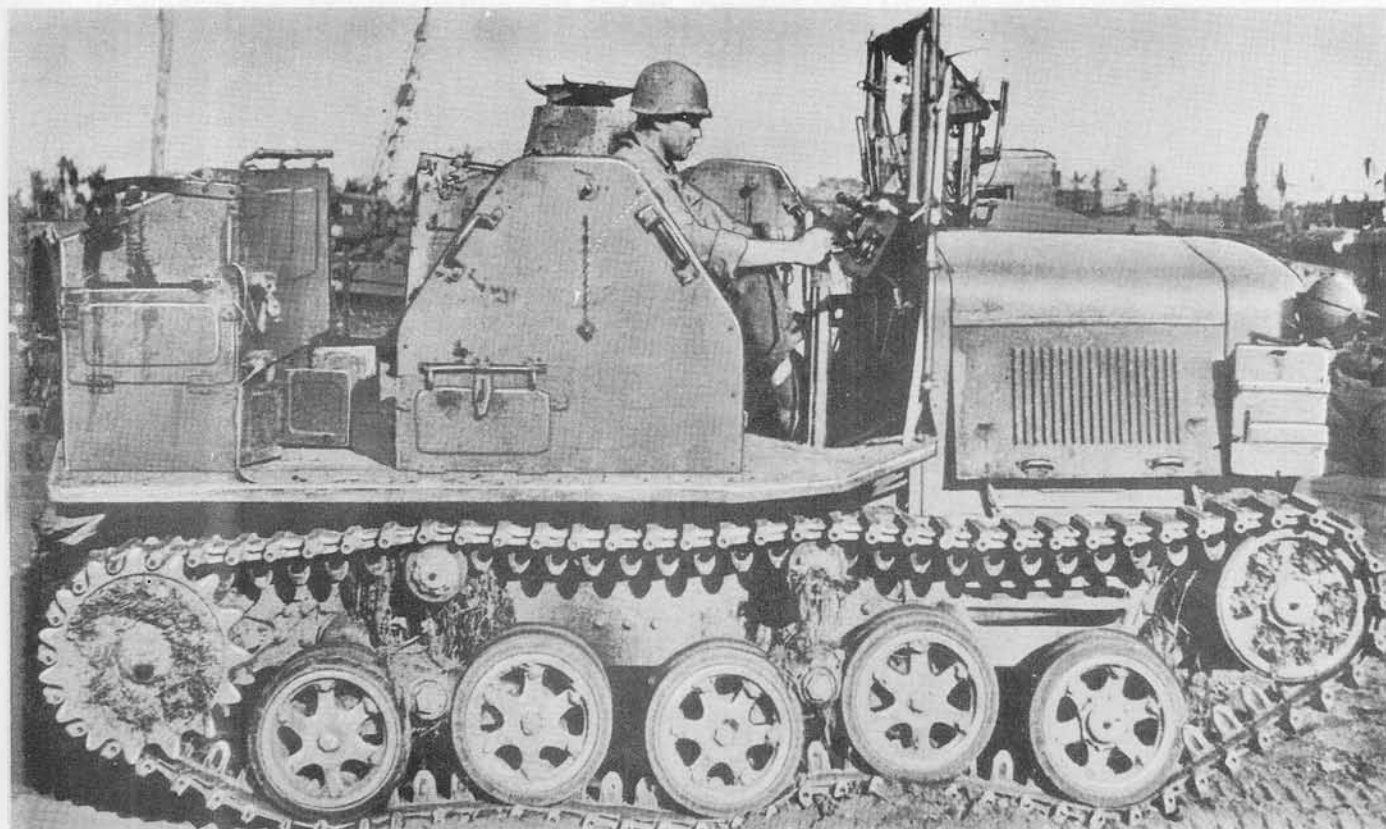
This weapon is the 38 year type (1905) 15 cm howitzer mounted on a medium tank chassis. The chassis resembles that of the Medium Tank Model 2597 (1937), Special, described on page 8.1. The armor is riveted in the characteristic Japanese fashion, and on the chassis is of the same thickness as on the corresponding tank chassis, with a maximum of approximately one inch. On the superstructure, the gun shield has one-inch frontal armor and one-half-inch side armor.

The vehicle uses the standard V12, air-cooled, diesel engine, and the type 97 medium tank suspension, consisting of six dual rubber-tired bogie wheels on each side. The weapon mounted on this vehicle is the type 38 (1905) 15 cm howitzer, a very short weapon. It has an interrupted screw breechblock opening to the right, and uses a percussive primer. The rifling is 58 inches long and has increasing right hand twist. The maximum range of the Field Howitzer is reported as 6,500 yards. The maximum elevation is 30 degrees.

A self-propelled vehicle mounting a gun of 75 mm or 105 mm caliber, employing the same chassis and with a superstructure somewhat resembling the present vehicle has been reported.

SPECIFICATIONS

| | |
|---|---------------------------------|
| Weight | 15 tons |
| Length | 18 ft. |
| Width | 7 ft., 6 ins. |
| Height (overall) | 93 ins. |
| Height of chassis | 47 ins. |
| Height of shield | 61 ins. |
| Ground clearance | 14 ins. |
| Tread centers | 6 ft., 7 ins. |
| Ground contact (approx.) | 160 ins. |
| Width of track | 13 ins. |
| Pitch of track | 5½ ins. |
| Track links | 96 |
| Fording depth | 39 ins. |
| Theoretical radius of action: | |
| Roads | 100 miles |
| Cross country | |
| Speed: | |
| Roads | 25 m.p.h. |
| Cross country | |
| Armor: gun shield | |
| Front plate | 1 in. |
| Sides | ½ in. |
| Armament | 15 cm Howitzer, Model 38 (1905) |
| Ammunition (Rds.) | |
| Engine | V12, air-cooled, diesel |
| Transmission—4 speeds forward; 1 reverse (high and low range) | |
| Steering | clutch brake |
| Crew | probably 5 |

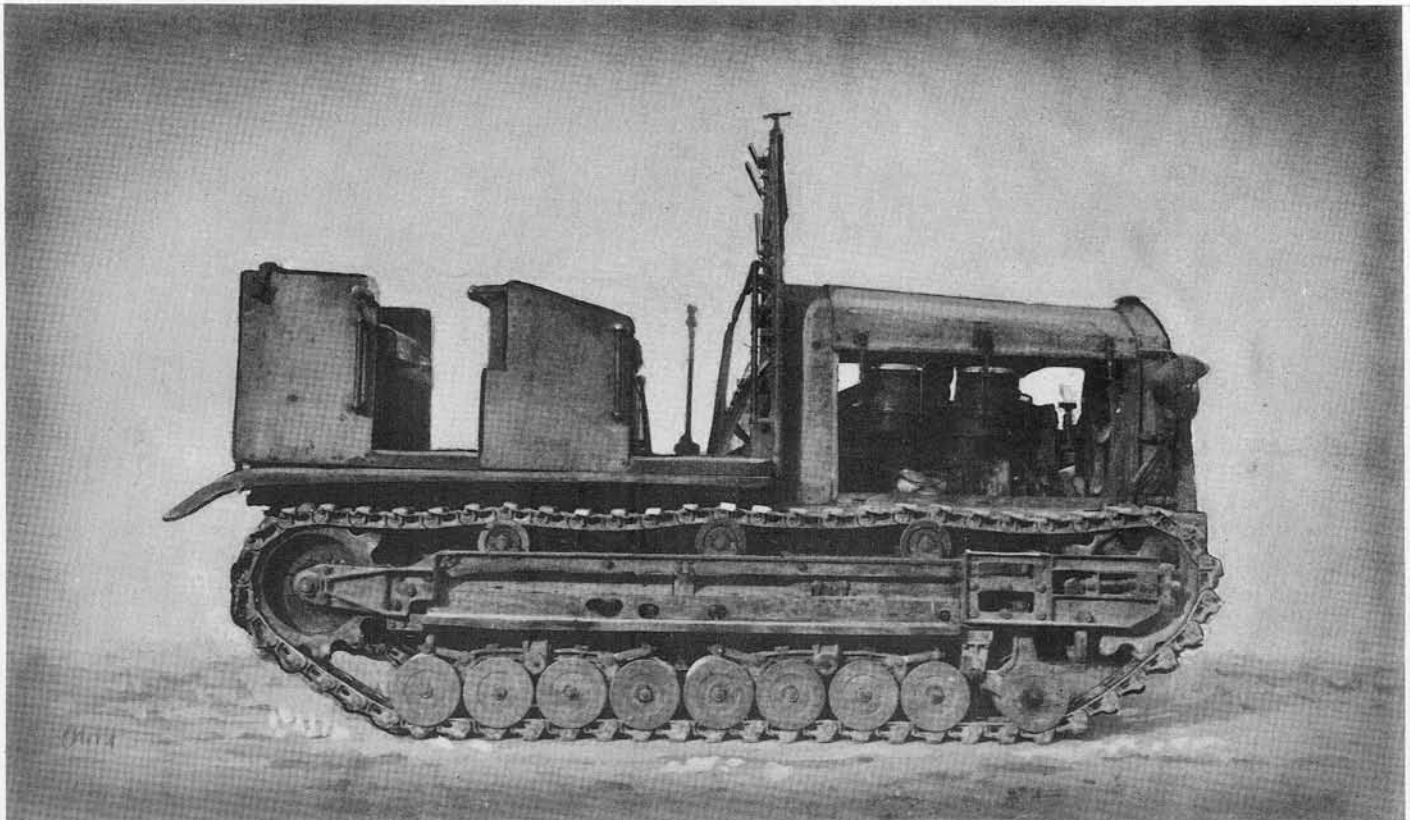


The 4-ton Prime Mover is powered by a 90°, V-8 air-cooled gasoline engine with a cylinder bore of 90 mm and a piston stroke of 125 mm. The normal horsepower is 73 at 1,600 r.p.m.; maximum horsepower is 88. The firing order is 1-8-7-3-6-5-4-2. The electrical system includes a Bosch type magneto (Gesal model); a Bosch R.T.C. 900 LI model, 75-watt generator; a 12-v., 80 amp.-hr. storage battery, and a Bosch 2.5 hp. electric starting motor. The ratio of the final drive is 5.657:1. Clutch brake steering is used and both hand and foot operation applies the brakes. The transmission is the central selector type with 4 speeds forward and 1 reverse.

The vehicle is capable of towing its complement of artillery at 25 m.p.h. There is a main and auxiliary type of lubricating oil pump. Oil pressure is 4.4 to 6.6 lb. of gage pressure when warmed up. A Stromberg UR Z model carburetor is used. The main fuel storage tank has a capacity of 26.6 gals. In addition, there is an auxiliary tank having a capacity of 15.8 gals. A Sirocco type fan provides circulation for the air-cooled engine. A dry two-plate clutch is used. The grade-ascending ability is said to be 30° under the towing load. This vehicle can pivot turn. The winch capacity is 2.2 tons. The theoretical radius of action is 125 miles in 10 hours.

SPECIFICATIONS

| | |
|--|--|
| Weight | 4 tons |
| Trailer load capacity | |
| Winch capacity | over 2 tons |
| Length | 12 ft., 5 ins. |
| Width | 6 ft., 1 in. |
| Height | 7 ft., 3 ins. |
| Ground clearance | 11.5 ins. |
| Tread centers | 5 ft., 4 ins. |
| Ground contact | 7 ft., 8 ins. |
| Track width | 10 ins. |
| Track links | 5½ ins. |
| Fuel tank.....Main, 26.6 gals.; aux., 15.8 gals. | |
| Fuel consumption | |
| Fording depth | 20 ins. |
| Speed | 25 m.p.h. |
| Engine | V-8 cyl., air-cooled, gasoline |
| Bore and stroke..... | 90 mm x 125 mm— 3.54 ins. x 4.92 ins. |
| Horsepower | 88 (max.) |
| Ignition | Magneto |
| Battery | 12 v., 80 amp.-hr. |
| Transmission..... | Selector type 4 speeds forward, 1 reverse |
| Steering | Clutch brake |
| Crew | 6 |



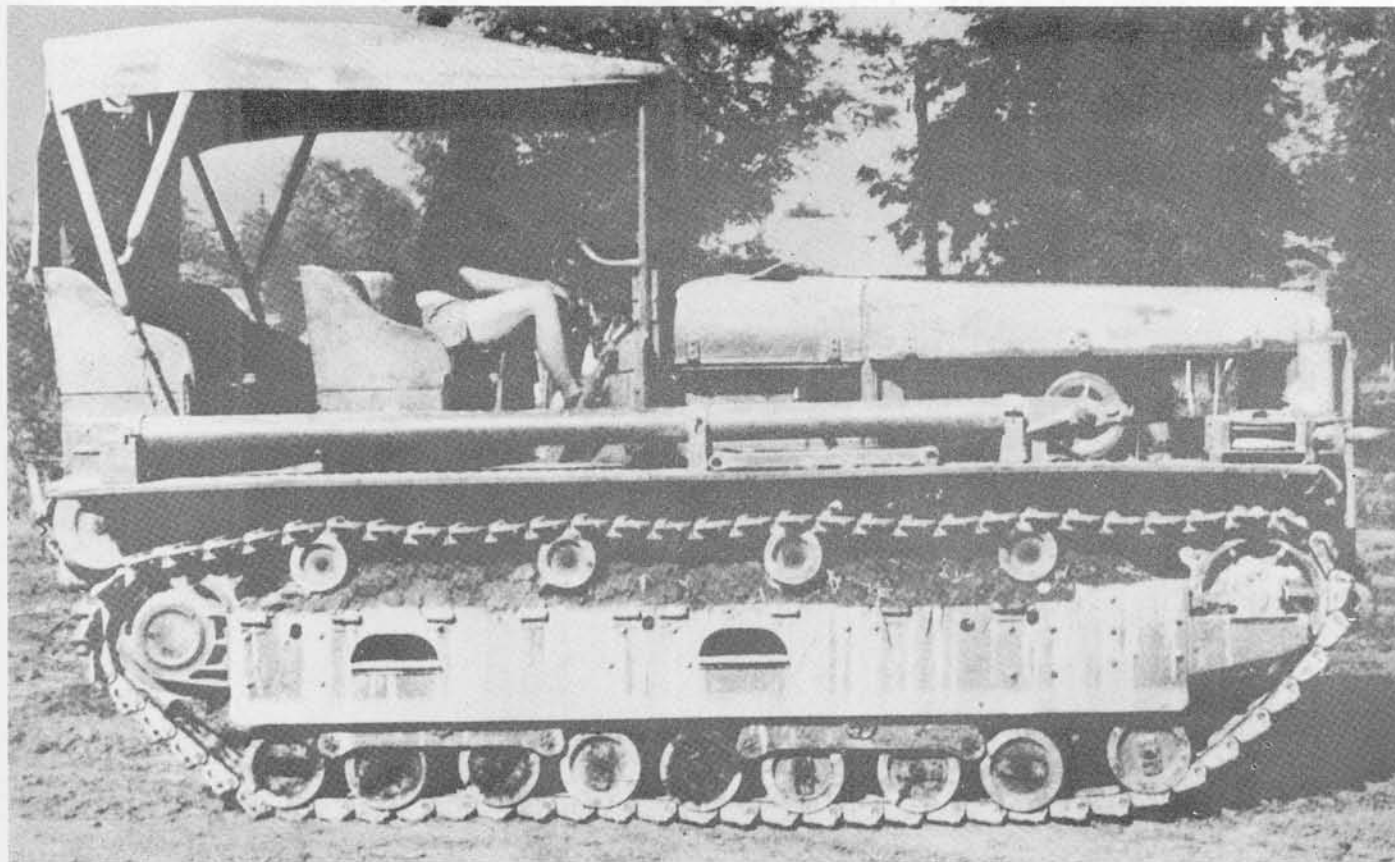
It is reported that there are two variations of this vehicle. Model A is powered by a 6-cylinder in-line L-head Sumida gasoline engine, and Model B by a 6-cylinder in-line air-cooled Isuzu Diesel. As far as may be ascertained, with exception of a modification in radiator design, the general appearance and suspension of these two models is similar.

The Model A engine is an L-head type with the valves on the side. The cylinder bore is 110-mm, the stroke 135 mm, and the compression ratio is 4.5:1. The normal hp. is 64 at 1,200 r.p.m.; the maximum hp. is 98. Ignition is provided by a Bosch high-tension magneto with 12-v. charging generator and two 12-v. 60 amp.-hr. vibration-proof batteries. The electric starting motor is 12-v. with a rating of 2.5 hp. Bevel spur pinion and ring gears have reduction ratios of 2.66 and 5.

The steering system is the clutch brake type with both hand- and foot-operated brakes. The transmission provides four speeds forward and one reverse. The maximum speed is 19 k.p.h. (11.8 m.p.h.). The lubricating oil is distributed by gear pump force-feed system. Oil pressure registers 1.0 kg. (2.2 lb.) at low speed and 2 kg. (4.4 lb.) at 1,100 r.p.m. The oil capacity measures 14.65 liters (3.7 gal.). A vacuum fuel system is used with Stromberg UT 4 model carburetor. The main fuel storage tank holds 125 liters (32 gal.), the auxiliary tank 55 liters (14.5 gal.). Fuel consumption is 17 liters (4.5 gal.) per hour, or 1.05 liters per km. (2.4 mi./gal.). The cooling liquid is circulated by a centrifugal pump from a radiator, which carries 39.5 liters (10.4 gal.). The grade ability of this vehicle pulling a fixed weight is 30°. The winch capacity is 2.5 metric tons (2.8 tons). The winch cable length is 20 meters (65½ ft.).

SPECIFICATIONS

| | |
|---------------------------|--|
| Weight | 4.8 Metric tons—5.28 tons |
| Trailer load capacity.... | 4.5 Metric tons—4.9 tons |
| Winch capacity | 2.5 Metric tons—2.75 tons |
| Length | 3.55 m—11 ft., 8 ins. |
| Width | 1.71 m—5 ft., 11 ins. |
| Height | 2.35 m—7 ft., 8 ins. |
| Ground clearance | .295 m—11.75 ins. |
| Tread centers | 5 ft., 11½ ins. |
| Ground contact | 7 ft., 4½ ins. |
| Track width | 9¾ ins. |
| Track links | 59 |
| Fuel tank | Main, 32 gals.; aux., 14.5 gals. |
| Fuel consumption | 2.4 m.p.g. |
| Fording depth | 24 ins. |
| Speed | |
| Hard roads | 18 m.p.h. |
| Cross-country | 8 m.p.h. |
| Engine | Sumida, 6-cyl., gasoline |
| Bore and stroke..... | 110 mm x 135 mm— 433 ins. x 5.31 ins. |
| Horsepower | 64 at 1,200 r.p.m. (normal) |
| Ignition..... | Bosch high-tension magneto |
| Battery | 2 12-v., 60 amp.-hr. |
| Transmission | 4 speeds forward, 1 reverse |
| Steering | Clutch brake |
| Crew | 6 |



This vehicle is powered by a 6-cylinder, in-line, water-cooled gasoline engine with a cylinder bore of 135 mm and piston stroke of 150 mm and a compression ratio of 5.1:1. Normal horsepower is 130 at 1,300 r.p.m.; maximum horsepower, 160 at 1,900 r.p.m. The firing order is 1-5-3-6-2-4. Ignition for the vehicle is distributed by a high-tension type magneto. The electrical system includes charging generator; two 12-v., 80 amp.-hr. batteries, and a 24-v. electric starting motor of 8-hp. capacity.

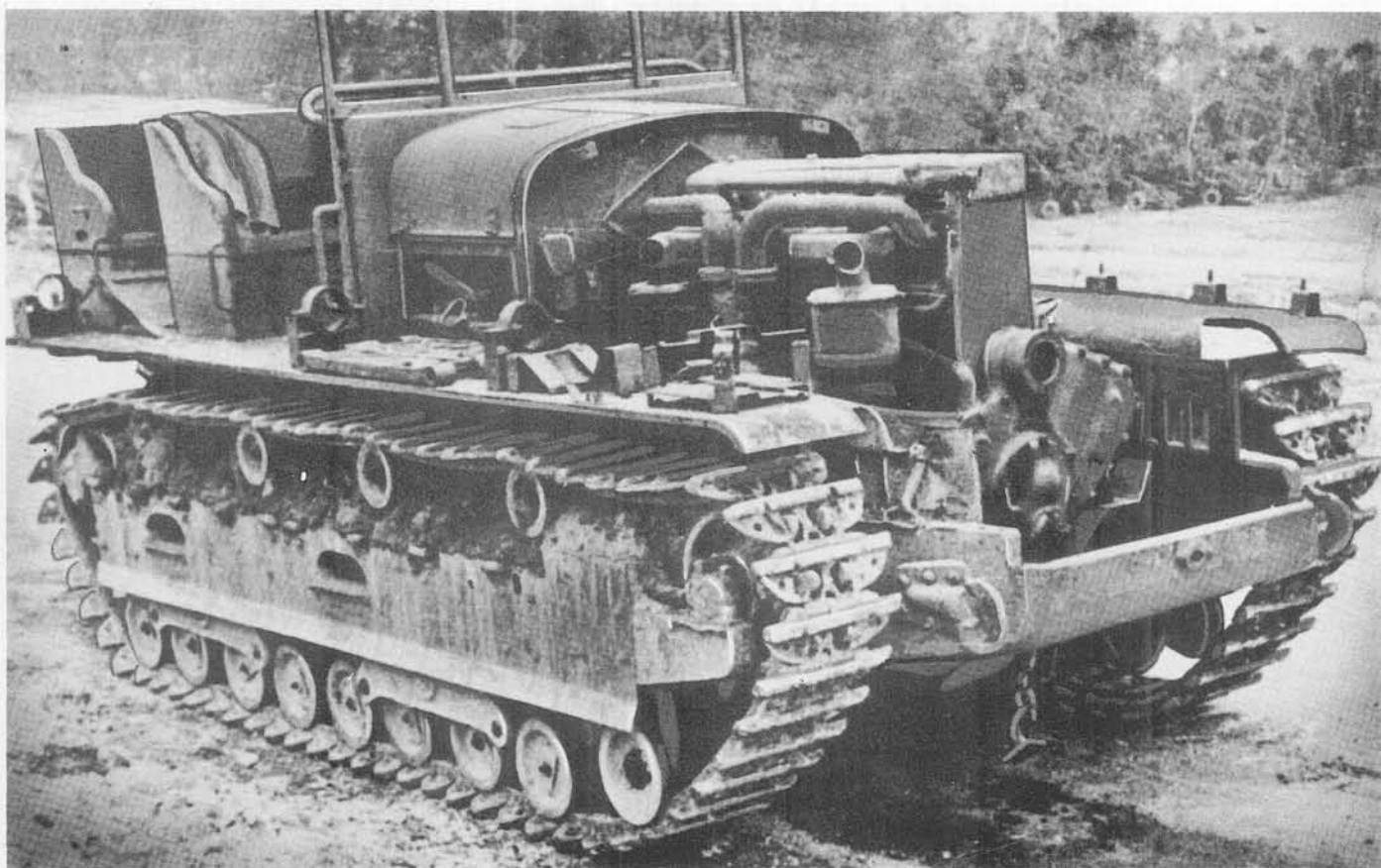
The final drive has a reduction ratio of 2.93:1. A dry multiple plate clutch is used. Both foot- and hand-operated brakes are employed and the vehicle is steered by the clutch brake principle and is said to utilize a locking feature of the control brakes. The transmission is of the synchromesh type with 4 speeds forward and 1 reverse.

Lubricating oil is distributed by gear-type force-feed system through an oil-pressure regulator. The oil-pressure gage registers 29-44 lb. and an oil-level stick is used for checking the crankcase, which has a capacity of 5¾ gals. It has been stated that the fuel feed equipment includes a fuel pump between the carburetor and storage tank and that the heavy-duty type of fuel is forced fed to a NIPPON B 45 model carburetor.

There are two models of fuel storage tanks manufactured for this vehicle—one is the Mitsubishi type with main tank holding 70 gals. and an auxiliary holding 43 gals., and the other is the NIIGATA type main tank holding 50 gals. and an auxiliary tank holding 38 gals. Fuel consumption is stated to be 7.5 gals. per hour. The radiator holds 11 gals., circulated by a pump to the engine block. The grade-ascending ability of this prime mover is quoted as 14 tons up a 15° incline, or 32 tons on a 7½° incline. The winch capacity is 11 tons.

SPECIFICATIONS

| | |
|-----------------------------|---|
| Weight | 14.3 tons |
| Trailer load capacity | 32 tons |
| Winch capacity | 11.25 tons |
| Length | 16 ft. |
| Width | 7 ft., 6 ins. |
| Height | 9 ft., 3 ins. |
| Ground clearance | 1 ft. |
| Tread centers | 5 ft., 11 ins. |
| Ground contact | 9 ft., 9 ins. |
| Track width | 16½ ins. |
| Track links | |
| Fuel tank | Main, 70 gals.; aux., 43 gals. |
| Fuel consumption | .83 m.p.g. |
| Fording depth | |
| Speed | 6.2 m.p.h. |
| Engine | 6-cyl., water-cooled, gasoline |
| Bore and stroke..... | 135 mm x 150 mm— 5.31 ins. x 5.91 ins. |
| Horsepower | 130 at 1,300 r.p.m. |
| Ignition | High-tension magneto |
| Battery | 2 12-v., 80 amp. |
| Transmission..... | Synchromesh |
| | 4 speeds forward, 1 reverse |
| Steering | Clutch brake |
| Crew | |



This prime mover makes use of the same chassis as the Model 95A, the only difference being its accommodation of a 6-cylinder, in-line, water-cooled, valve-in-head Diesel engine. The cylinder diameter is 140 mm, the piston stroke 190 mm, and compression ratio 15.5:1. The normal horsepower is rated at 145 at 1,300 r.p.m. Maximum hp. is 165. The firing order is 1-5-3-6-2-4. There is a 24-v., 300-w. capacity charging generator, two 12-v., 80 amp.-hr. batteries, and two 24-v., 6-hp. electric starting motors.

Details are lacking on the reduction gear, which has a ratio of 2.92:1. The steering system is of the clutch brake type assisted on short turns by hand- and foot-operated control brakes, which include a locking feature. The transmission is said to be synchromesh with 4 speeds forward and 1 reverse. The maximum speed is 8.68 m.p.h. A gear-type forced-feed system is used for distributing lubricating oil in the crankcase. An oil pressure gage and oil-level stick are also fitted. Diesel oil fuel is supplied from a total storage capacity of 68 gals. Forty-four liters (11.6 gals.) of water are circulated from the radiator to the engine block with the normal type pump. This vehicle is said to be capable of ascending a 15° grade while towing a 14-ton load, or a 7½° grade pulling a 32-ton load. The winch capacity is 11 tons.

SPECIFICATIONS

| | |
|-----------------------------|---|
| Weight | 15 tons |
| Trailer load capacity | 32 tons |
| Winch capacity | 11.25 tons |
| Length | 16 ft. |
| Width | 7 ft., 6 ins. |
| Height | 9 ft., 3 ins. |
| Ground clearance | 1 ft. |
| Tread centers | 5 ft., 11 ins. |
| Ground contact | 10 ft., 4 ins. |
| Track width | 16½ ins. |
| Track links | |
| Fuel tank | 68 gals. |
| Fuel consumption | |
| Fording depth | |
| Speed | 8.6 m.p.h. |
| Engine | 6-cyl., water-cooled, Diesel |
| Bore and stroke..... | 140 mm x 190 mm— 5.51 ins. x 7.48 ins. |
| Horsepower | 145 at 1,300 r.p.m. |
| Ignition | Diesel |
| Battery | 2 12-v., 80 amp./hr. |
| Transmission..... | Synchromesh— 4 speeds forward, 1 reverse |
| Steering | Clutch brake |
| Crew | |



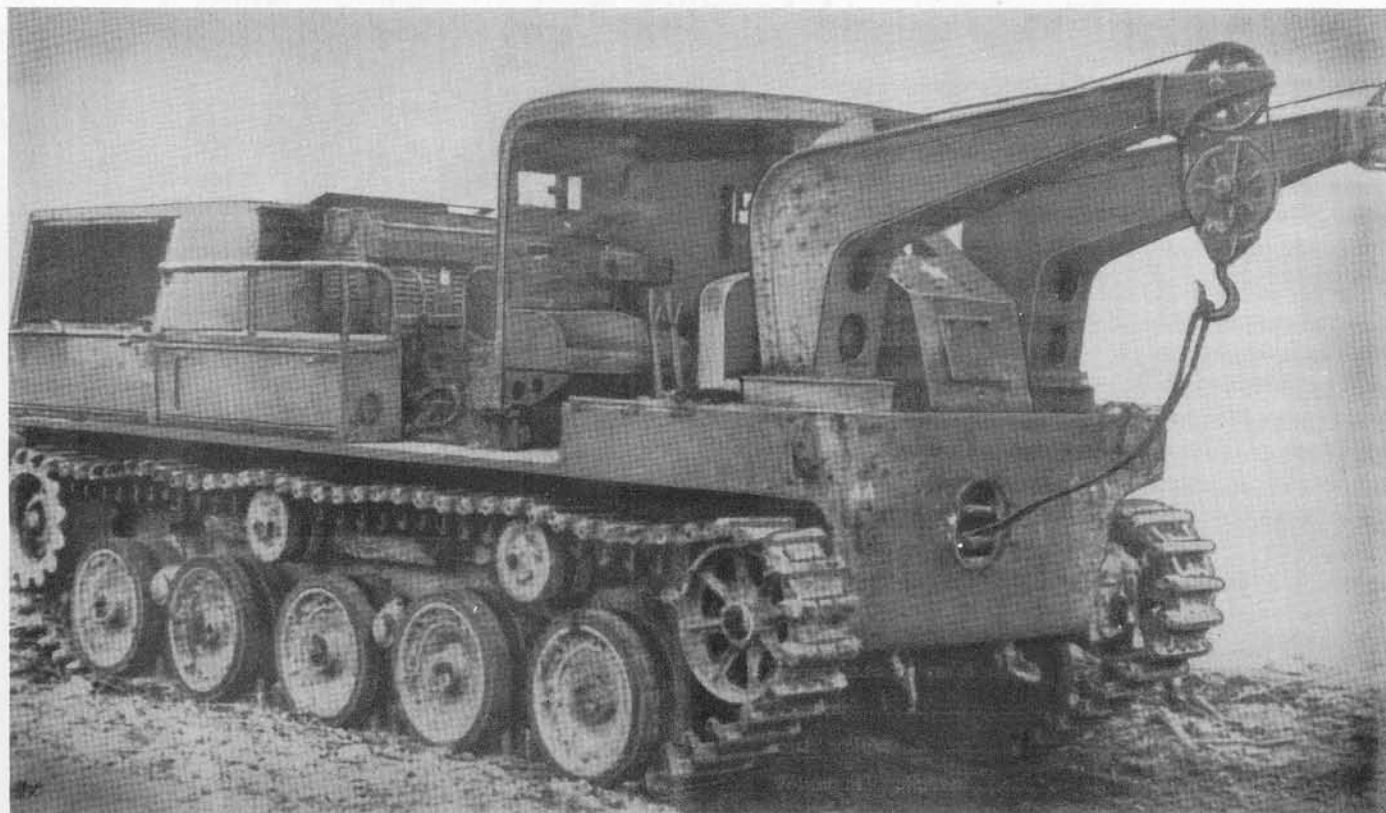
The chassis of this Japanese armored prime mover incorporates the better design features of the tankette development shown on pages one to three. This vehicle is an important link in the chain of Japanese transportation of personnel and supply in the large mainland areas. Its construction proves that the Japanese attach considerable importance to the interchange and utilization of standard tank component parts on combat vehicles for greater simplification of their supply problem.

The hull provides for a layout of the engine and power train on the right, while the driver's compartment is located on the left side. A large load and stowage compartment at the rear extends over the tracks. Tubular bows are raised for protective covering and camouflage nets. Double doors open at the rear, below which a towing pintle is attached. There is no main armament; however, there is an observation turret built in the roof of the crew compartment behind the driver. Speaking tubes with ear phones are used for crew communication. Four hinged flap-covered openings provide additional vision for the crew and allow employment of small arms weapons.

The power train in this vehicle is made up of the engine, four-speed and reverse transmission, controlled differential with steering brakes and a final drive single reduction gear. The engine is a four-cylinder in-line diesel with Bosch type automatic fuel injection. A 12-volt ignition system is also provided with spark plugs located in the fuel injection ports. The electrical system utilizes parts standard and interchangeable with other vehicles. Two fuel tanks hold 38 gallons.

SPECIFICATIONS

| | |
|------------------------------|----------------------------------|
| Weight | 5 tons |
| Length | 12 ft., 8 ins. |
| Width | 6 ft., 4 ins. |
| Height | 5 ft., 2 ins. |
| Ground clearance | 14 ins. |
| Tread centers | |
| Ground contact | 124 ins. |
| Width of track | 8 ins. |
| Pitch of track | 3 ins. |
| Track links | 88 |
| Fording depth | 31 ins. |
| Theoretical radius of action | |
| Roads | |
| Cross-country | |
| Speed | |
| Roads | 28 m.p.h. |
| Cross-country | |
| Armor | |
| Front plate | 6 mm |
| Sides | 12 mm |
| Floor | 12 mm |
| Armament | Small arms weapons |
| Ammunition (Rds.) | Unknown |
| Engine | 4-cylinder air-cooled OHV Diesel |
| Transmission | 4 speeds forward; 1 reverse |
| Steering | Controlled differential |
| Crew | 2 |



This vehicle, in addition to its function as a prime mover and wrecker, may have been used as a tank recovery vehicle. It has a total seating capacity of thirteen men. Two front booms are provided, and a removable boom at the rear. The latter can be attached in such a manner as to act as a brace for the vehicle. The front booms, which are traversed by gears, are moved and operated independently by two different operators. There is a large towing winch behind the driver's seat, and two smaller winches near the front end.

The prime mover/wrecker has been derived in part from components of the Japanese Medium Tank. There are five bogies on each side, four of which are mounted in pairs. Each pair connects to a coil spring, and the front bogie wheel is independently sprung by a separate coil spring. The drive sprocket is smaller than that employed in the Medium Tank.

The vehicle is powered by a 6-cylinder, valve-in-head, air-cooled Diesel engine located in the rear. The engine head is made of aluminum. There are two fuel tanks which have a capacity of thirty gallons each. The clutch, a single plate type, is housed in an aluminum clutch housing. The transmission provides four speeds forward and one in reverse. The power takeoff of the winches is from the transmission. The final drive system is quite unusual in that there are two separate drive shafts, and each track is driven by an independent final drive mechanism. Removable track grousers are supplied for use in difficult terrain.

SPECIFICATIONS

| | |
|-----------------------------|---|
| Weight | |
| Trailer load capacity | |
| Winch capacity | |
| Length (overall) | 20 ft., 8 ins. |
| Length (less arms) | 17 ft. |
| Width | 7 ft., 5½ ins. |
| Height | 7 ft., 11 ins. |
| Ground clearance | 16 ins. |
| Tread centers | 6 ft., 4 ins. |
| Ground contact | 9 ft., 11 ins. |
| Track width | 12 ins. |
| Track links | |
| Fuel tanks | 2—30 gals. each |
| Fuel consumption | |
| Fording depth | |
| Speed | |
| Engine..... | 6 cyl. valve in head, air-cooled Diesel |
| Bore and stroke | 5.5 ins. x 6.5 ins. |
| Horsepower | |
| Ignition | |
| Battery | 2—12 v. |
| Transmission..... | 4 speeds forward, 1 reverse |
| Steering | |
| Crew | 13 |



This vehicle serves as an artillery prime mover and as a personnel carrier for 24 men. It appears to be of recent manufacture, and its first known appearance in combat was during the Leyte campaign in the Philippines.

It is a full-tracked vehicle armored with $\frac{1}{4}$ -inch plate throughout. The engine which is located at the right front of the body is a 6-cylinder, in-line, valve-in-head, air-cooled diesel of a type similar to those used in the Model 2595 light tank and the combination prime mover and wrecker. Two fuel tanks provide an estimated total capacity of 50 to 60 gallons.

The tracks and suspension are of the conventional Japanese design, using dual bogie wheels and a steel center guide track. The four bogie wheels, apparently identical with those on the Model 2595 light tank, are mounted on bell cranks and are sprung by horizontal coil springs which are inclosed within the body armor with only the bogie arms exposed. There are two return rollers. The track is driven from the rear. A clutch and brake steering system is used. The transmission provides four speeds forward and one reverse. A high and low transfer case is also provided.

A mount for a 7.7 mm machine gun is located on the left front of the driver's compartment. The vehicle does not mount a winch, but is provided with a spring mounted towing pintle for use as a prime mover. It has a capacity of from 2 to 3 tons if used as a cargo carrier. Maximum speed is reported as approximately 35 miles per hour, with exceptionally good cross-country performance due to the amount of track area in contact with the ground in relation to the weight of the vehicle.

SPECIFICATIONS

| | |
|------------------------------|--|
| Weight | |
| Length (overall) | 15 ft., 9 ins. |
| Width (overall) | 6 ft., 8 ins. |
| Height | |
| Ground clearance | |
| Tread centers | |
| Ground contact | 9 ft., 10 ins. |
| Width of track | 10 ins. |
| Pitch of track | 3-13/16 ins. |
| Track links | 125 |
| Fording depth | |
| Theoretical radius of action | |
| Roads | |
| Cross-country | |
| Speed (maximum) | 35 m.p.h. |
| Armor (reported) | $\frac{1}{4}$ in. |
| Armament | 7.7 mm machine gun |
| Ammunition (Rds.) | |
| Engine..... | 6-cylinder, in-line, valve-in-head, diesel. |
| Transmission..... | 4 speeds forward, 1 reverse; high and low range. |
| Steering..... | Clutch and brake system |
| Seating capacity | 24 |



REAR VIEW

This is an armored, self-propelled crane designed to retrieve damaged A. F. V.'s up to a weight of about 12 tons. The manufacturing date of one recovered specimen is given as 1941. The crane is mounted towards the rear of the chassis on a platform traversing through 360° on an electrically powered turntable. The crane is powered by the main engine through a drive shaft from the transmission to a gear box and thence through another box to the cable drums. The crane is controlled by three hand levers and three foot control clutches. When not in use, the boom which has a total length of 18 ft., 2 ins., rests on the top of the drive compartment and is held in place by two screw clamps. The conventional Japanese type of suspension is used. Four bell cranks are resisted by four armored compression springs per side. Eight-and-one-half-inch dual steel bogie wheels per side are mounted four inches apart and paired to each bogie. An 18 13/16-inch diameter double-tooth front drive sprocket, a rear idler, two 10 3/4-inch diameter rubber-covered return rollers, and the center guide steel track complete the suspension.

The driver's compartment measures 45 1/2 x 59 inches, and is fitted with a door on the right side. The 6-cylinder, in-line, air-cooled, Ikegai gasoline engine delivers 60 horsepower. The steering system is of the clutch brake principle, a separate spring-loaded clutch being fitted to each track. Two pressed steel fuel tanks are located at the right rear of the hull; an additional one is utilized as the driver's seat. They have a combined estimated capacity of 40 gallons.

SPECIFICATIONS

| | |
|---|--------------------|
| Weight | 8 1/4 tons |
| Trailer load capacity | |
| Length | 14 ft., 4 1/2 ins. |
| Width | 6 ft., 7 ins. |
| Height (to top of vehicle) | 5 ft., 3 ins. |
| (to top of jib) | 6 ft., 9 ins. |
| Ground clearance | 11 ins. |
| Tread centers | |
| Ground contact | 11 ft., 4 ins. |
| Track width | 9 3/4 ins. |
| Track links | |
| Fuel tank | 40 gals. (est.) |
| Fuel consumption | |
| Fording depth | |
| Speed | 21 m.p.h. |
| Engine.....Ikegai, gasoline, 6-cylinder, in-line, air-cooled, 60 hp. | |
| Transmission | |
| Steering | Clutch brake |
| Crew | 2 |
| Armor | |
| Front | 1/4 in. |
| Sides | 5/16 in. |
| Length of cable drums | 10 1/4 ins. |
| Diameter of cable drums | 10 1/2 ins. |
| Diameter of cables | 3/4 in. (approx.) |
| Overall length of boom | 18 ft., 2 ins. |

"KATO" GENERAL PURPOSE TRACTOR

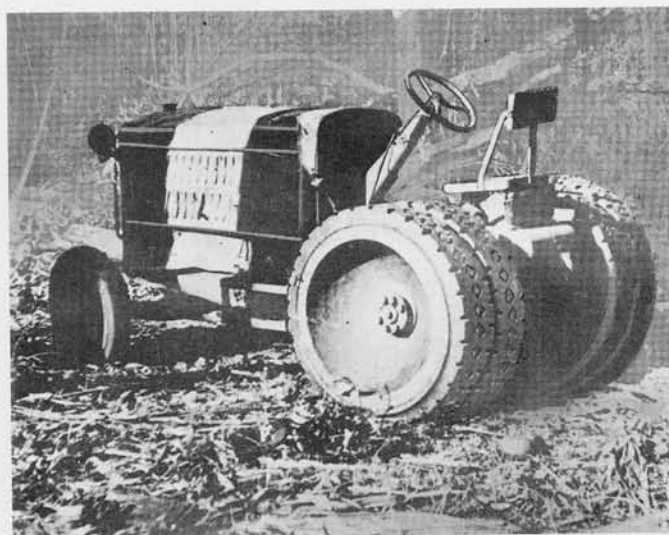
JAPANESE



This is a commercial type wheeled tractor used for general purpose work. The front wheels are 29 x 5 inches and the rear dual wheels are 40 x 10 inches, all fitted with solid rubber tires. The drive is from the rear wheels only, and steering is effected by a worm gear system operating the front wheels. Normal automotive controls are provided, save for a hand throttle. The transmission provides three speeds forward and two in reverse.

The K3 type engine is identical to that used in the "Kato" 70 tractor—a 4-cylinder, valve-in-head, gasoline type. There are two cylinder blocks of two cylinders each instead of a solid cylinder block. The generator, high-tension magneto, and water pump are all linked together with universal joints and driven from a single shaft extending from the timing gear on the right of the engine.

The tractor is fitted with front and rear towing pintles cast solid with the frame.



SPECIFICATIONS

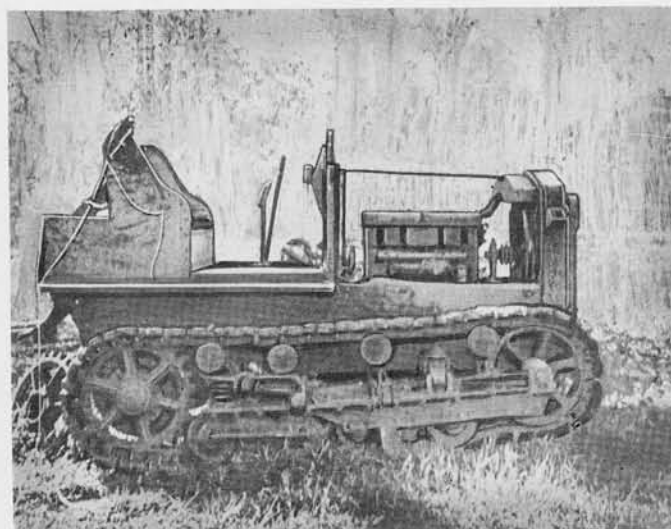
| | |
|---------------------------------------|-------------------------|
| Weight | |
| Winch capacity | |
| Length | |
| Wheel base | 90 ins. |
| Overall width of tractor (rear) | 74 ins. |
| Overall height of tractor | 5 ft. |
| Capacity of fuel tank | 30 gals. |
| Tread centers (front) | 63 ins. |
| Ground clearance | 8 ins. |
| Fuel capacity | (approx.) 30 gals. |
| Engine | 60 h.p. at 1,200 r.p.m. |
| Bore | 121 mm |
| Stroke | 152 mm |

"KATO" 70 ARTILLERY TRACTOR

This is a slow speed tractor equipped with a towing hook and is believed to be the standard Japanese artillery prime mover. There are two bogies on each side, each bogie having three bogie wheels, two bearing on the outside and one on the middle of the tractor. Clutch and brake steering are provided. The power plant is a 4-cylinder, water-cooled, gasoline engine. The cylinder block is of two separate sections. Each section is joined into one piece at the top, but the base of each cylinder is separate from all other cylinders.

SPECIFICATIONS

| | |
|--|--------------------|
| Weight | |
| Winch capacity | |
| Length | |
| Wheel base | 85 ins. |
| Diameter of drive sprocket | 26 ins. |
| Width of track | 13¾ ins. |
| Length of track in contact with ground | 89 ins. |
| Width of tread (from outside edge of tracks) | 67 ins. |
| Engine | Kato, K-3, 70 h.p. |
| Bore | 4.75 ins. |
| Stroke | 6 ins. |

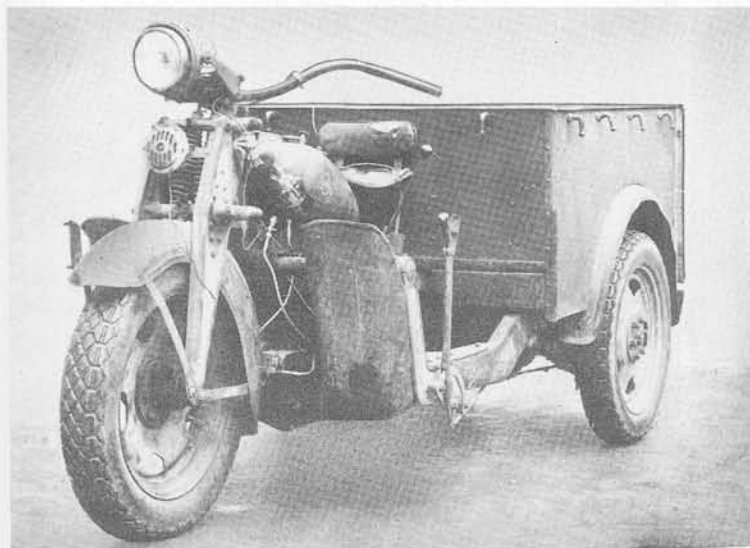




The partial disruption of the Burma railway system has brought into being a very effective locomotive truck. One report states that use of the Japanese locomotive truck has not only aided in the transportation of supplies over damaged rail lines, it has made it possible to carry over the damaged railroad considerably more tonnage than could be moved by the use of locomotives alone.

The "Loco-truck" is a highly specialized vehicle specifically designed to overcome the problem of breaks in the rails. The inner sections of the six wheels are cut to run along rail tracks; the outer sections are designed for tire mounts. On both front and rear of the truck are two permanently attached hydraulic jacks equipped with rollers. To remove the vehicle from the tracks, it is necessary to put one rail under the rear jacks and one under the front jacks at right angles to the tracks, lift the truck off the rails, and roll the truck to the side. The truck is then let down on its wheels, driven past the break in the rail line, and returned to the tracks.

A diesel engine estimated at about 60 horsepower is used to power the vehicle. Overall length, including couplings, is 19 feet, 2 inches and width is 6 feet, 3 inches.



Above: Motor tricycle with light cargo carrier body.



Right: Adapted for use as a small personnel carrier.

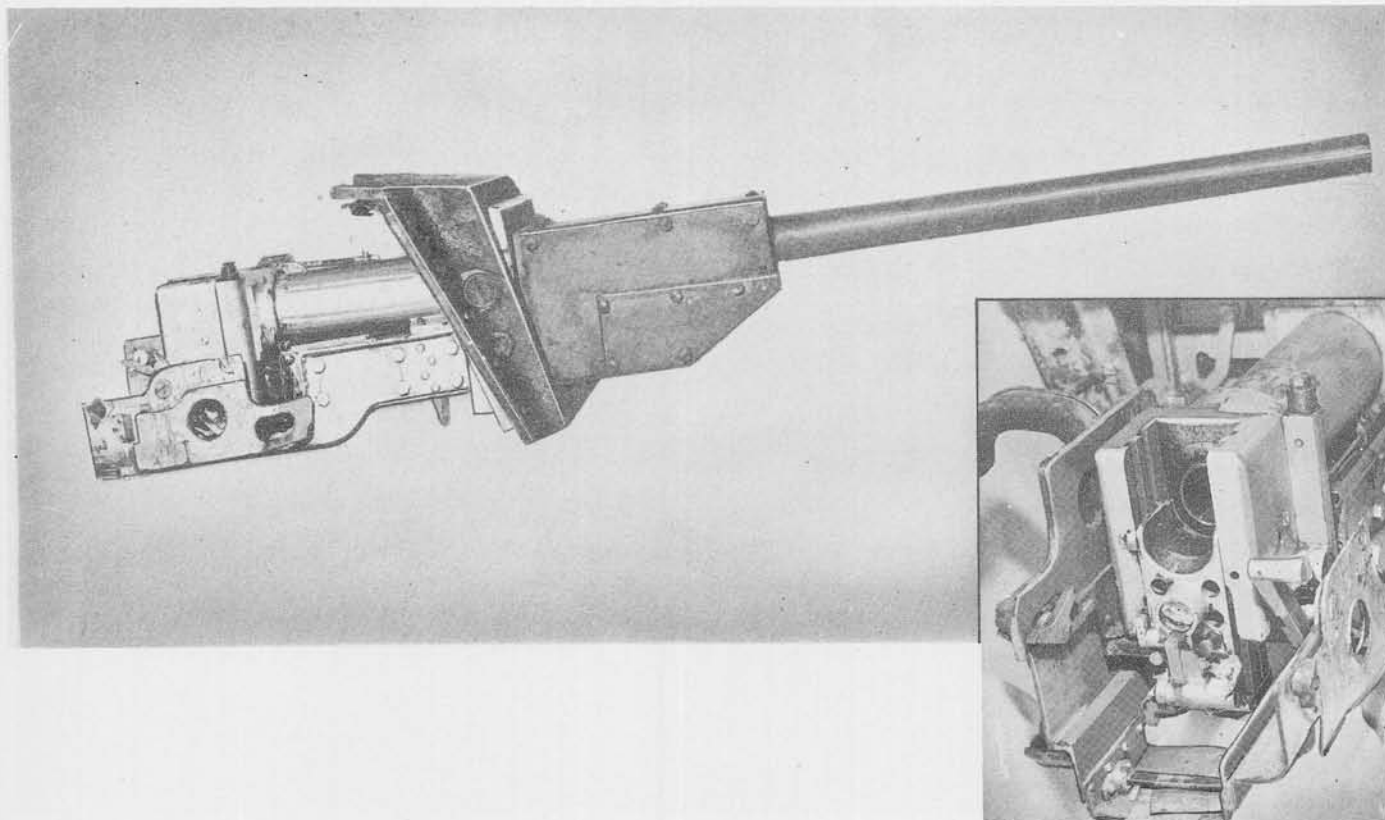
This motor tricycle has been recovered in two adaptations: as a light cargo vehicle and as a small personnel carrier. The motor is a 2-cylinder, V-type, air-cooled, gasoline engine with cooling fins made of ferrous metal. The ignition, of the automotive type, comprises battery, generator, coil, and distributor. Motorcycle type coil springing is used on the front wheels and leaf type springs on the rear part of the vehicle. The automotive type transmission provides three speeds forward and one reverse. Power is transmitted to the rear by a shaft and both rear wheels are driven through a differential. The brakes are mechanical, rod-operated, internal expanding, and operate on the two rear wheels only.

The motor tricycle has been developed as a commercial freight carrier in Japan since 1930. Many commercial versions exist, with engines ranging from 350 cc to 1,000 cc displacement. Lighter types have single-chain drive without differentials, whereas heavier types may have shaft or double-chain drive with differentials. Load capacities vary from 300 to 1,000 pounds. It is believed that the army adopted whatever types were available, and that no standard army model exists.

SPECIFICATIONS

CARGO CARRIER

| | |
|------------------------|--|
| Weight | 1,185 lbs.* |
| Loading capacity | |
| Length (overall) | 8 ft., 11½ ins. |
| Length of body | 4 ft., 2 ins. |
| Width (overall) | 4 ft., ½ in. |
| Width of body | 3 ft., 8½ ins. |
| Height (overall) | 4 ft., ½ in. |
| Ground clearance | 6 ins. |
| Tread centers | 3 ft., 6¾ ins. |
| Wheelbase | 6 ft., 3 ins. |
| Tire size | 4.75 x 18 ins. 4.75 x 27 ins. |
| Fuel tank | |
| Fuel consumption | |
| Fording depth | |
| Speed | |
| Engine..... | 2-cylinder, V-type, air-cooled, gasoline |
| Bore and stroke | |
| Ignition | |
| Transmission | 3 speeds forward; 1 reverse |
| *Not verified | |



The Japanese Type I (1941) 47 mm tank gun is mounted in the Type 97 Improved Medium Tank, replacing the 57 mm tank gun, a weapon of much lower velocity. The 47 mm tank model is very similar to the Type I, 47 mm antitank gun described on page 106. The breech mechanism, however, is of the semi-automatic, vertical sliding block type instead of the horizontal sliding block type. The barrel, 7 feet, 11½ inches long, is of built-up construction. The firing mechanism is of the percussion hammer type, the recoil mechanism is a hydro-spring type.

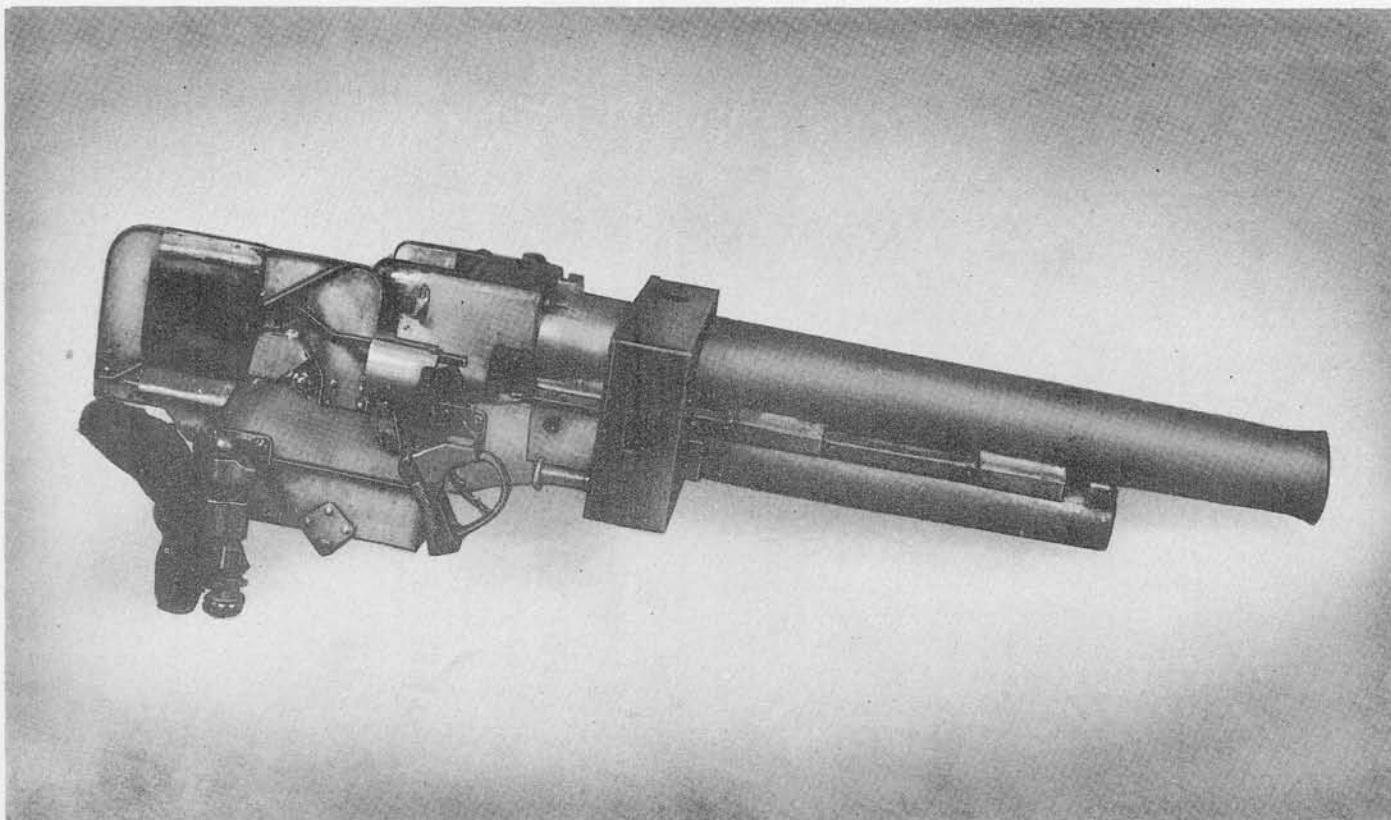
The piece is free mounted in a mantlet in the turret which permits a total traverse of approximately 15 degrees. Elevation and depression of from 8 to 10 degrees may be obtained. The gun fires high explosive and armor-piercing high explosive ammunition.

Two types of telescopic sights for this gun have been recovered. Although different in size and design, they are both 4 power by 14 degrees.

Firing tests on this gun reveal that A.P.H.E. ammunition at 500 yards will penetrate 2.7 inches of homogeneous armor at normal, and 2.2 inches of homogeneous armor at 30° from normal.

SPECIFICATIONS

| | |
|---|-----------------------|
| Caliber | 47 mm (1.85 ins.) |
| Weight | 904 lbs. |
| Length (overall) | 9 ft., 7 ins. |
| Length of tube | 7 ft., 11½ ins. |
| Length of bore (including chamber) | 7 ft., ¾ in. |
| No. of grooves | 16 |
| Width of grooves | |
| Depth of grooves | |
| Width of lands | |
| Muzzle velocity (A. P. H. E. shell) | 2,700 f/s |
| Max. range | |
| Rate of fire | |
| Traverse | 15° |
| Elevation | 8° to 10° |
| Depression | 8° to 10° |
| Length of recoil | |
| Ammunition | H. E. and A. P. H. E. |
| Wt. of projectile (H. E.) | 3.08 lbs. |
| (A. P. H. E.) | 3.37 lbs. |



This gun, manufactured at Osaka Arsenal in 1939, is mounted on the Japanese Medium Tank Type 97. The tube, of monobloc construction, is fastened to the breech ring by twelve interrupted threads and secured by a lock on the right side of the tube. The breech ring is box-shaped. The breechblock of the vertical sliding type rides in two dovetailed slots in each side of the breech ring, and may be operated manually or semi-automatically.

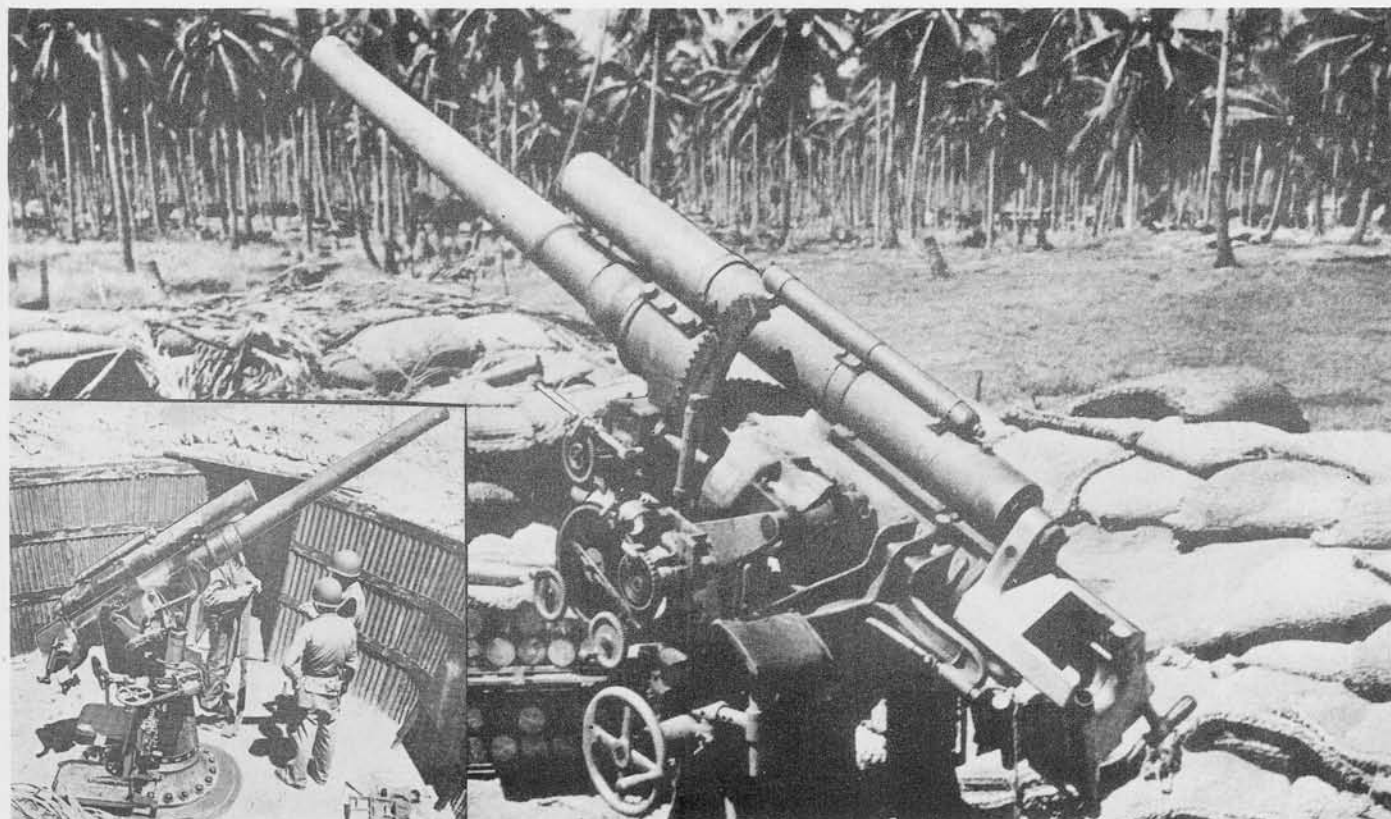
The firing pin is automatically cocked when the breech is opened. The trigger, on the left side of the gunner's shield, is protected by a trigger guard with a pistol grip. The recoil mechanism is a hydro-spring type.

The gun is mounted in the turret of the tank, and has a 360° traverse. It may also be freely elevated or traversed independently of the turret by means of two sets of trunnions. The inner vertical trunnions are set in a heavy steel bracket fitted to the cradle and permit a 5° left and right traverse. The bracket has a sighting window which may be closed for the gunner's protection. The outer horizontal trunnions fit into another steel bracket and give approximately 11° elevation and 9° depression.

Although no sighting equipment was recovered with the gun, the appearance and location of the head rest, shoulder rest, and sight bracket indicate that a straight tube telescope is used.

SPECIFICATIONS

| | |
|-------------------------------------|--|
| Caliber | 57 mm |
| Weight of tube and breech ring..... | 138 lbs. |
| Weight (firing position) | 293.5 lbs. |
| Length of tube and breech ring..... | 41½ ins. |
| Length (firing position) | |
| Height (traveling position) | |
| Height (firing position) | |
| Width (overall) | |
| Width of trail spread | |
| Length of tube and breech ring..... | 41½ ins. |
| Rifling..... | R.H., uniform twist; approx. 1 turn in 28½ cals. |
| Length of rifling | 32.5 ins. |
| No. of grooves | 20 |
| Width of grooves | .25 in. |
| Depth of grooves | .039 in. |
| Width of lands | |
| Muzzle velocity (shell) | |
| Max. range (horizontal) | |
| Max. range (vertical) | |
| Rate of fire | 20 r.p.m. |
| Traverse..... | 360° with turret and 5° right and left independent of turret |
| Elevation | 11° |
| Depression | 9° |
| Length of recoil | 11 ins. |
| Ammunition | H.E. and A.P.H.E. |
| Wt. of projectile | |



This weapon, previously erroneously called the Type 10, is a naval type anti-aircraft gun, mounted on a pedestal which permits a traverse of 360 degrees. The gun tube, of built-up construction, recoils inside a sleeve type cradle. A guide on the bottom of the tube rides in a groove, preventing rotation of the tube. Since the trunnions are located at the rear of the tube, muzzle preponderance is compensated for by an equilibrator inside the pedestal.

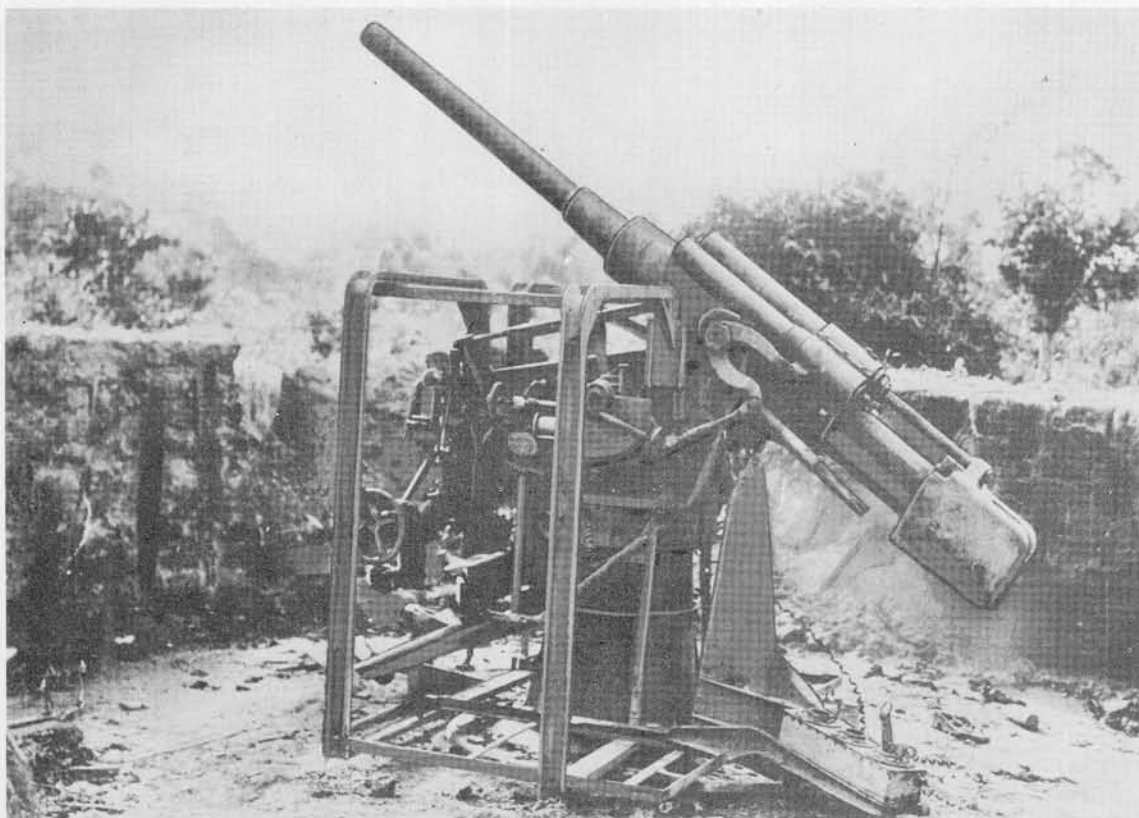
A hand-operated, semi-vertical sliding type breechblock and a hydrospring recoil mechanism are used. Recoil and recuperator are located over the tube. A small cylinder above the recoil cylinder is apparently for storing an oil reserve.

The elevating handwheel is located to the left of the weapon, and the traversing handwheel to the right. Two platforms, one on either side attached to the superstructure, allow the layers to move with the gun in traverse.

A bracket on the left of the piece is believed to mount a telescope and range drum.

SPECIFICATIONS

| | |
|------------------------------------|-------------------------------|
| Caliber | 76.2 mm (3 ins.) |
| Weight of gun and mount | 5,290 lbs. |
| Weight of gun | 1,100 lbs. |
| Length of barrel | 40 cal. |
| Length of tube | 9 ft., 6 ins. |
| Height (traveling position) | |
| Height (firing position) | |
| Width (overall) | |
| Length of chamber | 1 ft., 8 ins. |
| Rifling | R. H. twist |
| No. of grooves | 24 |
| Width of grooves | |
| Depth of grooves | |
| Width of lands | |
| Muzzle velocity (H.E. shell) | 2,200 f/s |
| Max. range (horizontal) | |
| Max. range (vertical) | 26,000 ft? |
| Rate of fire | 10 to 12 r.p.m. |
| Traverse | 360° |
| Elevation | 75° |
| Depression | 5° |
| Length of recoil | |
| Ammunition | H.E. w/powder train time fuze |
| Wt. of projectile | 12 lb., 11 ozs. |



This weapon which was recovered at Rangoon has a barrel of monobloc construction, machined to take a rectangular breech ring. A large threaded brass locking collar holds the breech ring in position. Rifling is right hand twist. The breech mechanism is semi-automatic of the vertical sliding type; the firing mechanism is a percussion type.

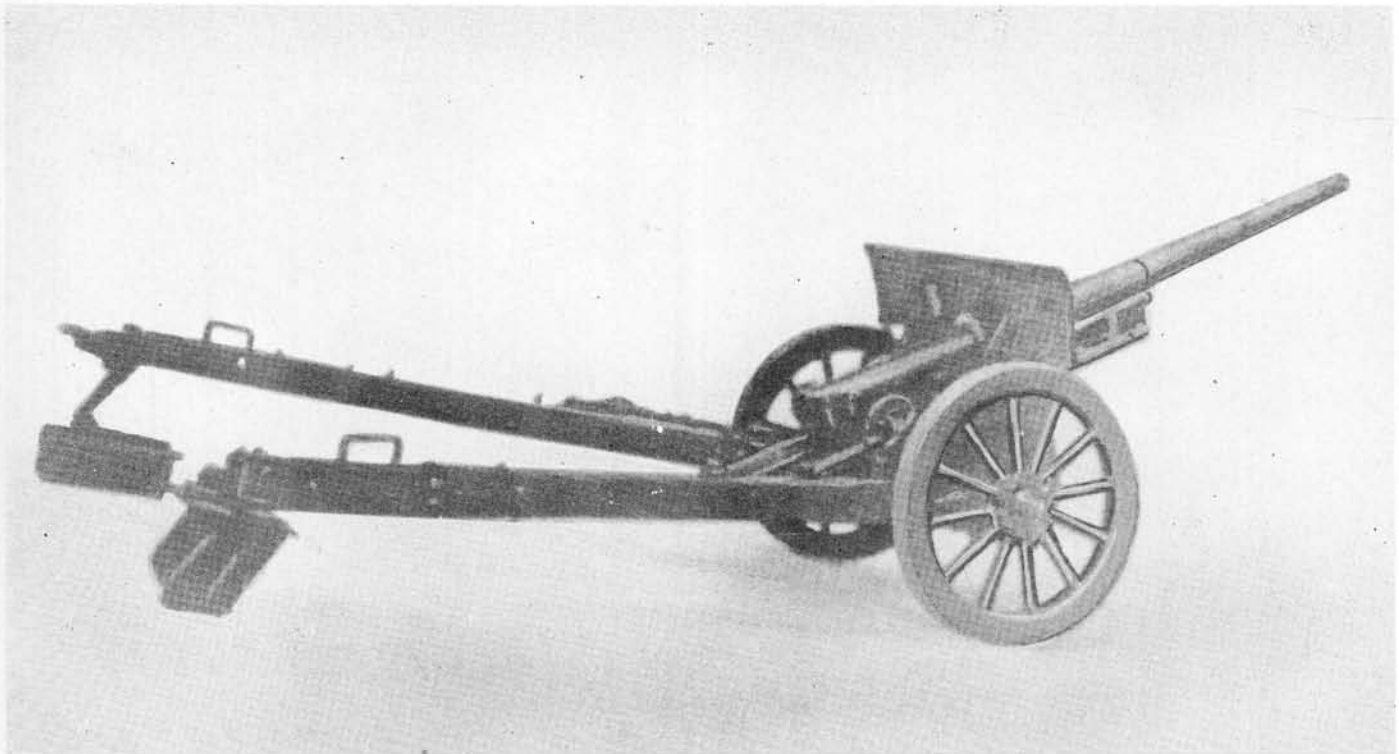
The piece fits in a sleeve type cradle to which are fitted the buffer cylinder, the recuperator cylinders, the trunnions, and the elevating arc. The recoil mechanism is hydropneumatic. Two recuperator cylinders are located one on each side of the recoil cylinder which is centrally mounted above the piece. The elevating arc is mounted under the piece offset slightly to the left. It is operated by a handwheel and crank on the left of the gun, and like the traversing handwheel, on the right of the gun, is forward of the trunnions.

The upper carriage consists of two side plates joined by three cross members, and revolves on a ball race fitted to its base. A pintle, bolted to the center of the base, extends down into a bearing in the pedestal. Three brackets are set at regular intervals around the upper carriage to prevent lateral play. The pedestal is a single cast truncated cone, reinforced internally and externally by six ribs. Twelve bolts secure it to a circular steel base plate.

Follow-the-pointer dials are provided for azimuth, elevation, and fuze setting. Three mechanical fuze-setters are also provided. Some of the guns examined were equipped with open sights of very primitive design.

SPECIFICATIONS

| | |
|--|----------------------|
| Caliber | 88 mm (3.5 ins.) |
| Weight (complete) | 14,560 lbs. |
| Weight of cradle | 1,256 lbs. |
| Weight of carriage (including elevating & traversing mech.)..... | 4,894 lbs. |
| Length (traveling position) | |
| Length of barrel assembly | 255.8 ins. |
| Height (traveling position) | |
| Height (firing position) | |
| Width (overall) | |
| Length of bore | |
| No. of grooves | 32 |
| Width of grooves | |
| Depth of grooves | 1 mm |
| Width of lands | |
| Muzzle velocity (shell) | 2,650 f/s |
| Max. range (horizontal) | |
| Max. range (vertical) | |
| Rate of fire | |
| Traverse | 360° |
| Elevation | 80° |
| Depression | 7° |
| Length of recoil | (approx.) 14-15 ins. |
| Ammunition | H. E. |
| Wt. of projectile (H. E.) | (approx.) 18 lbs. |



The Japanese 105 mm gun, Type 14, is a medium field weapon mounted on a two-wheeled carriage and drawn by a prime mover. The tube, of built-up construction, is retracted above the trails when in traveling position to provide proper balance. A breech block of the interrupted screw type is used.

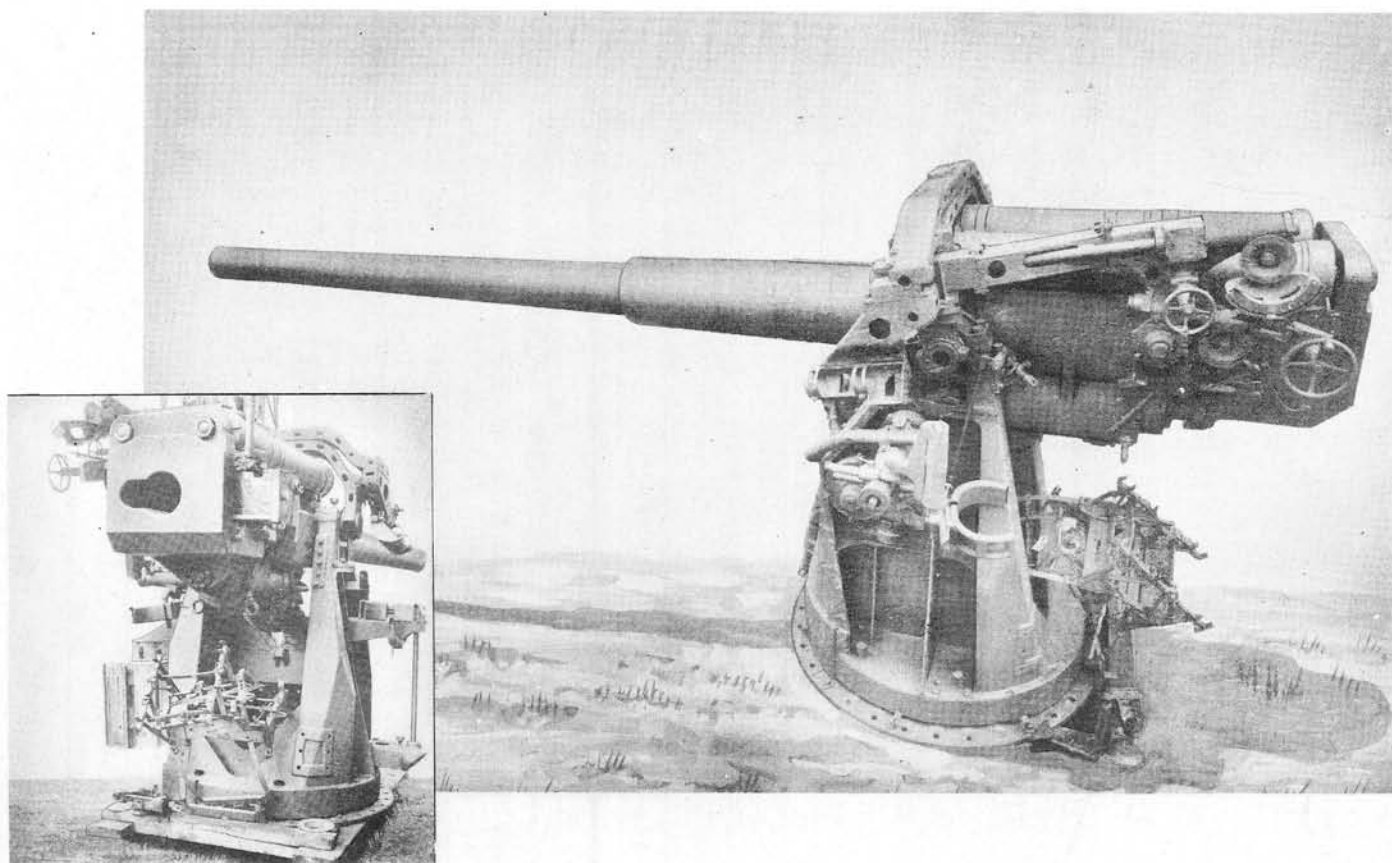
The weapon has split trails which may be adjusted to equalize cant. The wheels are equipped with rubber or steel tires.

The recoil system is the variable, hydropneumatic floating piston type. The fluid passage to the other side of the two air cylinders is suitably interrupted when the elevation is increased.

The traversing mechanism consists of a worm and arc gear. The elevating mechanism is of the arc gear type. A spring equilibrator is attached to the gun, since the trunnion is retracted in relation to the tube. The sighting equipment consists of a panoramic sight and a drum type range scale.

SPECIFICATIONS

| | |
|-----------------------------------|--|
| Caliber | 105 mm (4.13 ins.) |
| Weight (traveling position) | |
| Weight (firing position) | |
| Length (traveling position) | |
| Length (firing position) | |
| Height (traveling position) | |
| Height (firing position) | |
| Width (overall) | |
| Width of trail spread | |
| Length of bore | |
| No. of grooves | |
| Width of grooves | |
| Depth of grooves | |
| Width of lands | |
| Muzzle velocity | 2,040 f/s |
| Max. range (horizontal) | 16,500 yds. |
| Max. range (vertical) | |
| Rate of fire | 6-8 r.p.m. |
| Traverse | 30° |
| Elevation | 43° |
| Depression | 5° |
| Length of recoil | |
| Ammunition..... | H.E. (long pointed); H.E., Shrapnel, Chemical, A.P. |
| Wt. of projectile (H.E.) | 33 lbs. |



This gun is a naval coast defense weapon manufactured at Sasebo Arsenal. It uses semi-fixed ammunition. The barrel is of built-up construction with uniform right hand twist rifling. A manually operated, horizontal sliding block breech mechanism is used. It is unusual in that the block does not pass all the way across the rectangular breech ring. The rear of the breech ring is cut in a keyhole shape. The operator of the elevation handwheel may fire the gun by means of a lever mechanism, or it may be fired by a lanyard attached to the right side of the breechblock.

The recoil system comprizes three cylinders, two located above and one below the barrel.

The mount consists of a rectangular upper carriage which is mounted on a pedestal normally embedded in a solid foundation. A traversing scale is located on the pedestal. The traversing handwheel is in a horizontal position with the vertical shaft engaging a series of gears in the base mount. Platforms attached to the upper pedestal are provided for the gun layers and move in traverse with the gun.

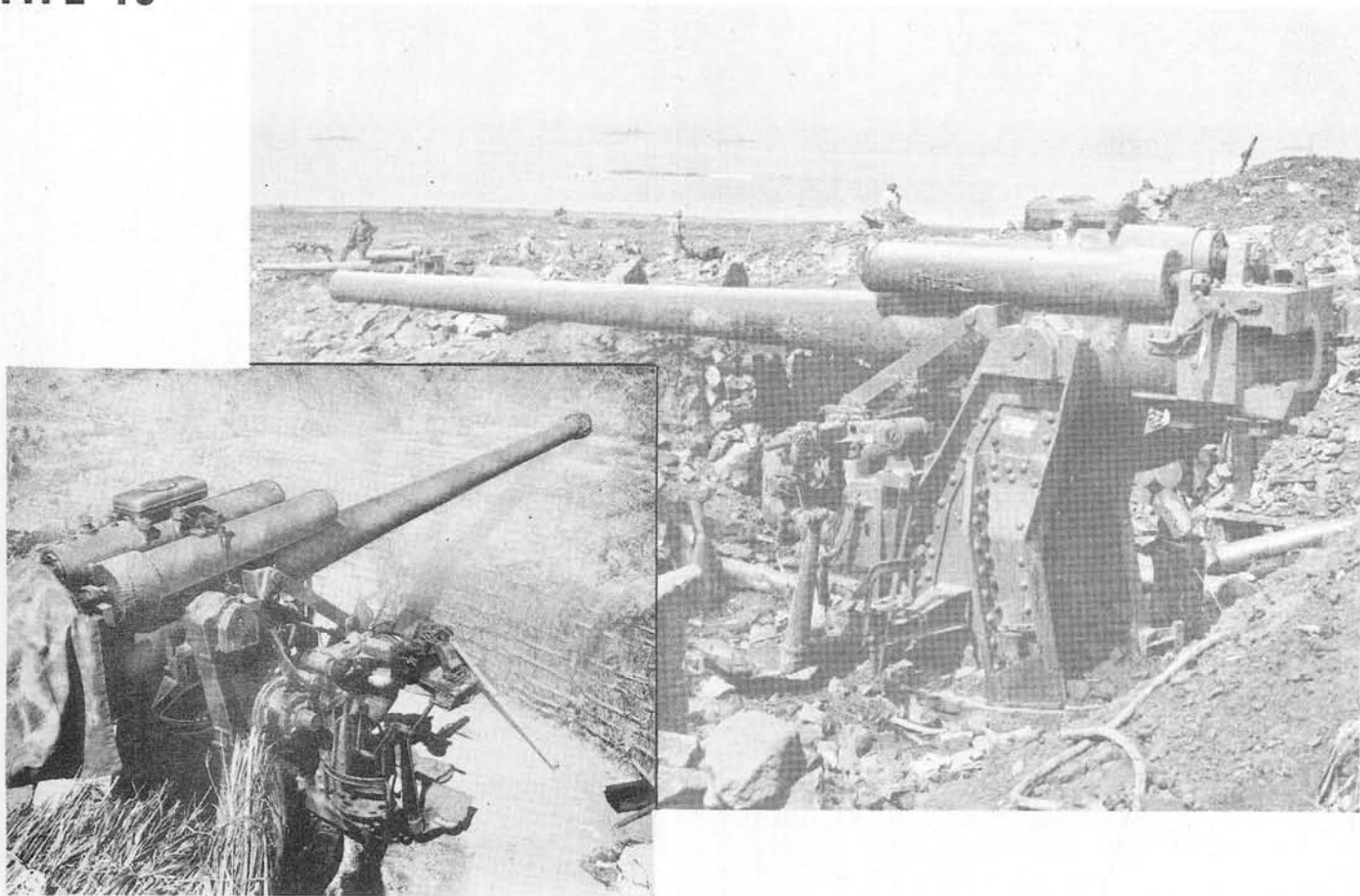
Fire control equipment is of the usual Japanese naval coast defense gun type.

SPECIFICATIONS

| | |
|-------------------------------------|--------------------|
| Caliber | 120 mm (4.72 ins.) |
| Weight (traveling position) | |
| Weight (firing position) | |
| Length of gun (overall) | 18 ft., 3¼ ins. |
| Length of tube | 17 ft., 3¾ ins. |
| Height of gun | 6 ft., 11 ins. |
| Height (firing position) | |
| Width (overall) | |
| Length of rifling | 14 ft., 8½ ins. |
| No. of lands | 34 |
| Width of grooves | |
| Depth of grooves | |
| Width of lands | |
| Muzzle velocity (H. E. shell) | 2,700 f/s |
| Max. range (horizontal) | |
| Max. range (vertical) | |
| Rate of fire | |
| Traverse | 360° |
| Elevation | 50° |
| Depression | 10° |
| Length of recoil | |
| Ammunition | H. E. |
| Wt. of projectile (H. E.) | 44.75 lbs. |

120 mm, 45 CALIBER, NAVAL DUAL PURPOSE GUN, TYPE 10

JAPANESE



The Japanese Type 10 dual purpose gun has a 45-caliber barrel of monobloc construction with uniform right hand rifling. A long, narrow rectangular projection on the bottom of the barrel slides in a groove in the sleeve type cradle, preventing the barrel from rotating. The bearing surface for recoil being the machined barrel surface. The cradle is mounted on a pedestal mount which permits a traverse of 360 degrees.

The elevating handwheel is on the right side of the mount, while the traversing handwheel is on the left. An auxiliary handwheel on the left side permits the piece to be elevated and traversed by the gunner. To compensate for muzzle preponderance, a spring pusher type equilibrator is used. The gun is well balanced, and exceptionally easy to elevate. The recoil mechanism is a hydrospring type, the two outside cylinders housing the counterrecoil springs, and the center cylinder the hydraulic mechanism. A semiautomatic horizontal sliding breechblock is used.

The mount is of riveted construction.

SPECIFICATIONS

| | |
|--------------------------------|--------------------------------|
| Caliber | 120 mm (4.7 ins.) |
| Weight (firing position) | 6,500 lbs. |
| Length (gun and mount) | 19 ft., 6½ ins. |
| Length (firing position) | |
| Height (gun and mount) | 7 ft., 8½ ins. |
| Height (firing position) | |
| Width (gun and mount) | 7 ft., 1 in. |
| Length of tube | 17 ft., 1½ ins. |
| Length of rifling | 14 ft., 9½ ins. |
| Length of chamber | 29.5 ins. |
| No. of lands | 34 |
| Width of grooves | ¼ in. |
| Depth of grooves | .050 in. |
| Width of lands | ⅛ in. |
| Muzzle velocity (shell) | 2,700 f/s |
| Max. range (horizontal) | 17,000 yds. |
| Max. range (vertical) | 32,800 ft. (fuze) |
| Rate of fire | 10-12 rds. |
| Traverse | 360° |
| Elevation | 75° |
| Depression | 10° |
| Length of recoil | 19.3 ins. |
| Ammunition | H.E. shrapnel; H.E. phosphorus |
| Wt. of projectile | 45.75 lbs. |



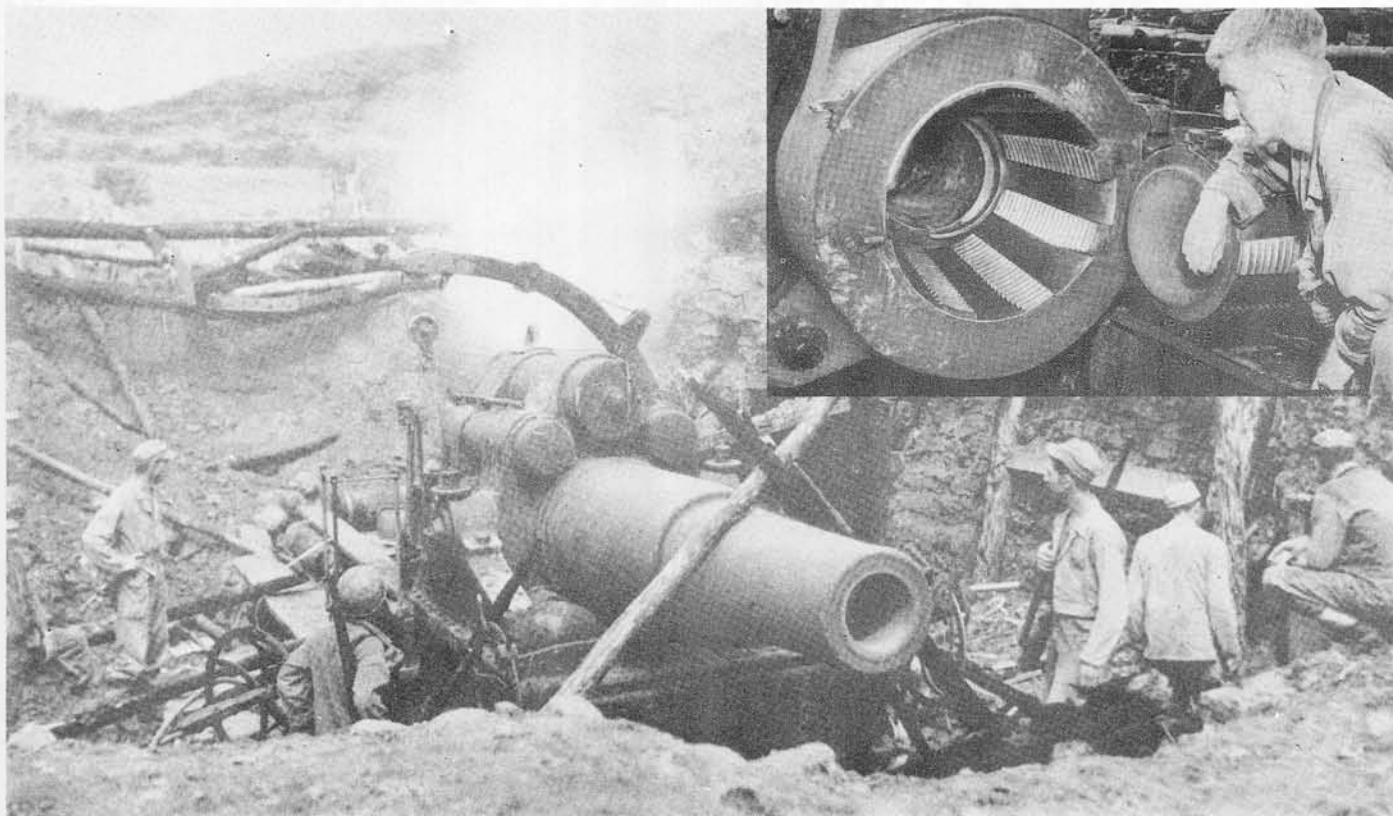
It is believed that this naval coast defense weapon was designed primarily for use against ships, as the fuzes used with the gun's ammunition are not sensitive enough to function satisfactorily upon impact with soft ground. This gun uses separate loading ammunition, and has a standard type mushroom head obturator. The breechblock is the horizontal swinging, interrupted screw type, having three threaded segments with two step threads. A hydropneumatic recoil mechanism is located above the barrel.

A naval pedestal type mount is used. Strips of iron fastened to and radiating from the pedestal are buried in the ground to insure stability. The piece is sometimes fitted in a casemate, the front and sides of which are cast in one piece. The top is rolled plate. A mantlet is fitted to the gun on the inside of the casemate. Gun and casemate are rotated manually, as no power system is provided.

No fire control equipment, with the exception of a telescopic sight mount, was recovered with the gun, and it is believed that the piece is fired by direct laying.

SPECIFICATIONS

| | |
|--|--|
| Caliber | 140 mm (5.5 ins.) |
| Weight (firing position) | |
| Length (overall) | 23 ft., 8 ins. |
| Length (firing position) | |
| Height (firing position) | |
| Width (overall) | |
| Length of tube | 22 ft., 10½ ins. |
| Length of rifling | 19 ft., 3½ ins. |
| No. of grooves | 42 |
| Width of grooves | |
| Depth of grooves | 0.051 in. |
| Width of lands | |
| Muzzle velocity (shell) | 850 meters (2,789 ft.) per sec. from range disc on gun |
| Max. range (horizontal) | 17,000 meters (18,598 yds.) from range disc on gun |
| Rate of fire | |
| Traverse | 360° |
| Elevation | 30° |
| Depression | —7° |
| Length of recoil | |
| Ammunition | |
| Wt. of projectile (H. E.) Common | 83.8 lbs. |



This howitzer was captured on Luzon. The emplacement, circular in shape and measuring 33 feet in diameter and 8 feet in depth, was camouflaged by a house on rails which was rolled back when the guns were to be fired. A small garden of banana trees was planted around the emplacement to add to the effect.

The howitzer tube is believed to be a built-up type. The liner is rifled with a uniform right hand twist, calculated to be one turn in 9.4 calibers. Two air flasks are mounted on the carriage for blowing out the tube after firing. Two equilibrators are mounted below the tube. The breech mechanism is an interrupted screw type having 8 segments of 20 threads. A percussion hammer firing mechanism is operated by a lanyard. A short cartridge case is used for obturation.

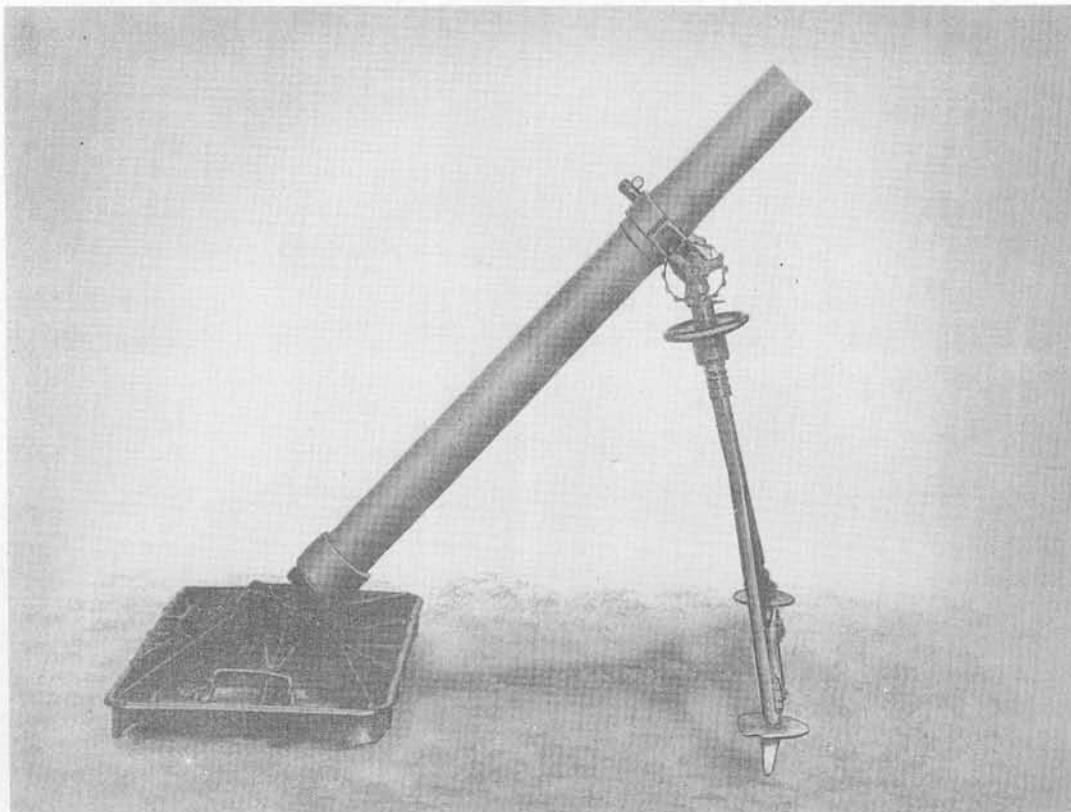
The upper carriage is a rectangular steel frame approximately 18 feet, 9 inches long, and 4 feet, 8 inches wide, fixed to a base plate. The lower carriage is a truncated steel cone embedded in concrete approximately 6 to 8 feet under the ground. The upper carriage baseplate rests on a rail above a worm wheel, fixed to the lower carriage which engages a spur rack fitted to the base of the upper carriage.

The traversing handwheel is mounted in a horizontal position engaging a vertical shaft which terminates in the worm gear. The elevating handwheels, one on either side of the tube, are mounted on the carriage in a vertical position. A direct shaft from the elevating handwheel terminates in a spur gear which engages the elevating arc.

A panoramic sight is mounted on the right side of the gun.

SPECIFICATIONS

| | |
|---|--------------------------|
| Caliber | 305 mm (12 ins. approx.) |
| Weight (firing position) | |
| Length of tube and breech | 16 ft., 6 ins. |
| Length of carriage base | 18 ft., 9 ins. |
| Width of carriage base | 4 ft., 8 ins. |
| Length (firing position) | |
| Height (firing position) | |
| Width (overall) | |
| Length of bore | |
| No. of lands | 72 |
| Width of grooves | |
| Depth of grooves | |
| Width of lands | |
| Muzzle velocity (shell) | |
| Max. range (horizontal)—Trans. document | 13,000 yds. |
| Max. range (vertical) | |
| Rate of fire | |
| Traverse | 360° |
| Elevation, scale reading..... | 70° |
| Depression, scale reading..... | 3° |
| Length of recoil, scale reading..... | 420 mm |
| Ammunition | |
| Wt. of projectile—Trans. document..... | 970 lbs. |



The Japanese 81 mm Mortar, Model 3, is a forerunner of the Model 97 (1937). It was manufactured at the Yokosuka Navy Arsenal in 1943.

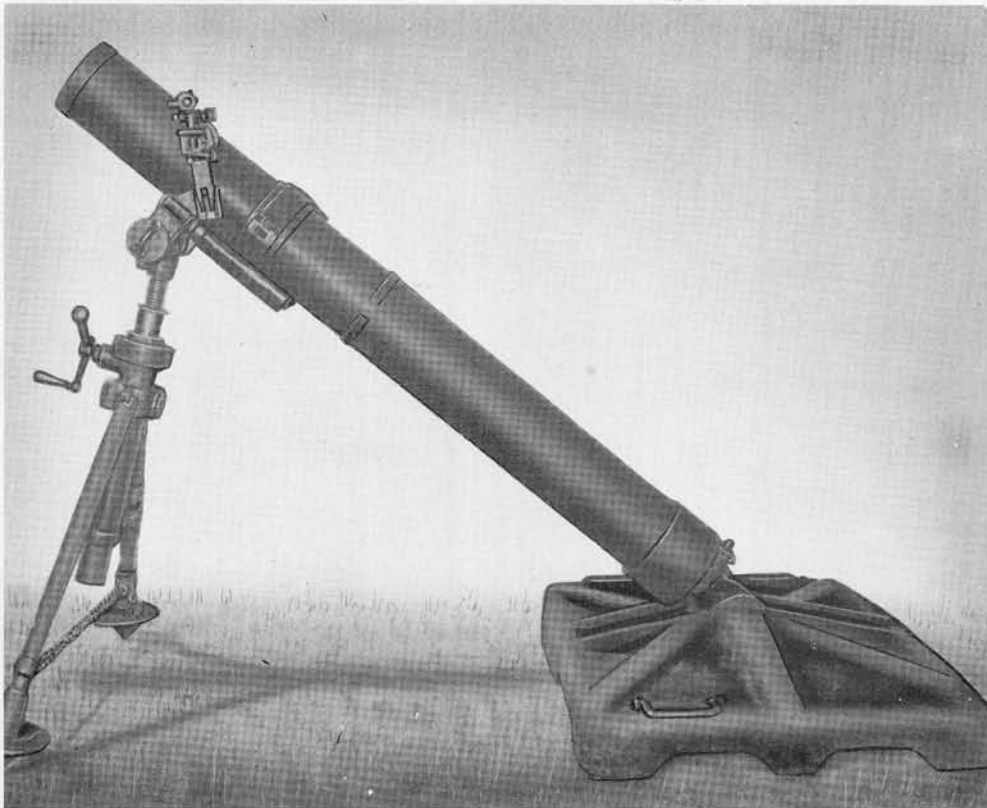
The tube is a smooth-bore type and has two collars machined on the forward part for securing the bipod clamp. The bipod, constructed of light weight tubing, is very unstable. There is no cross leveling device, and rough cross leveling adjustments could be made by breaking the bipod support and moving the leg on the low side inward.

The base plate is relatively heavy, and is believed to be identical with that now used with the 90 mm Mortar, Model 94. It is interchangeable with the base plate for the Model 97.

Both traversing and elevating mechanisms employ the square type threads rather than the usual and more efficient buttress type as used on Model 97. No sight was recovered with the mortar.

SPECIFICATIONS

| | |
|----------------------------|---------|
| Weight of tube | 47 lbs. |
| Weight of bipod | 25 lbs. |
| Weight of base plate | 95 lbs. |



This mortar, of conventional design, is a smooth bore, muzzle-loading weapon referred to by the Japanese as a medium mortar. Although its tactical use is not fully defined, it is known to have been used in fixed concrete emplacements as a part of the island defense system.

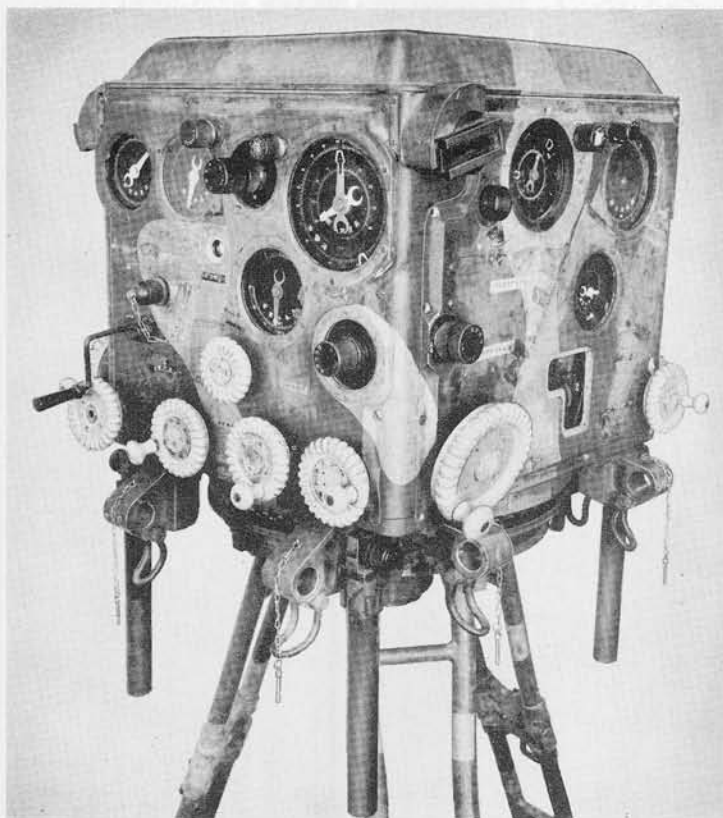
The Model 97 is very heavy and sturdily constructed, weighing 770 pounds complete with sight. The breech cap and stud, with assembled firing mechanism, are screwed on in the normal manner. The firing pin may be adjusted to three different positions by means of a cam lock. When the lock is in the rear center position the firing pin is in a safe position; when the lock is turned to the right, the pin is "Floating," or, in other words, may be actuated by a sharp blow on the end of the cam shaft. When the firing pin is locked forward, the operation is the same as that of a mortar with a fixed firing pin.

The bipod is of normal construction with but one exception. The elevating screw is actually two concentric screws comparing very favorably with a single screw in stability and overall length. The traversing screw, buffer mechanism, and collar assembly are of the same design as other Model 97 Japanese mortars. The bipod and cradle may be separated for handling.

The base plate is a heavy ribbed stamping of 0.25 inch metal built up by reinforcing ribs welded to the original stamping. It has the usual ball and socket locking arrangement. The sight is a panoramic elbow telescope of three power and thirteen degree field.

SPECIFICATIONS

| | |
|--|---------------------|
| Caliber | 150 mm (5.906 ins.) |
| Weight (complete) | 770 lbs. |
| Weight of tube | 257 lbs. |
| Weight of bipod & traversing assembly, | |
| (total) | 174.5 lbs. |
| Weight of sight & extension | 1.5 lb. |
| Weight of baseplate | 337 lbs. |
| Length of tube | 75.37 ins. |
| Length of tube (internal) | 66 ins. |
| Length of baseplate | 47.75 ins. |
| Width of baseplate | 35.5 ins. |



This director (possibly referred to by the Japanese as Model 97) is a plan prediction type of computer. It is probably used with the Japanese Model 88 (1928) 75 mm antiaircraft gun.

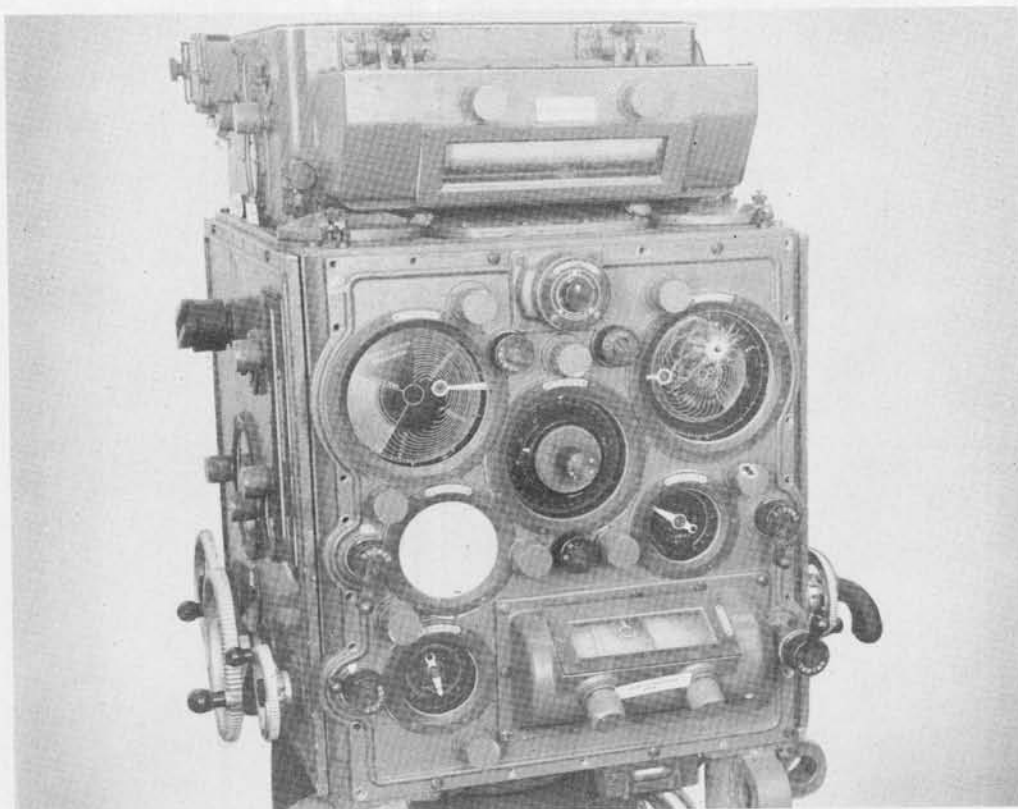
Standard ballistics are obtained from cams; approximations and spot corrections take care of wind effects, muzzle velocity, and air density variations. The director is provided with telescopes, and with electric data receivers for azimuth and angular height, and for altitude or horizontal range.

The director imposes significant limits on altitude and horizontal component rates. The maximum altitude rate is ± 179 miles per hour. The maximum horizontal component rates are 335 miles per hour. It is not known whether it is Japanese practice to orientate their directors with respect to true North; but if that is the case, targets flying in the cardinal directions with ground speeds in excess of 335 miles per hour would be beyond the capability of this director. Such ground speeds, when aided by wind, may be feasible. It should be noted that the director is capable of handling greater speeds if the target does not fly parallel to one of the principal coordinate axes.

Optical tracking is provided on the director proper. An electrical data transmission system provides for the use of an external tracker such as a radar unit.

SPECIFICATIONS

| | |
|-----------------------------------|---------------------|
| Time of flight | 30 secs. max. |
| Present altitude | 0 to 7,655 yds. |
| Future altitude | -820 to 8,475 yds. |
| Present horizontal range | 0 to 10,936 yds. |
| Future horizontal range | 0 to 10,936 yds. |
| N-S and E-W rates | ± 164 yds./sec. |
| Altitude rate | ± 87 yds./sec. |
| Lateral deection | ± 800 mls. |
| Horizontal range prediction | $\pm 4,101$ yds. |
| Altitude prediction | ± 820 yds. |



This appears to be the latest model of mechanical antiaircraft director made by the Japanese. It has data receivers (selsyns) for azimuth, angle of site, and slant range, probably provided for use with radar equipment. Primary input data may also be obtained by optical tracking by means of telescopes attached to the director and a height finder.

Computation is based on angular rates. The transmitted data is future azimuth, future quadrant elevation, and future fuze. Data is transmitted to each weapon by means of selsyn motors and applied to the weapon by means of a match pointer system resembling that used with the American 90 mm, M1 antiaircraft fire control equipment. It is believed that this instrument is capable of furnishing data for three weapons. It is assumed the azimuth receiver will work with both the 8 cm and the 12 cm Japanese antiaircraft guns.

As compared with other modern directors, it is felt that this instrument is deficient in both design and construction. An angular rate computer is considered too inaccurate for anything other than small or medium caliber automatic tracer controlled antiaircraft fire. Human error is permitted through the curve-following method of introducing time of flight, superelevation, and converting slant range into altitude. A great deal of backlash exists in various gear trains and in the mechanical linkage of the multipliers.

SPECIFICATIONS

Limits as indicated by drums and dials

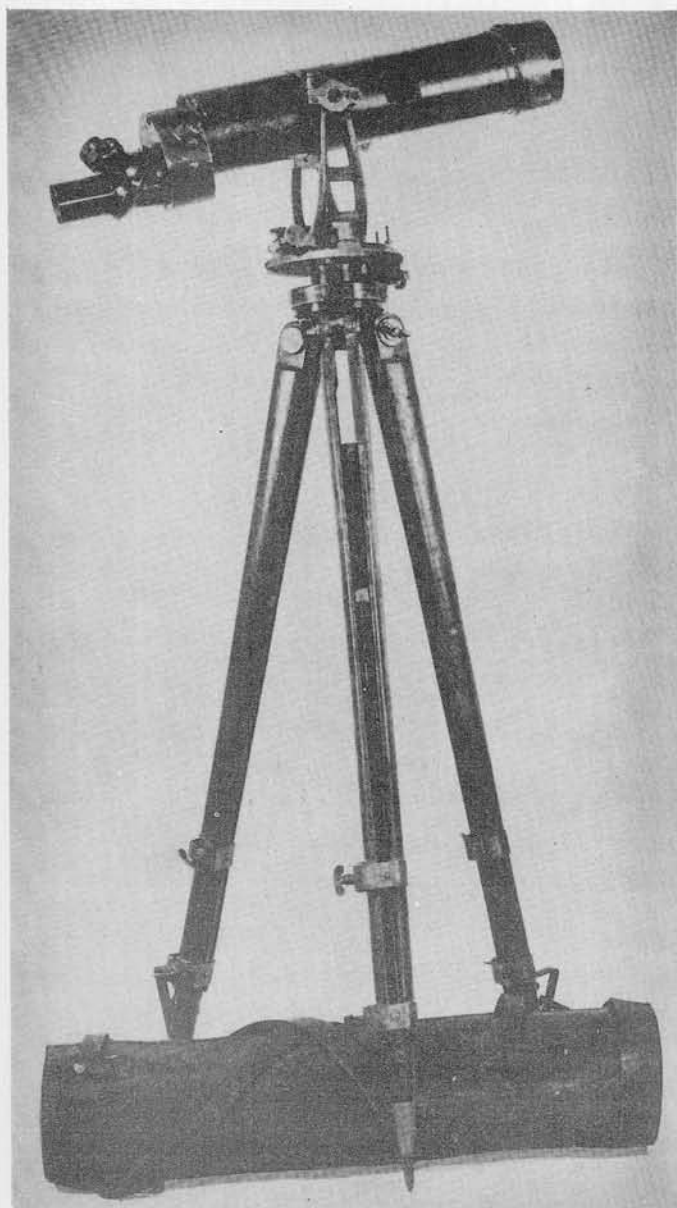
| | |
|--|---|
| Slant range (dial calibration) | 40,000 meters |
| Slant range (limit of movement w/alt. converter) | 19,000 meters |
| Horizontal range | 12,500 meters |
| Altitude | 9,000 meters |
| Quadrant elevation | - 10° to + 90° |
| Fuze | 35 seconds |
| Dead fuze time | 10 seconds |
| Wind velocity | 20 meters/sec. |
| Azimuth | No limit |
| Angular rate | Undetermined |
| Electrical data | |
| Cycles | 50 or 60 |
| Volts | 50 or 60 |
| Weapon with which used..... | 120 mm, 45 cal. A.A. gun and 80 mm. 40 cal. A.A. gun. |

Characteristics

| | |
|---------------------------|-----------------|
| Height | 44 1/4 ins. |
| Length | 34 1/2 ins. |
| Date of manufacture | Showa 18 (1943) |

Weapon data obtained from drums

| | |
|------------------------------|------------------------------------|
| Fuze types (120 mm gun)..... | M88 (1928), M89 (1929), M91 (1931) |
| Muzzle velocity | 825 meters/sec. |
| Fuze types (80 mm gun)..... | M89 (1929), 5th year type (1930) |
| Muzzle velocity | 670 meters/sec. |



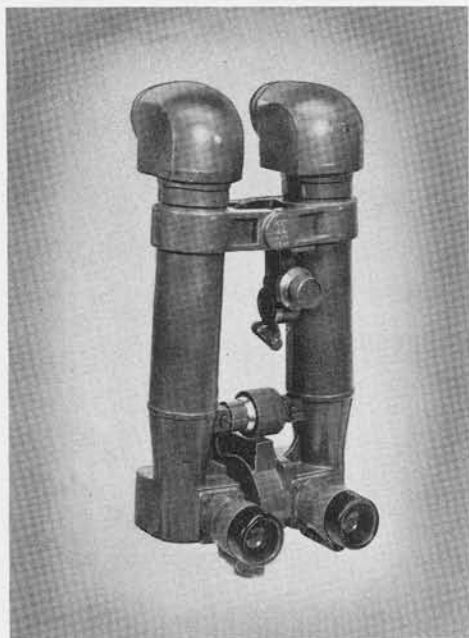
The Japanese multiple power observation telescope has three powers: 33X, 24X, and a third degree of magnification which has not been determined because of the absence of a third eyepiece in the instrument examined. Selection is made by rotating a dome-shaped holder in which the three eyepieces are mounted. This is somewhat similar to the turret head employed in motion picture cameras and to the selective eyepiece head of compound microscopes.

The objective is a compound lens with an air space between the crown and flint components. A modified porro prism is used for the erecting system. The reticle design used with the 24 power eyepiece is a simple cross. The 33 power eyepiece is not equipped with a reticle. No provision is made for an instrument light. An open line sight is provided for quick location of an object in the field of view.

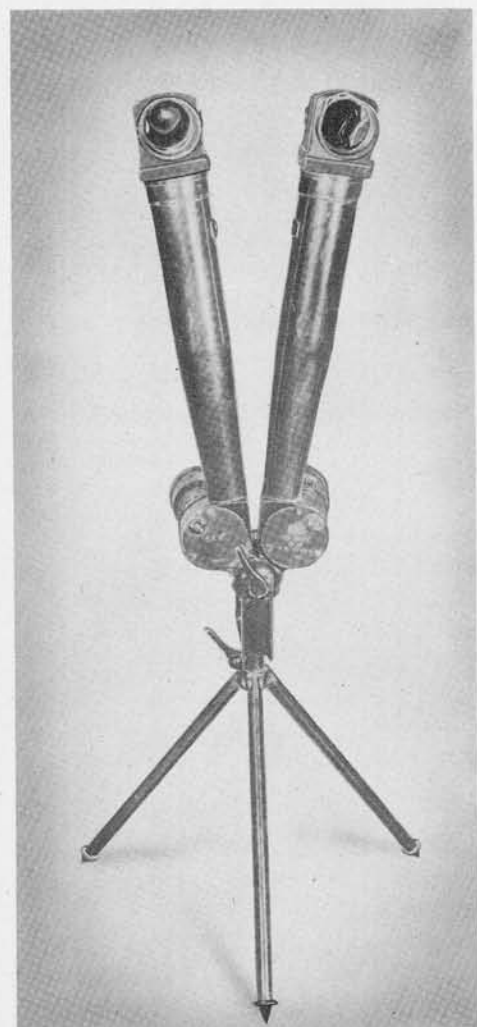
The support which is made largely of machined brass castings has an upper and lower movement. The azimuth scale is graduated from 0 to 360 degrees in $\frac{1}{2}$ degree steps; a vernier indicator allows readings of one minute to be made. Leveling is accomplished by adjusting the length of the tripod legs. The elevation arc is graduated in increments of $\frac{1}{2}$ degrees to + and -30 degrees from 0. The tripod is of wood with brass fittings.

SPECIFICATIONS

| | |
|--|-----------------|
| Length of telescopes | 24 ins. |
| Weight of telescopes | 12 lbs., 8 ozs. |
| Height of support | 11½ ins. |
| Distance between trunnions | 5¼ ins. |
| Weight of support | 13 lbs., 4 ozs. |
| Length of tripod | 38¼ ins. |
| Length of tripod (legs extended) | 55½ ins. |
| Weight of telescope | 8 lbs., 8 ozs. |



Model 93 Battery Commanders Telescope



Battery Commanders Telescope
with Integral Tripod

Model 93, 8 x 6° 15'

This telescope is so constructed that the tubes can be used only in the vertical position. Its primary use is believed to be for observation and correction of artillery fire.

The eyepieces are of the multiple thread focusing type, and the diopter scale is graduated from + 2 to - 3. The reticle design consists of a vertical and horizontal mil scale graduated in increments of one mil from 0 to 30 on each side of 0. A light receptacle for artificial illumination of the reticle is provided.

The telescope is fitted with an angle of site mechanism. The hinge mechanism of the assembly consists of a simple hinge pin and a fitted yoke. The interpupillary mechanism is locked near the base and between the two tubes.

Telescope with Integral Tripod

The general purpose of this instrument is believed to be the observation and correction of fire, used with either machine guns or artillery. Unlike the instrument above, it employs a scissor movement and may, therefore, be used in either a vertical or horizontal position.

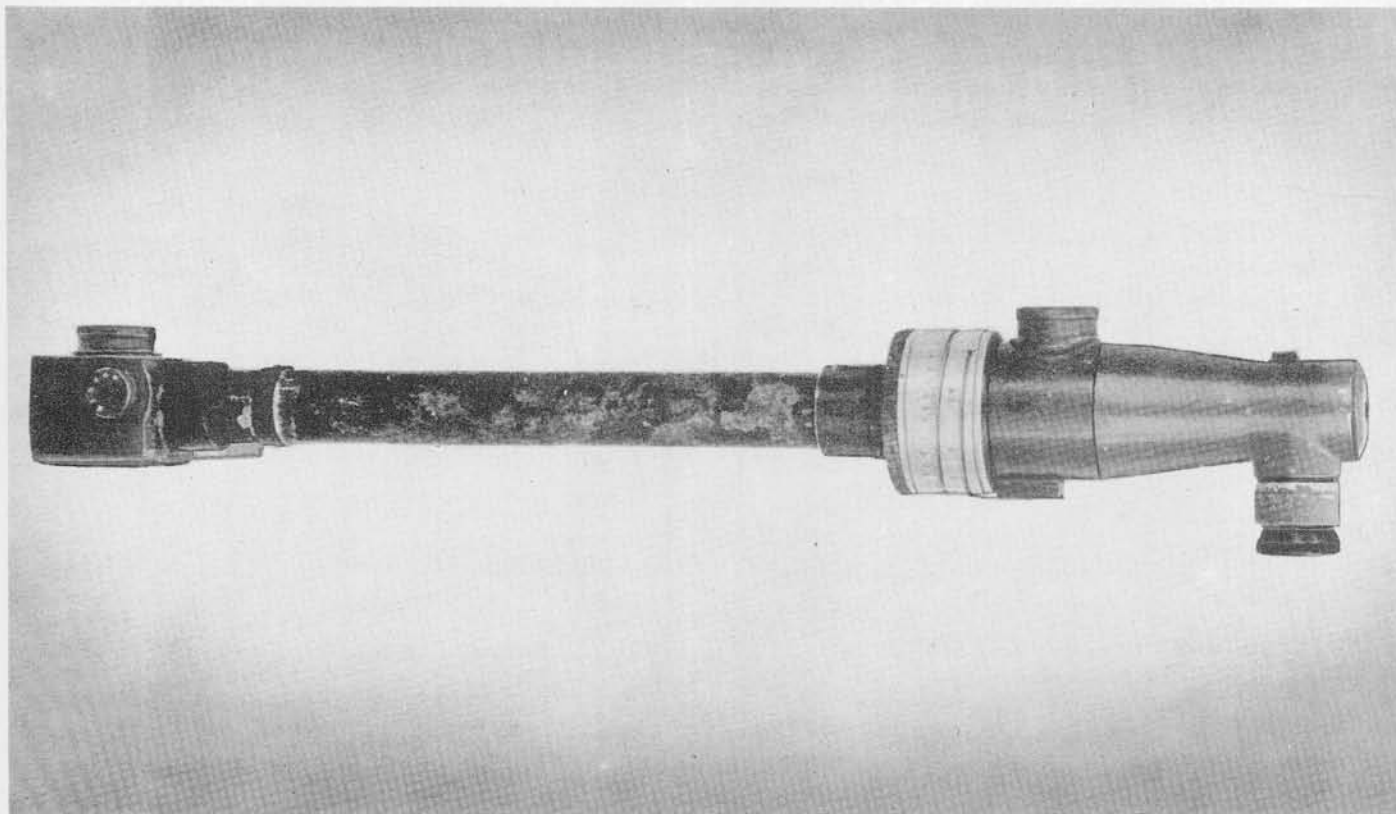
The reticle is the only angle measuring device provided. The limit for horizontal angles is 30 mils to the right and 10 mils to the left of zero. Vertical angles of plus and minus 20 mils can be measured. The 90° prisms are cemented. Minimum and maximum interpupillary distances are 60 mm and 70 mm.

The tripod is simply constructed, light in weight, and sturdy. It comprises an adapter or bracket for the telescope, a tripod head, and three tubular, fixed length legs with small metal shoes.

SPECIFICATIONS

| | Model 93 | Tel. with Int. Tripod |
|--|----------------|--------------------------|
| Power | 8 diameters | 8 diameters |
| Field of view | 6° 15' | 6° |
| Interobjective distance | 3¾ ins. | * |
| Interpupillary setting | 58 to 70 mm | 54 to 70 mm |
| Deviation of light in vertical plane | 10 ins. | 9 ins. |
| Diameter of Exit Pupil | .2 in. | .15 ins. |
| Overall length | 12¾ ins. | 12 ins. |
| Overall width | 6¼ ins. | |
| Weight | 6 lbs., 5 ozs. | 2 lbs., 2 ozs. |
| Length of tripod | | 11 13/16 ins. |
| Weight of tripod | | 11 ozs. |

* The interobjective distance with the tubes horizontal, and the interpupillary scale set at 64 mm is 21 ins.; with the tubes vertical, and the interpupillary scale set at 64 mm, the interobjective distance is 5 ins.

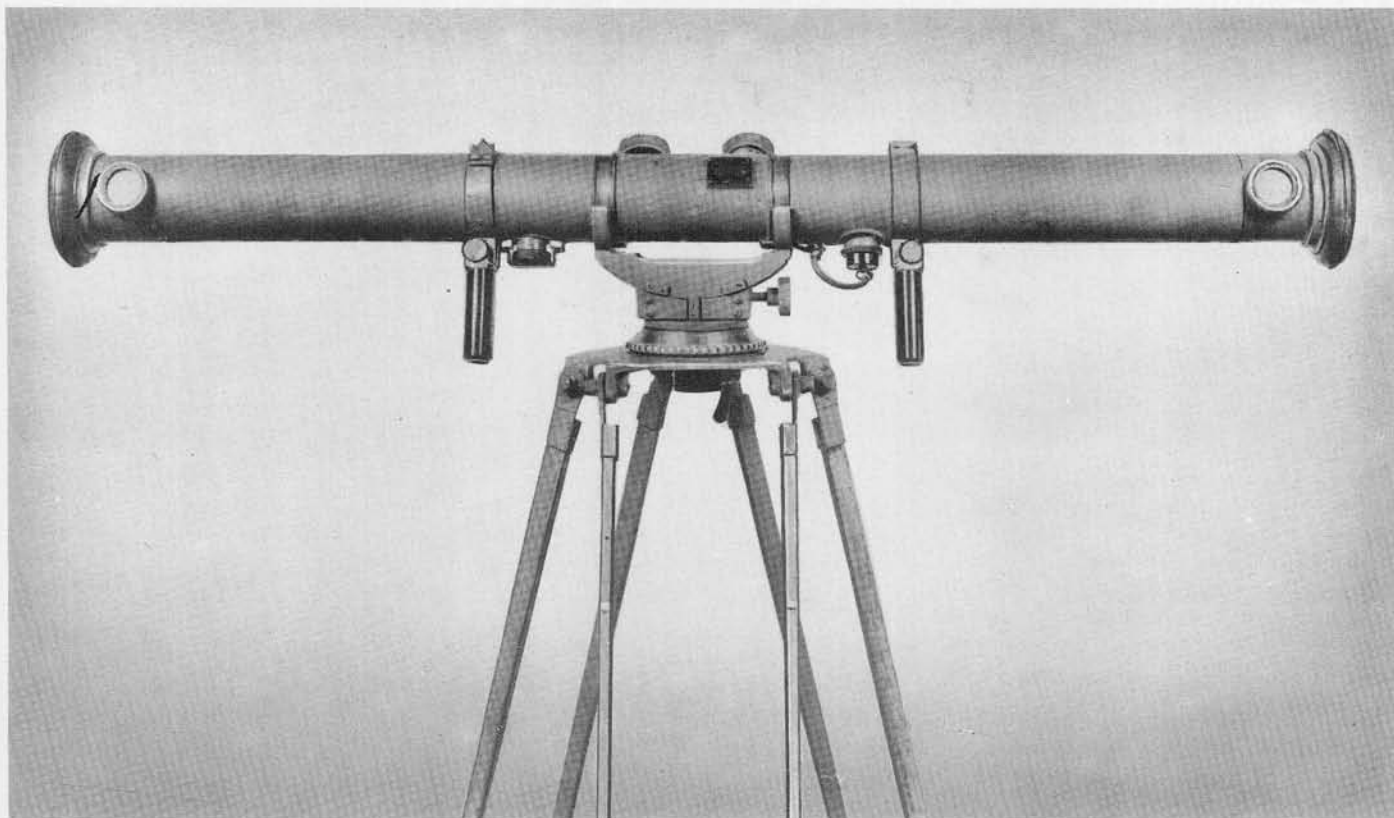


This range finder is a superimposed image vertical base instrument designed for use with machine gun and mortar fire. It consists of two major assemblies: the elbow, and the diaspirometer unit and head. The elbow housing is of seamless aluminum, 4¾ inches in length. It contains the eye and field lens, an amici prism, a reticle, a penta prism, and the objective lens. The brass diaspirometer unit contains two wedges with connecting gears that govern the aluminum range drum; the extension tube made of seamless aluminum which maintains the base length of the instrument; and the cast aluminum head which houses a penta prism and a weak correction wedge.

The instrument is used in conjunction with a mount and tripod. Because of the short base length, this range finder is not accurate at distant ranges.

SPECIFICATIONS

| | |
|-----------------------------------|--------------------|
| Power | 4 diameters |
| Field of view (upper field) | 11° |
| (lower field) | 4° |
| Base length | 40 cm |
| Measuring limits | 30 to 1,500 meters |



This instrument is very similar to the 80 cm base range finder, Keuffel and Esser Model 1918. It also resembles the design of the Barr and Stroud instrument. It is, therefore, assumed that it is used much the same as the American 80 cm base, M1914M1 Range Finder. It is a coincidence type range finder with a split field of view, and is used by light field artillery units.

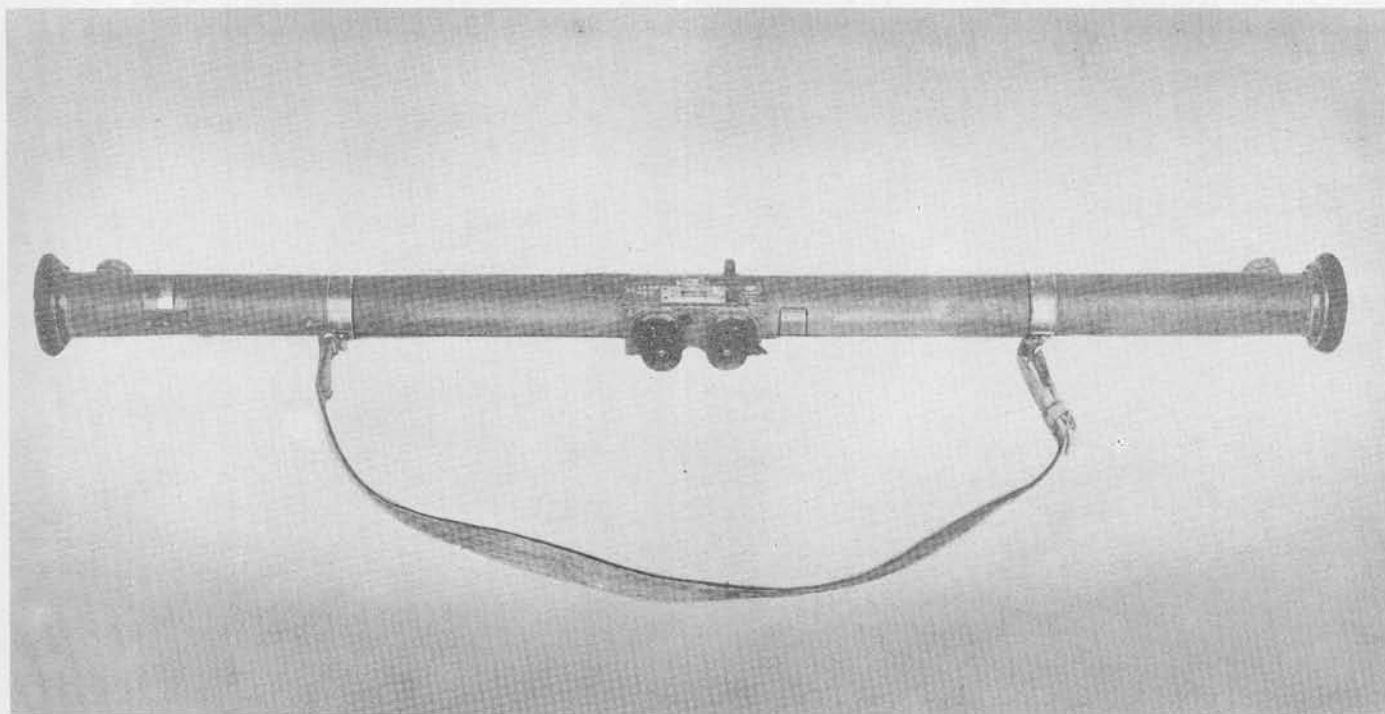
The ocular prism consists of three optical components cemented together resembling the arrangement in the American 1 meter base range finder, M1916. The eyepiece assembly is of the symmetrical type. The halving plate is a thick piece of optical glass with plano parallel surfaces. The measuring wedge and range scale are a single assembly. The latter is illuminated by the light rays entering through the range scale illuminating window, and reflected by a mirror. The objectives, installed as matched pairs are burnished in their cells. The penta prisms and wedge windows resemble those used in American range finders.

An effort has been made, through a bushing in the center of the buffer assemblies, to desiccate the instrument. It is not believed that the eyepiece assemblies can be sufficiently sealed to make this effective.

The tripod is lightly constructed and has no locking device for the legs. The tripod mount permits the range finder to be locked or rotated in azimuth. There is also a leveling device, but no level vial.

SPECIFICATIONS

| | |
|-------------------------------|---------------------------|
| Base length | 75 cm |
| Magnification | 12 power |
| Range | 100 to 10,000 yds. |
| Field of view | Vertical 2°—horizontal 3° |
| Weight of range finder | 9 lbs. |
| Weight of carrying case | 6 lbs. |



This instrument is a one-meter base, stereoscopic, horizontal base rangefinder. Ranges are read directly from the reticles.

The outer tube is made of cast aluminum. The inner tube, made of seamless steel tubing, is supported in the outer tube by means of a gimbal joint. The height of image knob is located on the right end of the instrument; the range correction knob is on the left side. The lighting window of the reticle is above the eyepiece plate. An auxiliary open sight is located above the right eyepiece.

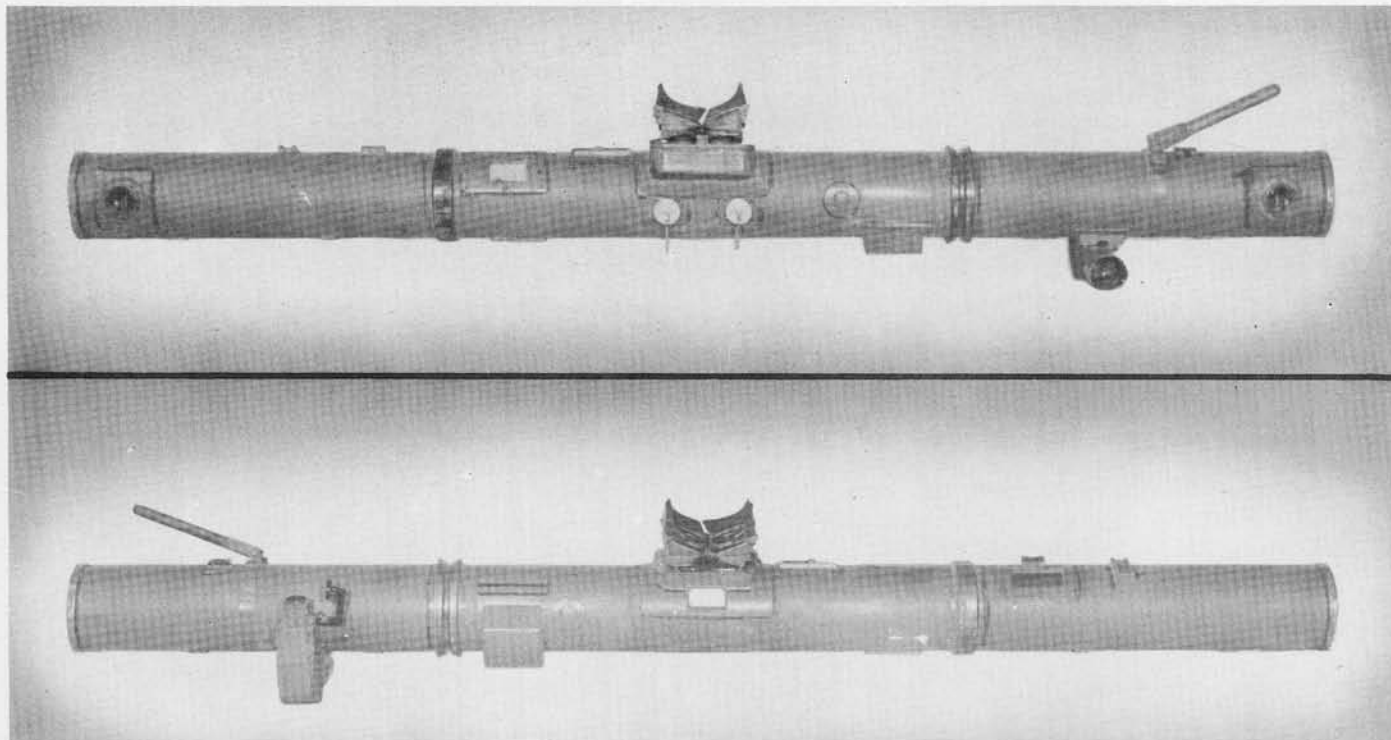
Uniform adjustment of interpupillary distance is obtained by connecting the two eyepieces with steel tape forming a figure 8. Rhomboid prisms keep the optical axes of the eyepieces in alignment with the reticles. The penta prism assemblies are held to circular plates which may be rotated to eliminate tilt of image and place both images at the same height in the field of view.

SPECIFICATIONS

| | |
|------------------------------|--------------------|
| Power | 8 diameters |
| Field of view | 5° |
| Base length | 1 meter |
| Diopter movement | + and - 4 diopters |
| Interpupillary setting | 55 to 75 mm |
| Overall length | 43¾ ins. |
| Weight | 6 lbs., 13 ozs. |
| Serial number | 1218 |
| Measuring limits | 250 to 8,000 yds. |

STEREOSCOPIC 2 METER BASE RANGE FINDER MODEL 97 TYPE 2

JAPANESE



This range finder is believed to be designed for use with seacoast defenses. It is provided with an elbow telescope for tracking purposes and a graphical computer for converting slant range to altitude.

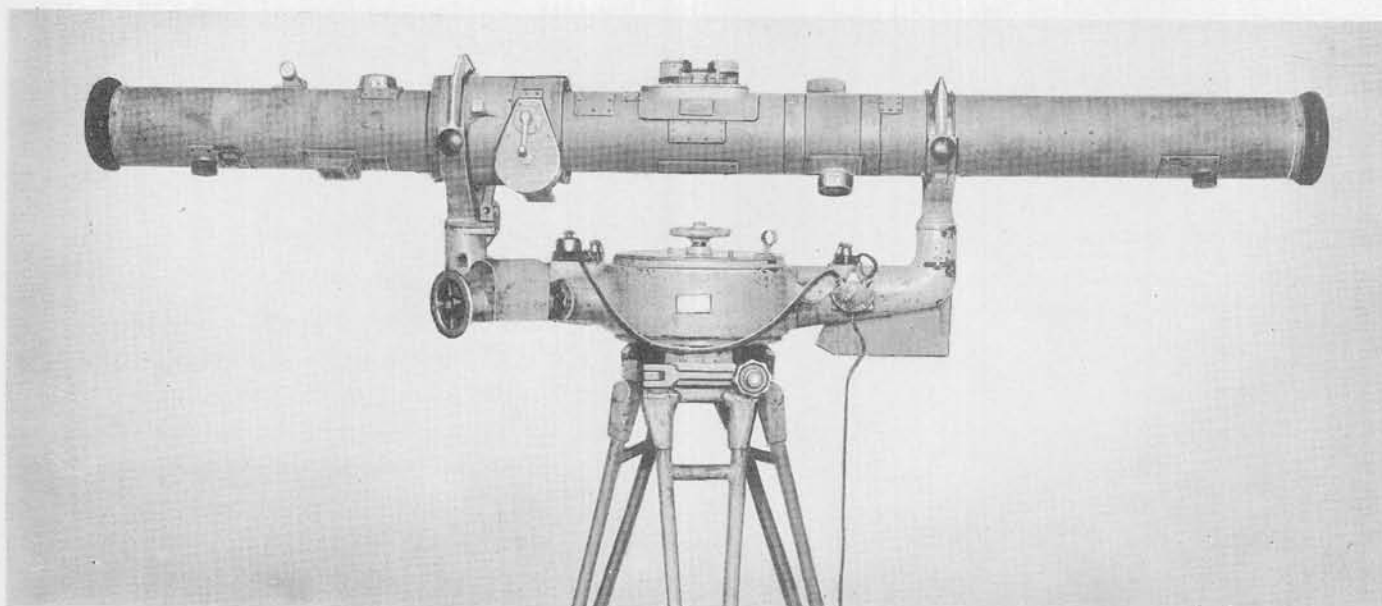
A number of its design features are quite similar to those in the Japanese 2 meter base Height Finder. Similarities are noted in the penta prism mounting, central prism assembly, reticle and eyepiece assemblies, night lighting of scales, and the filter assembly. The instrument is constructed with an outer tube, optical tube, and two tubular diaphragms, all of steel. The outer tube is covered with asbestos treated canvas. The tracking telescope provided with this instrument has a power of 10 diameters and a 5 degree field of view. The body is made of cast aluminum. The tracking telescope is attached to the main instrument by means of a dovetail bracket and is locked in place by a spring latch.

Another accessory, the graphical altitude computer, consists of a pendulum arm inclosed in a circular holder. The pendulum is graduated with a vertical scale in increments of 50 meters from 100 to 1,000 meters, which represents slant range. Angle of site is indicated by a graduated scale on the face of the holder. The cradle has the trunnion bearing arms cast as an integral part of the body. The eyeguard assembly is a copy of the Carl Zeiss design.

SPECIFICATIONS

| | |
|----------------------------------|----------------------|
| Power | 24 |
| Field of view | Undetermined |
| Diameter of entrance pupil | 1.9 ins. |
| Diameter of exit pupil | .08 ins. |
| Base length | 2 meters |
| Diopter movement | + 2 to - 4 diopters |
| Measuring limits | 500 to 20,000 meters |
| Inter-trunnion distance | 35½ ins. |
| Overall length | 86 ins. |
| Weight | 148 lbs. |

STEREOSCOPIC 2 METER BASE HEIGHT FINDER, MODEL 93

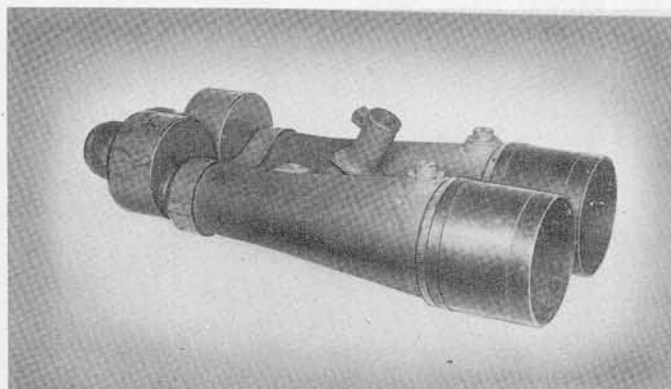


While primarily designed for use by antiaircraft batteries, a mining horizontal as well as vertical range. The eyepieces are of range finder of this type may be used by artillery units for determining the focusing type. Interpupillary distances may be set to suit the individual observer by means of a lever located on the right eyepiece. The eyepiece assembly also contains two ray filters.

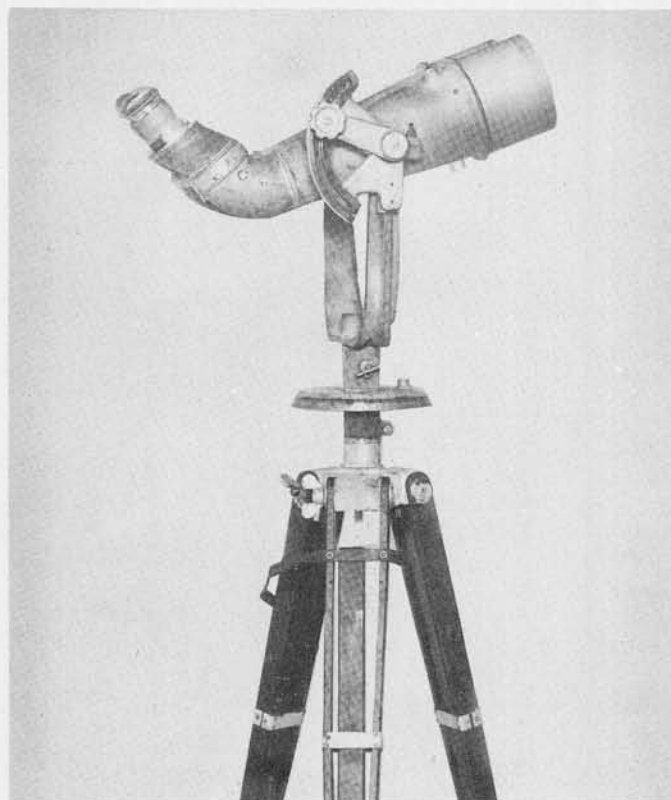
The instrument consists of three major assemblies which are: the Range Finder Table, the Cradle, and the Tripod assembly. The outer tube is made of seamless steel tubing and has seven openings for adjustments. In addition, there are other openings for the eyepiece assembly, wedge windows, infinity correction lens assemblies, range knob, height of image knob, correction wedge assembly, range drum window, and reticle light windows. The optical bar is made of seamless machined steel and represents better machine work than most Japanese fire control instruments.

SPECIFICATIONS

| | |
|----------------------------------|--------------------|
| Power | 20 diameters |
| Field of view | 2° 15' |
| Interpupillary setting | 56 mm to 74 mm |
| Diopter adjustment | + 2 to - 4 |
| Limits of range measuring..... | 400 to 20,000 yds. |
| Base length | 2 meters |
| Overall length | 7 ft. 5 3/8 ins. |
| Weight | 201 lbs. |
| Cradle | |
| Overall length | 36 3/8 ins. |
| Distance between trunnions | 34 11/16 ins. |
| Height | 23 ins. (approx.) |
| Weight | 162 lbs. |
| Tripod | |
| Overall height | 32 ins. |
| Weight | 100 lbs. |



Observation Binoculars, 85 mm



Aircraft Spotting Binoculars, 100 mm



Aircraft Spotting Binoculars, 120 mm

Observation, 85 mm

These binoculars are used for general observation upon a tripod for which an adapter is provided on the instrument. An elevation scale is etched on the reticle and the 90° prisms are cemented. Two steel bands connect the eyepieces mechanically. Drying bents are contained in each telescope.

Aircraft Spotting, 100 mm

The telescope bodies of this instrument are of cast aluminum; the fittings are of brass. The erecting system consists of a roof angle prism held in position by four screws. The objective is housed in an eccentric adapter. The eyepieces are offset from the main tube. Interocular settings are obtained by rotating the eyepiece housings. There are two drying plugs in the body of each telescope.

Aircraft Spotting, 120 mm

It is believed that this improved model is replacing the 100 mm binoculars described above. The eyepiece assemblies include a rhomboid prism. Interocular distances are varied by rotating the left eyepiece assembly. The erecting system consists of one porro prism and two 90° prisms cemented to the porro system.

A feature of this instrument is the dehydrating unit consisting of a silk bag of silica gel placed in a perforated metal holder fitted between the two telescope assemblies. Drying vents are also provided.

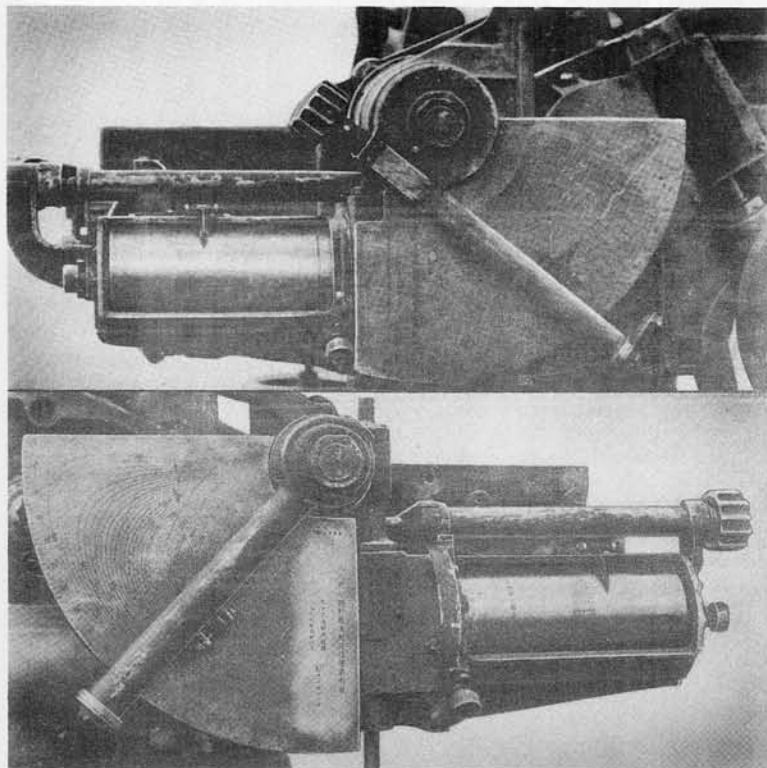
SPECIFICATIONS

| | 85 mm | 100 mm | 120 mm | |
|--|--------------|------------------|--|--|
| Power | 15X | 15 | 20X | |
| Field of view | 4° | 4° | 3° | |
| Interobjective distance (approx.) | 4 7/16 ins. | 5 9/16 ins. | 7 ins. | |
| Diopter move- ment | + 2 to - 4 | + 2 to - 3 | + 2 to - 4 | |
| Interpupillary Move- ment | 60 to 72 mm | 60 to 72 mm | 58 to 72 mm | |
| Length | 18 ins. | 21½ ins. | 24 ins. | |
| Width | 18½ ins. | 16 ins. | 18 ins. | |
| Weight | 21½ lbs. | 32 lbs., 12 ozs. | 50 lbs., 8 ozs. | |
| Manufacturer..... | Jap. Op. Co. | Jap. Op. Co. | Toyko Optical Mach. Stock Joint Co. | |
| Serial number | 915 | 2254 | 63 | |

FIRE CONTROL EQUIPMENT

for 75 mm Model 88 (1928) A. A. Gun

JAPANESE



Above: Elevation Computing Apparatus

Below: Azimuth Computing Apparatus

These instruments are used with the Mobile Field Antiaircraft Gun described on page 110. The method used to predict the future position of a moving target in space differs from both the angular rate of travel and the linear speed methods, although based on the latter. Antiaircraft installations captured before the middle of 1944 showed very little use of computing directors and remote control systems. The system described herein is apparently all that was available.

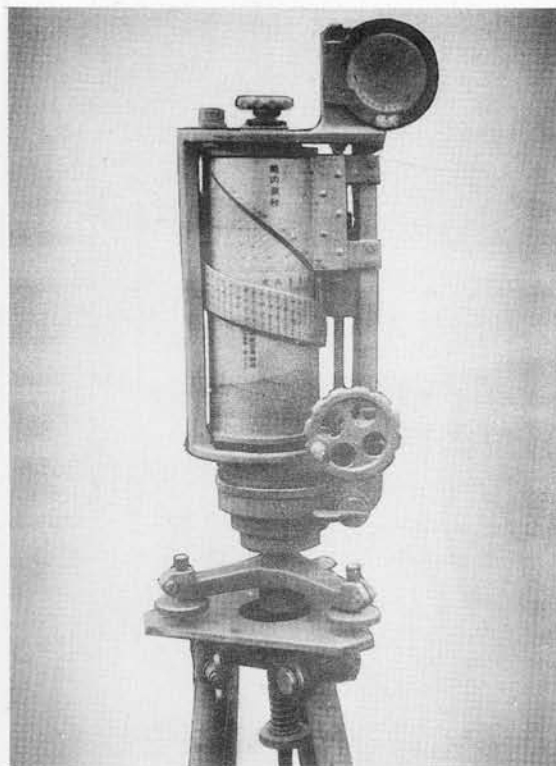
The following instruments and computing mechanisms are employed in the system as off-carriage components:

- a. Two-meter-base height and range finder.
- b. Speed and course angle calculator.
- c. Charge (propelling) temperature and wind corrector scale.
- d. Spotting binoculars.

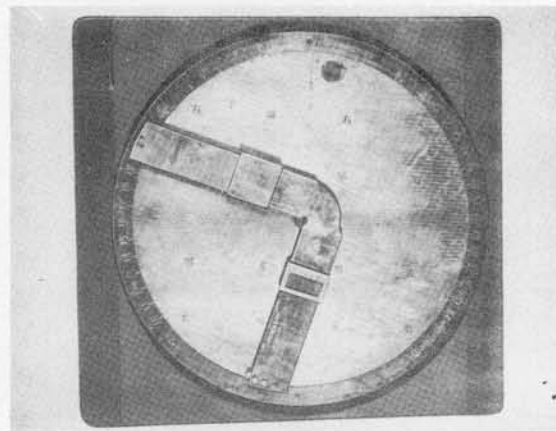
The data computed with the off-carriage components are transmitted orally to the gun where they are manually registered in the on-carriage fire control instruments. The on-carriage components consist of the following:

- a. Elevation computing apparatus.
- b. Azimuth computing apparatus.
- c. Auxiliary elevation and lead corrector disc.
- d. Fuze setter.

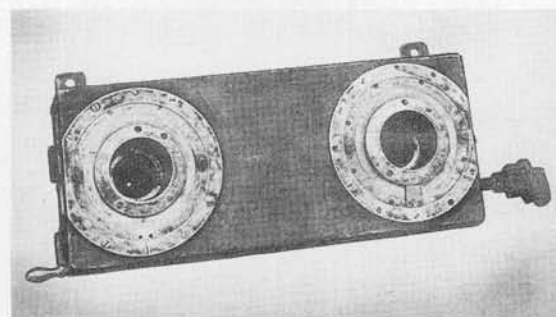
The accompanying illustrations show five of the significant components.



Speed and Course Angle Calculator



Propelling Charge Temperature and Wind Correction Scale



Fuze Setter



On the following three pages are reproduced trajectory charts for six Japanese antiaircraft and dual purpose guns. These were prepared by an Ordnance Technical Intelligence team in the field, and were constructed on the basis of the best available current information, but not on actual tests. It is, therefore, expected that revised charts will be made available as more accurate or detailed information is obtained, and that charts for other artillery pieces will be prepared from time to time.

On the charts the limit of time fire is indicated. In all cases where mechanical time fuzes are available, the limit of time fire is based on the maximum setting of the fuze, since the fuze setting of a mechanical time fuze nearly coincides with actual time of flight at all points. For the 7 cm Type 88 antiaircraft gun, the limit of time fire has been taken from documents. The fuze in this case is the Type 89 30-second, powder-train fuze. Here it should be noted that the actual time of flight obtained with the maximum fuze setting varies greatly over the range of elevations, resulting from the inherent variation in burning time of the powder trains along different trajectories. If subsequent intelligence indicates use of a mechanical time fuze for this gun, as for example, with the 8 cm (3") dual purpose gun, the limit of time fire would approximate the locus of points reached in the time of flight corresponding to the maximum setting of the fuze. A later model powder-train fuze (Type 2, 44-seconds) has been reported for the 7 cm gun. Its contour differs from that of the Type 89, so that the trajectories of the shell would be somewhat different from those here reported; no data are available on the ballistic performance of the gun firing shell equipped with the Type 2 fuze, but it is believed that the performance would be slightly poorer since the Type 2 fuze gives a height of ogive somewhat lower than does the Type 89. However, preliminary intelligence indicates that with the Type 2 fuze actual times of flight correspond much more closely to fuze settings than in the case of the Type 89.

TRAJECTORY CHARTS FOR A.A. GUNS

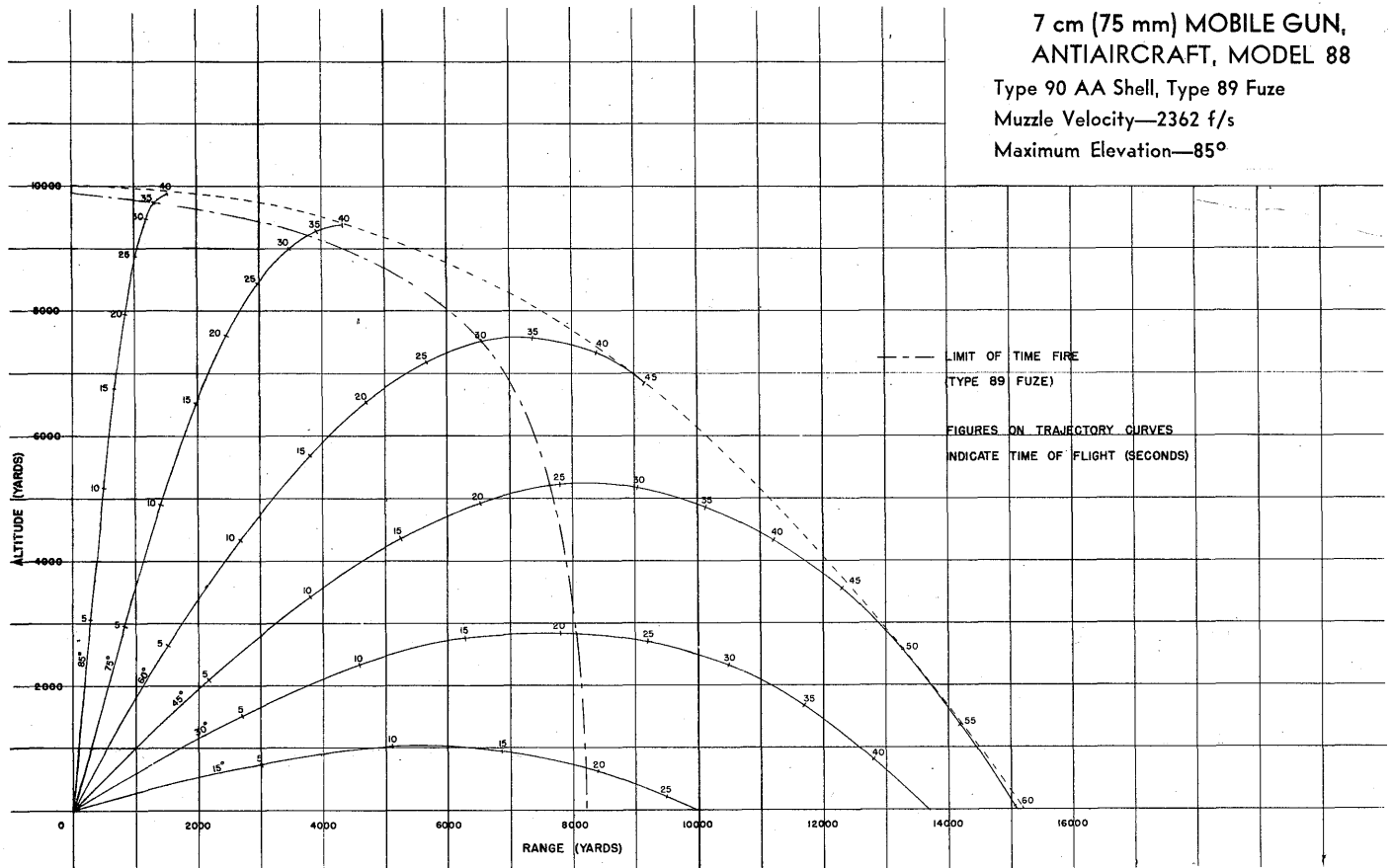
JAPANESE 

7 cm (75 mm) MOBILE GUN,
ANTI-AIRCRAFT, MODEL 88

Type 90 AA Shell, Type 89 Fuze

Muzzle Velocity—2362 f/s

Maximum Elevation—85°

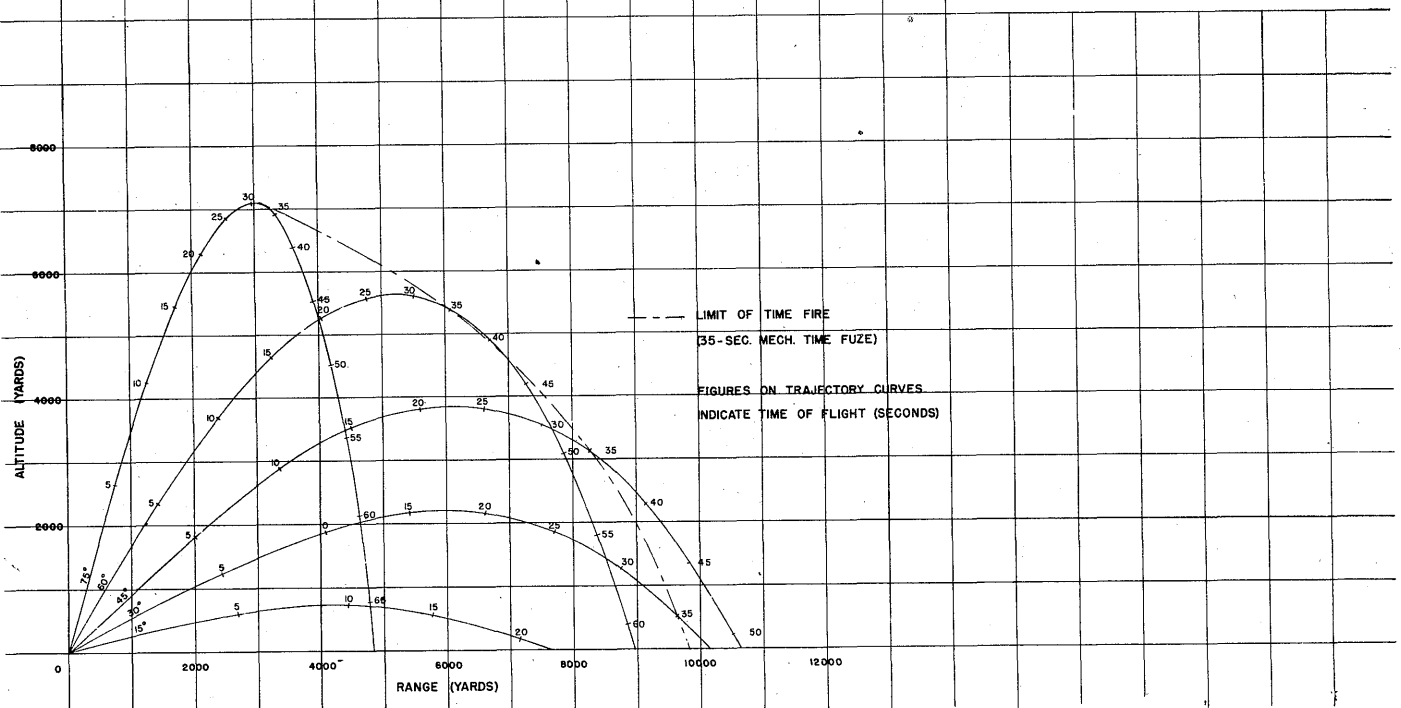


8 cm (3 inch) DUAL PURPOSE GUN
MODEL 3

HE Shell, Normal Charge

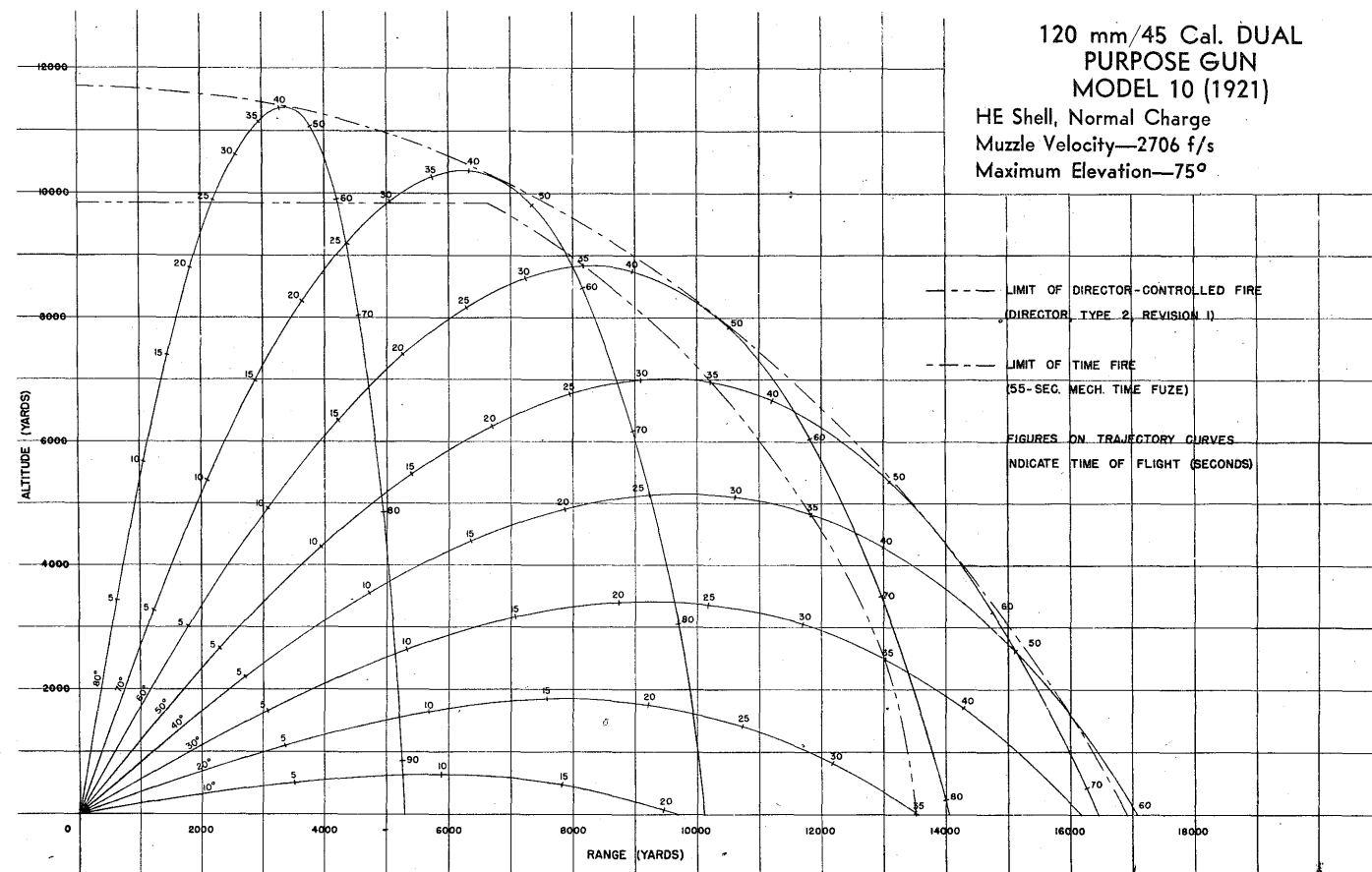
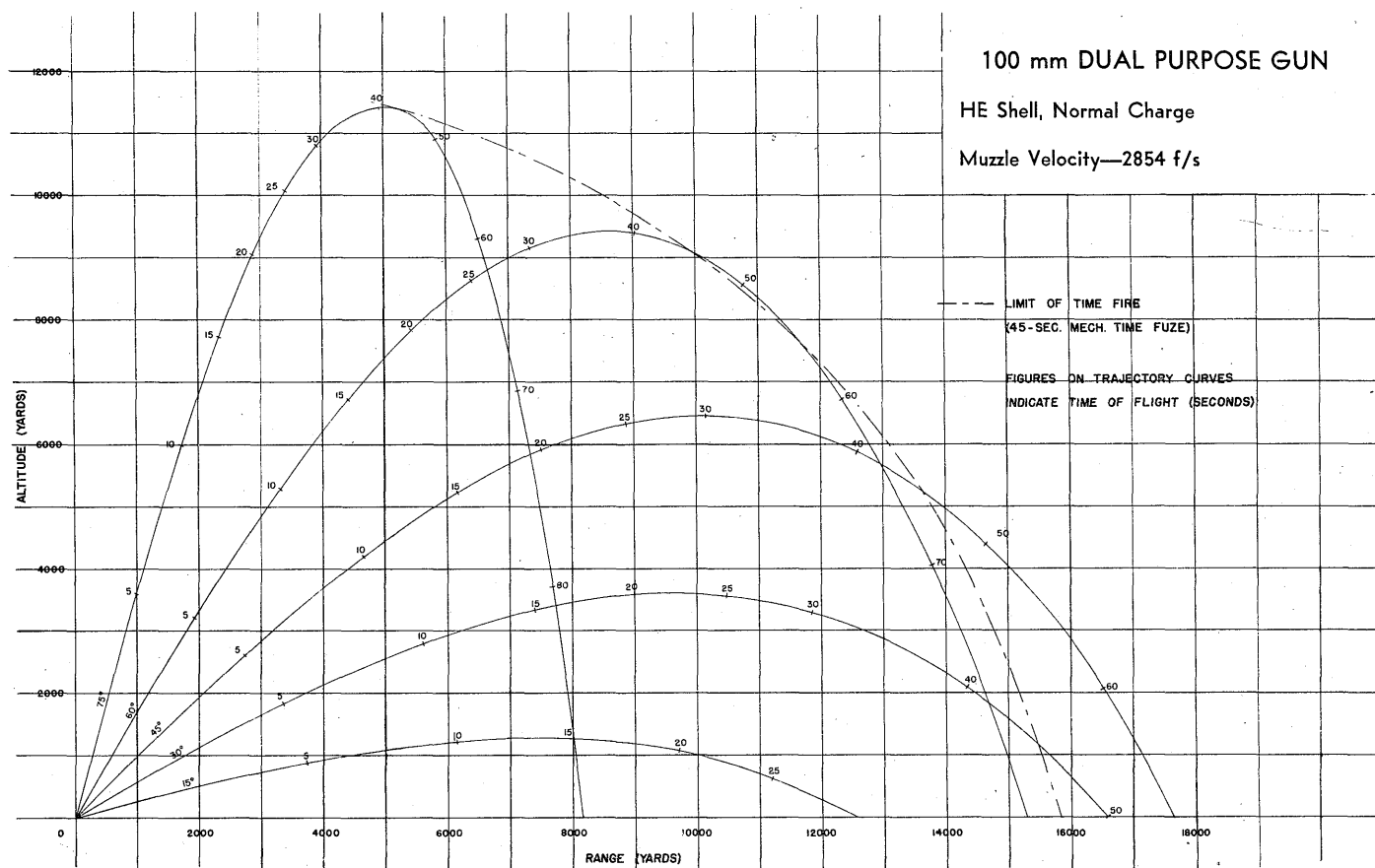
Muzzle Velocity—2230 f/s

Maximum Elevation—75°



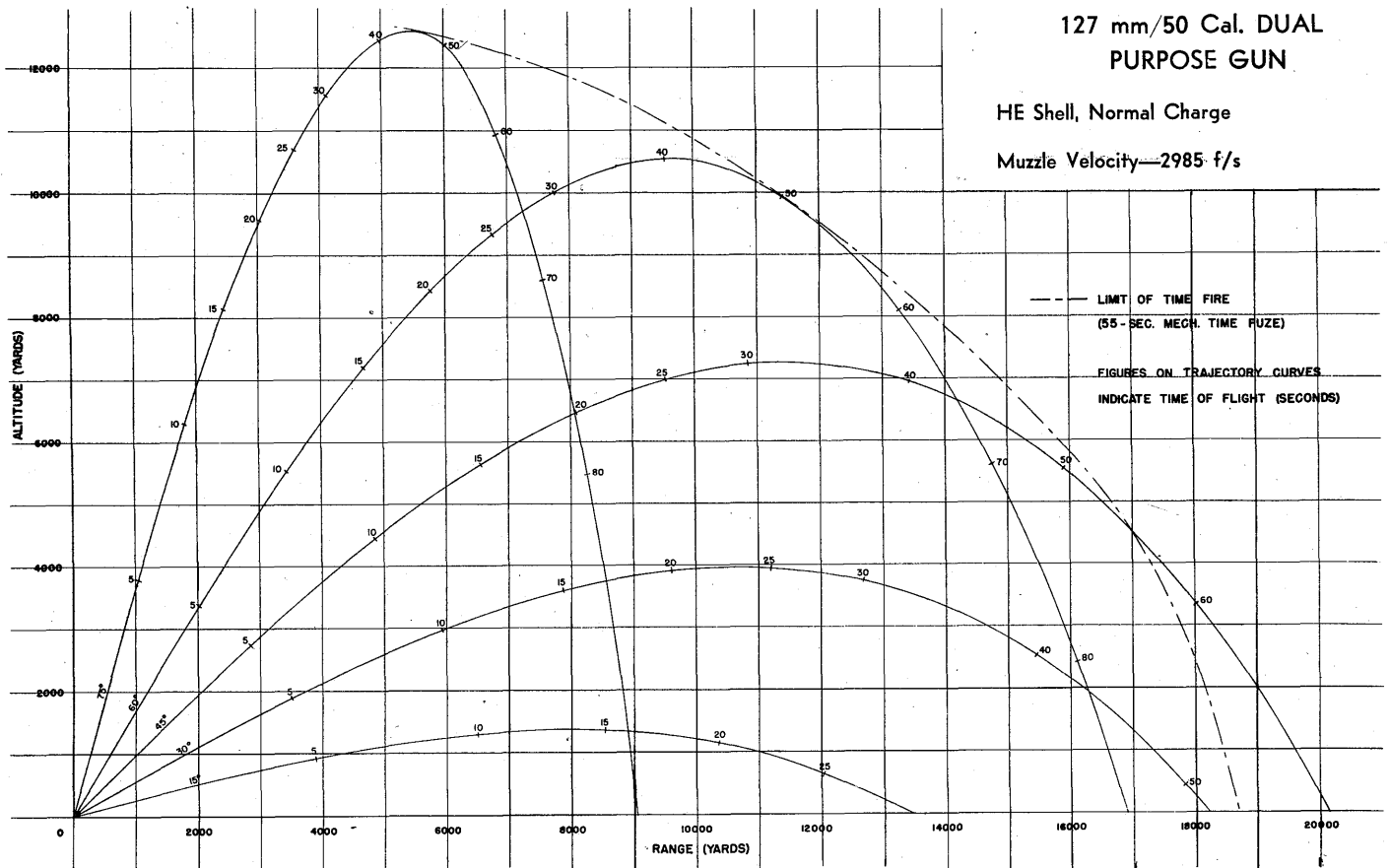
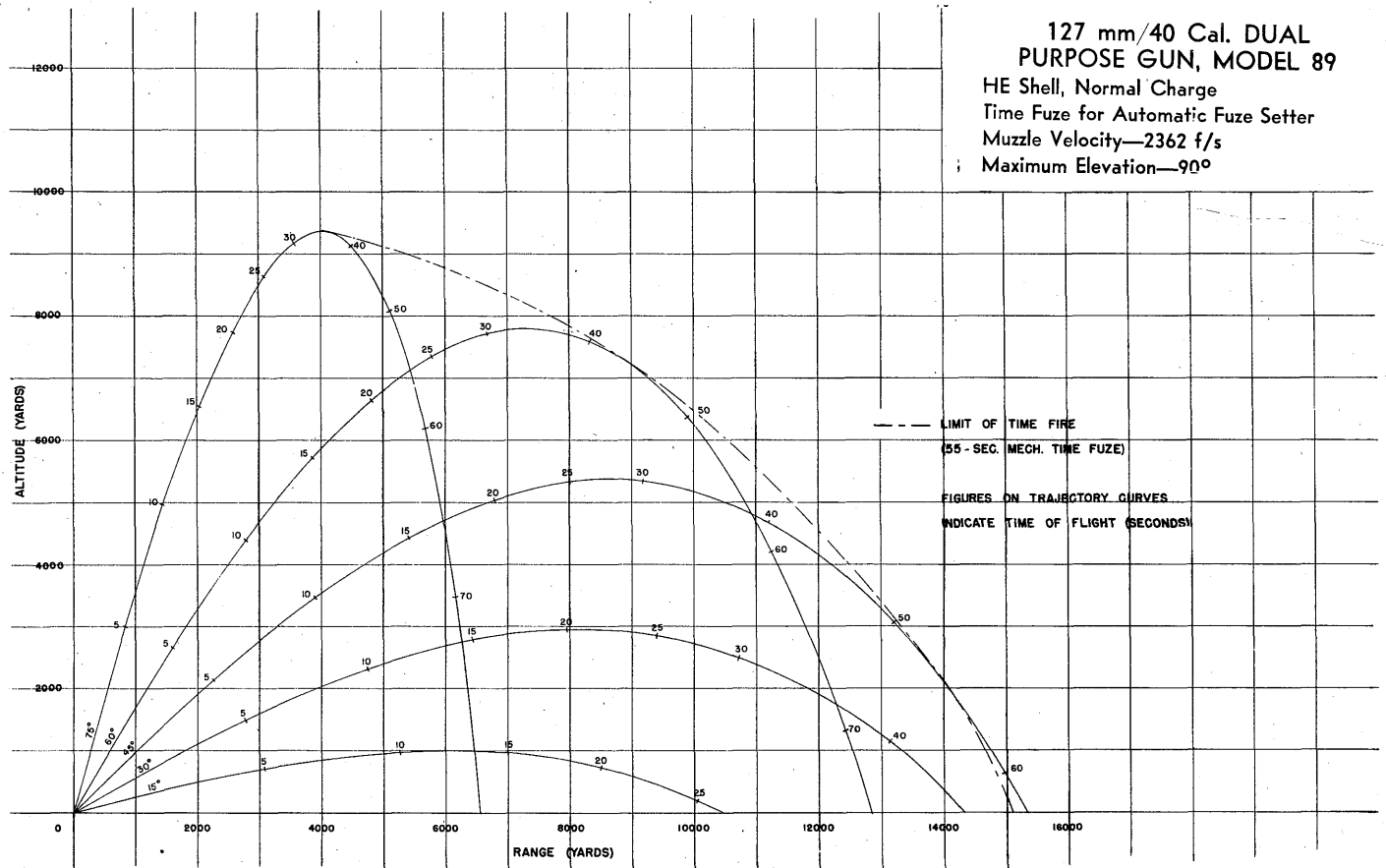
TRAJECTORY CHARTS FOR A.A. GUNS

JAPANESE



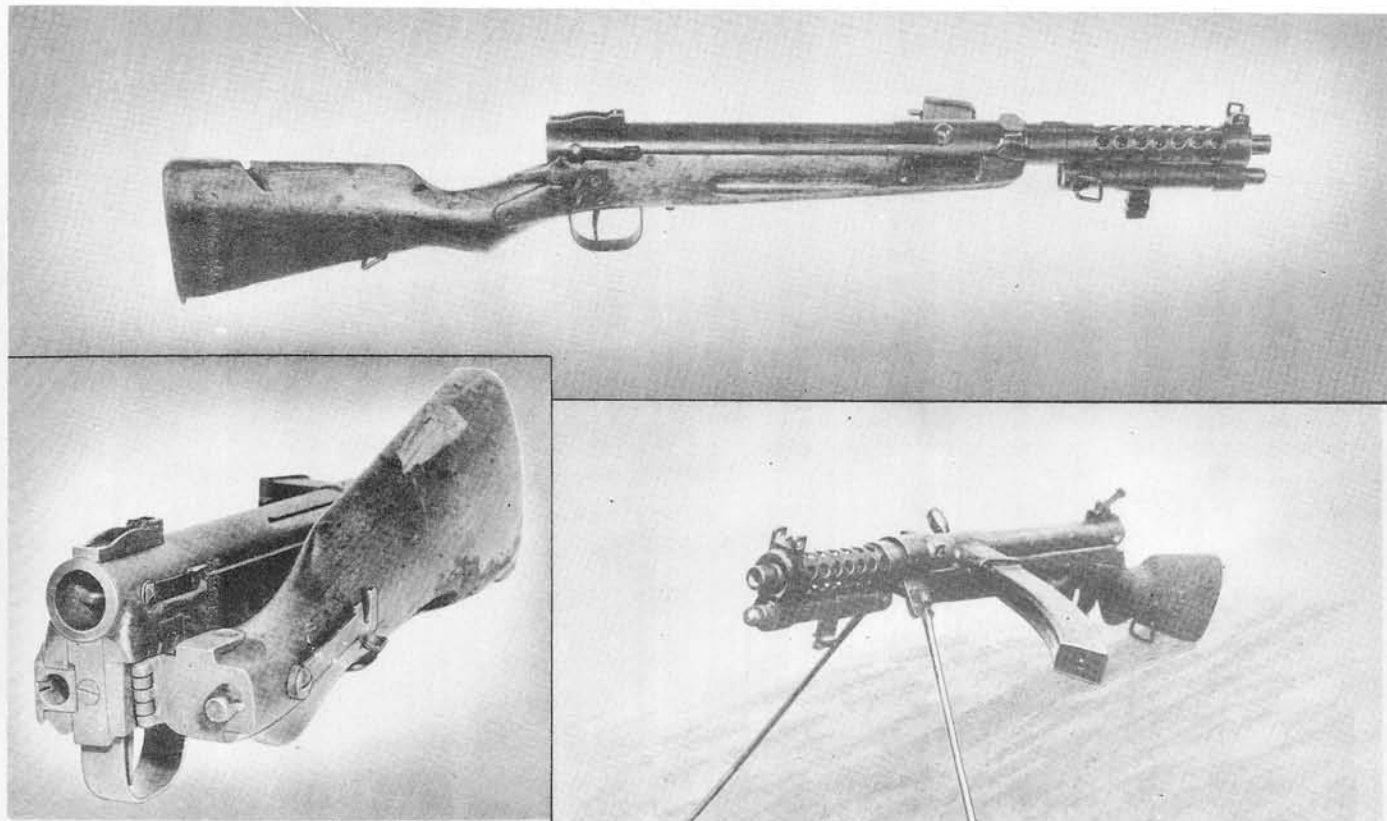
TRAJECTORY CHARTS FOR A.A. GUNS

JAPANESE



8 mm PARATROOPER'S SUBMACHINE GUN, TYPE 100 (1940)

JAPANESE 



This Japanese paratrooper's submachine gun is a light, blow-back operated, automatic weapon which fires the regular issue bottle-necked 8 mm pistol cartridge.

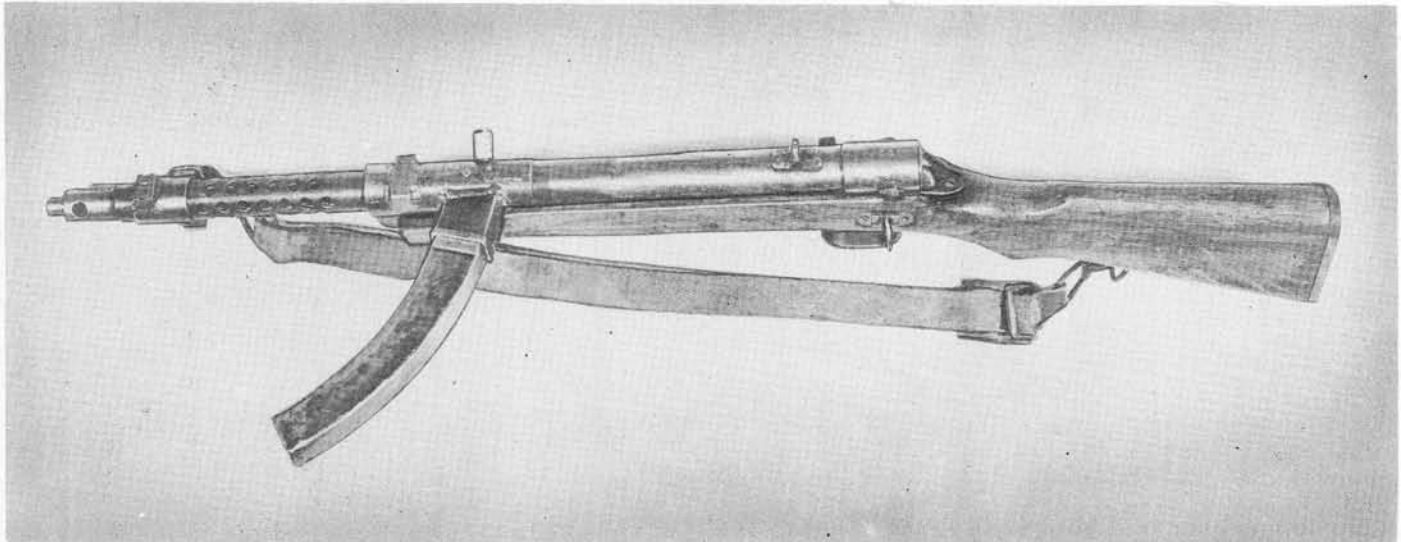
The gun, which is provided with a bayonet, also has a folding stock; that is, the stock is cut through just behind the receiver and hinged so that by releasing two locking hooks on the left side, the stock swings to the right and forward 180 degrees at the hinge and parallel with the barrel. The barrel and barrel jacket are held in place by a single screwpin threaded at the base and with a folding wingnut head, enabling changes without tools. The receiver assembly is machined in two units, with the units shrunk fit in final assembly.

Two features of the firing mechanism which are of unusual interest are the fixed firing pin which screws into the face of the bolt, and the feeding and chambering bar which insures that the cartridge is very nearly chambered before the firing pin can touch the primer.

In the illustrations above, the top picture shows the weapon as fired, and the photograph at lower left shows the method of folding. A bipod is frequently used with this gun as illustrated in the photograph at lower right.

SPECIFICATIONS

| | |
|---|---|
| Caliber | 8 mm |
| Weight (without bayonet, magazine, & sightleaf) | 7 lbs., 11 ozs. |
| Length (stock extended, without bayonet) .. | 34 ins. |
| Length (stock extended, with bayonet) | 49 ins. |
| Length (stock folded, without bayonet) .. | 22.25 ins. |
| Sight radius | 20 ins. |
| Principle of operation | Blowback, bolt action |
| Feeding device | Curved box magazine; staggered feed type. |
| Capacity of feeding device | 30 rounds |
| Cooling system | Air |
| Ammunition types | 8 mm bottle-necked pistol cartridges |
| Rate of fire | 400-450 r.p.m. |
| Type of sight | Leaf |
| Length of barrel | 9 ins. |
| Length of rifling | 8.125 ins. |
| Rifling | |
| Twist | Uniform R. H., approx. 1 in 12 |
| No. of grooves | 6 |
| Muzzle velocity | 1,080 f/s |



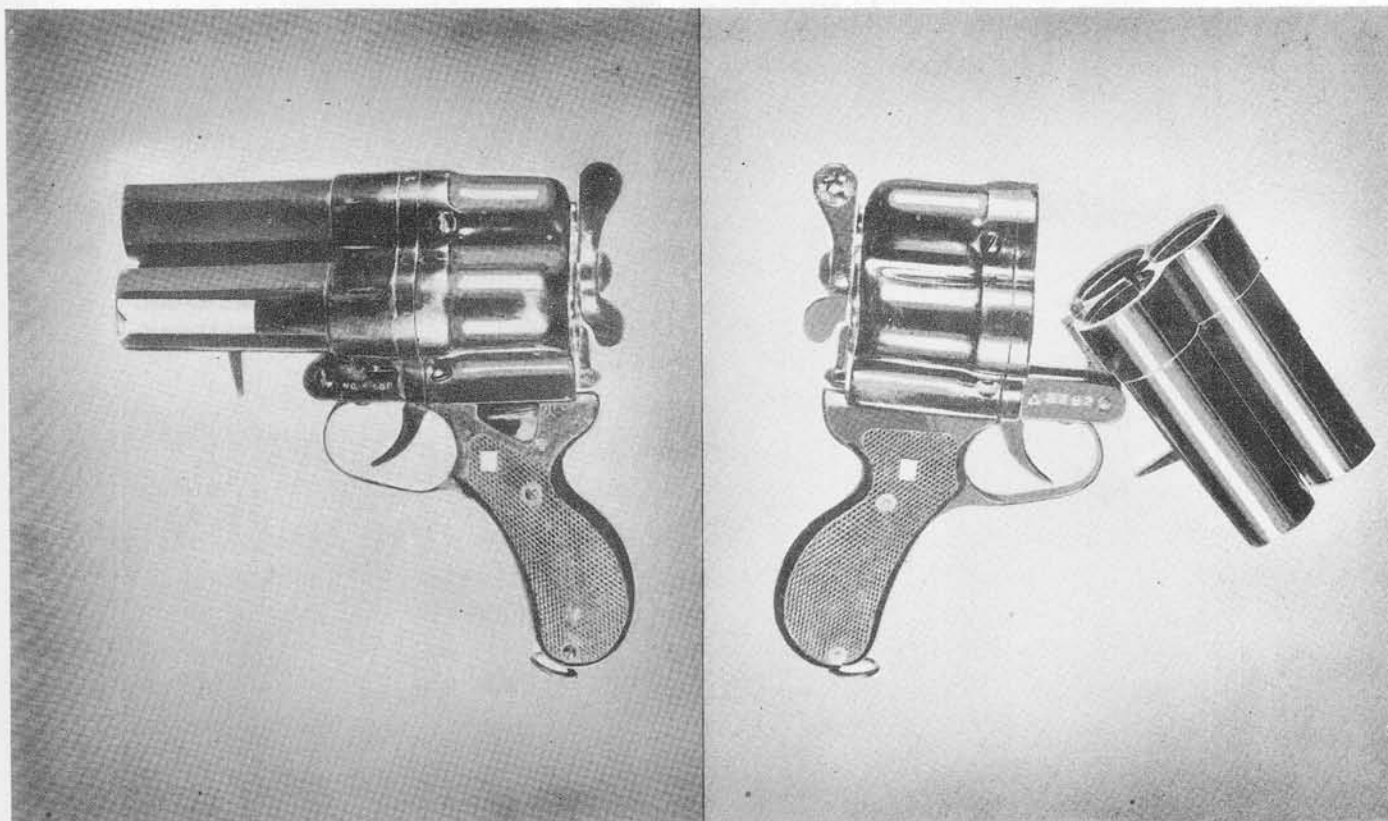
The Japanese 8 mm submachine Gun, Type 100, is an automatic, air-cooled, magazine-fed, straight blowback-operated type, firing from an open bolt. Its basic design strongly resembles that of the German submachine guns. The weapon may be broken down into three main groups: a receiver which contains the bolt and driving spring, a barrel assembly, and a wooden stock assembly containing the trigger and trigger guard. A considerable amount of rough welding is used on the weapon; the front sight, bayonet lug, barrel lock, magazine well, driving spring guide, and trigger guard have all been attached to the rifle by this method. An unusual feature of the gun is a replaceable firing pin which screws into the face of the bolt.

The weapon has a high cyclic rate of fire, estimated between 800 and 1,000 rounds per minute.

It differs from the Type 100 (1940) Paratrooper's rifle, described on page 204.1, in the following respects: it does not have a folding stock; a standard bayonet can be mounted directly on barrel and barrel jacket; and the rear sight is fixed rather than of the sliding ramp type.

SPECIFICATIONS

| | |
|---------------------------------------|--------------------------------|
| Caliber | 8 mm (.315 in.) |
| Weight with sling and magazine..... | 9 lbs., 2 oz. |
| Weight of magazine | 9 oz. |
| Length (overall) | 36 ins. |
| Sight radius: | |
| Principle of operation..... | Straight blowback |
| Feeding device | Curved box magazine |
| Capacity of feeding device | 30 rounds |
| Cooling system | Air |
| Ammunition types | 8 mm pistol |
| Rate of fire (cyclic) | 800-1,000 rds. per min. (est.) |
| Type of sight—Front: Inverted "V" | |
| Rear: "V" with small peep additional. | |
| Weight of barrel | |
| Length of barrel | 9-3/16 ins. |
| Length of rifling | 8.3 ins. |
| Rifling: | |
| Twist | R. H. |
| Form | |
| No. of grooves | 6 |
| Muzzle velocity | 1,050 f/s |
| Maximum range | |
| Effective range | |



The triple barrel signal pistol, of naval design, is made of steel with black baked enamel finish and is equipped with plastic grips. It consists of three main parts: the barrel assembly, the firing mechanism housing, and the receiver. The barrels, which are slightly tapered and of the smooth bore type, can be fired only singly. The left barrel is marked with a red stripe, the top barrel with a white stripe, and the right barrel with a green stripe. The various kinds of ammunition used with the weapon (red, white, and green flares) must correspond with the color markings on the barrel. The weapon is carried in a leather holster.

The pistol is opened for loading by pulling forward on the spring-loaded barrel release lever and forcing downward on both ends of the pistol. Movement of the safety lever upward places the gun in the firing position; downward movement of the lever places the gun in the safe position. A counter-clockwise movement of the cocking lever cocks all three spring-loaded firing pins. Each firing pin has its own sear, and movement of the barrel selector lever to the desired stop directs the movement of the trigger to the proper sear, releasing the proper firing pin and firing the round in the selected barrel. The three stops on the barrel selector lever are as follows: the left hand stop for the left hand barrel, the central stop for the top barrel, and the right hand stop for the right hand barrel.

The barrel assembly and firing mechanism recoil on the receiver during firing against the action of a recoil spring located in the receiver.

A double barrel version of this pistol is shown at the right.

SPECIFICATIONS

Weight of pistol 3 lbs., 11 ozs.

Length of barrel (approx.) 4 ins.

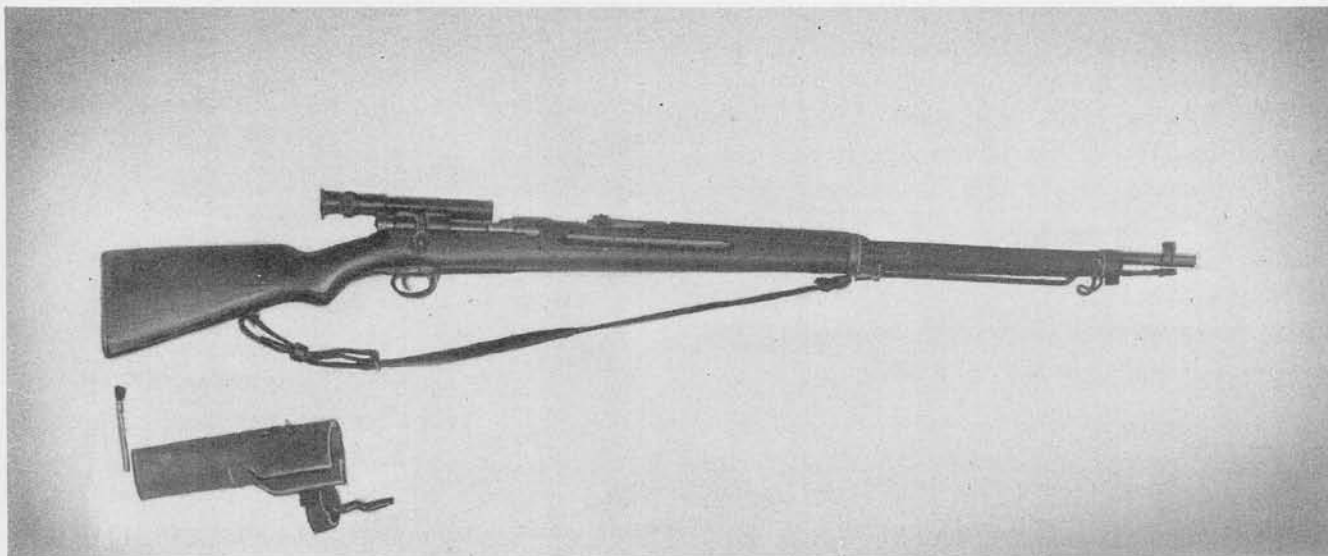
Bore diameter at muzzle 26.8 mm

Bore diameter at breech 28.4 mm

Types of ammunition used

Red, white, & green flares





The Japanese 6.5 mm Sniper's Rifle, Model 97, is a manually operated, bolt-action, air-cooled, shoulder weapon similar to the Model 38 (1905) 6.5 mm rifle except for its monopod, turned-down bolt handle, and telescopic sight. The telescopic sight is attached to the left hand side of the receiver by means of a dove-tailed base. It is a fixed focus type of 2.5 power and has a 10° field of vision.

The telescopic sight is approximately seven inches long and is equipped with an eyepiece of soft rubber. The reticle is marked in the following graduations: vertical from 0 to 15, horizontal 20 mils each side of the center, the markings being at 5 mil intervals. The horizontal line intersects the vertical scale at the 3 mark.

The telescopic sight is removable and when not in use is carried in a well constructed canvas case which has a heavy coating of lacquer on the outside for waterproofing. The case is fitted on the inside with a wooden spacer to secure the sight when it is inside. A small pocket to hold the sight cleaning brush is also constructed inside the case.

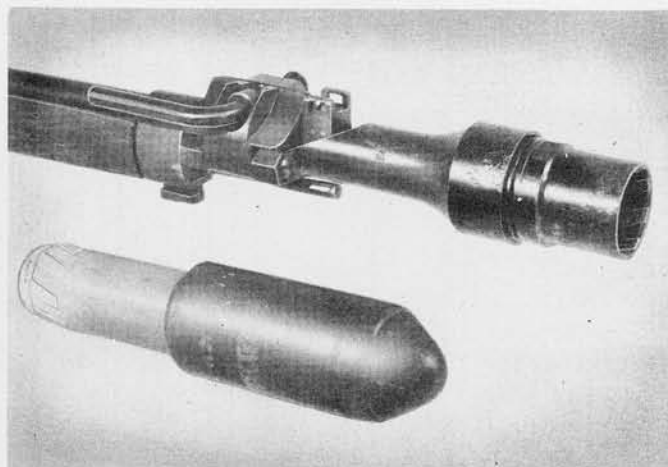
The rifle is also provided with a folding monopod which is pivoted on the lower band.

SPECIFICATIONS

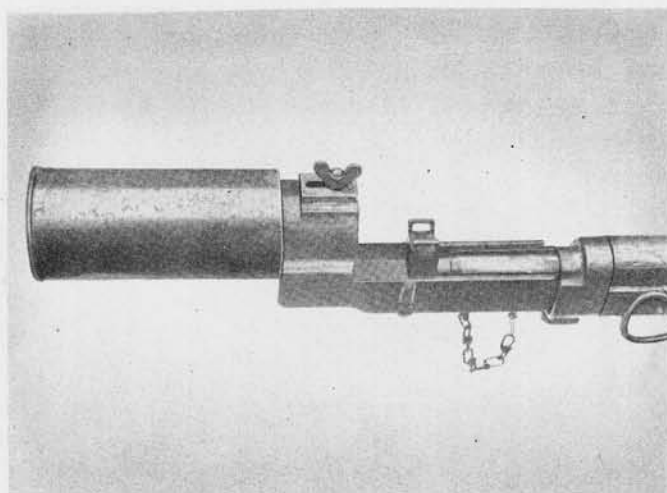
| | |
|-----------------------------------|--|
| Weight (w/telescopic sight)..... | 10 lbs., 8 oz. |
| Length (overall w/o bayonet)..... | 50.25 ins. |
| Sight radius | 26.9 ins. |
| Principle of operation | Manual, bolt-action |
| Feeding device | Box magazine |
| Capacity of feeding device | 5 rounds |
| Cooling system | Air |
| Ammunition types..... | Mod. 38, 6.5 mm ball and reduced charge ball |
| Rate of fire..... | According to dexterity of user |
| Type of sight | 2.5x telescopic sight |
| Weight of barrel | |
| Length of barrel | 31.4 ins. |
| Length of rifling | 29.1 ins. |
| Rifling | |
| Twist | Uniform R.H. one turn in 7.88 ins. |
| Form | Melford segmental |
| No. of grooves | 4 |
| Depth of grooves | |
| Width of grooves | |
| Chamber pressure | |
| Muzzle velocity | 2,400 ft. per sec. |
| Muzzle energy | |
| Maximum range | 2,600 yds. |
| Effective range (approx.) | 600 yds. |
| Type of mount | Folding monopod |

There are three distinct types of grenade launchers in use by the Japanese. They are known as the Type 2 or cup type, the Type 100 or Kiska type, and the spigot type.

The Type 2, which is patterned after the German grenade launcher of the same type, fits over the front sight of the rifle and has a short rifled barrel. It fires both the 30 mm and 40 mm hollow charge rifle grenades. This grenade weighs 12½ ounces, is 8 inches long, has a maximum external diameter of 1½ inches, and contains 3.8 ounces of TNT. The grenade, which is armed during flight by a base detonating, set-back actuated fuze, detonates upon impact with the target. It will penetrate 3¾ inches of mild steel plate.



TYPE 2 CUP TYPE LAUNCHER



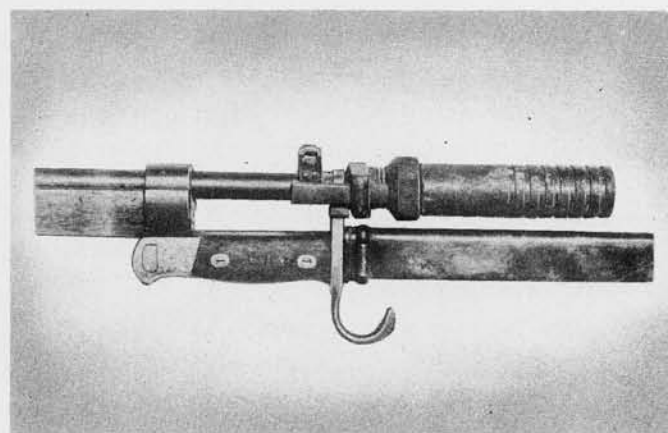
TYPE 100 LAUNCHER

The spigot type launcher, which may be used with either the Type 38 or Type 99 rifle, fires the Type 91, Type 3 H.E., and several types of smoke and incendiary grenades. It consists of a rifled barrel threaded to an adapter. The launcher is attached to the rifle at the rear of the front sight mount by two locking arms on the adapter. When a bayonet is fixed to the rifle, additional stability is obtained by the use of a two-pronged lug on the adapter which fits on the bayonet guard.

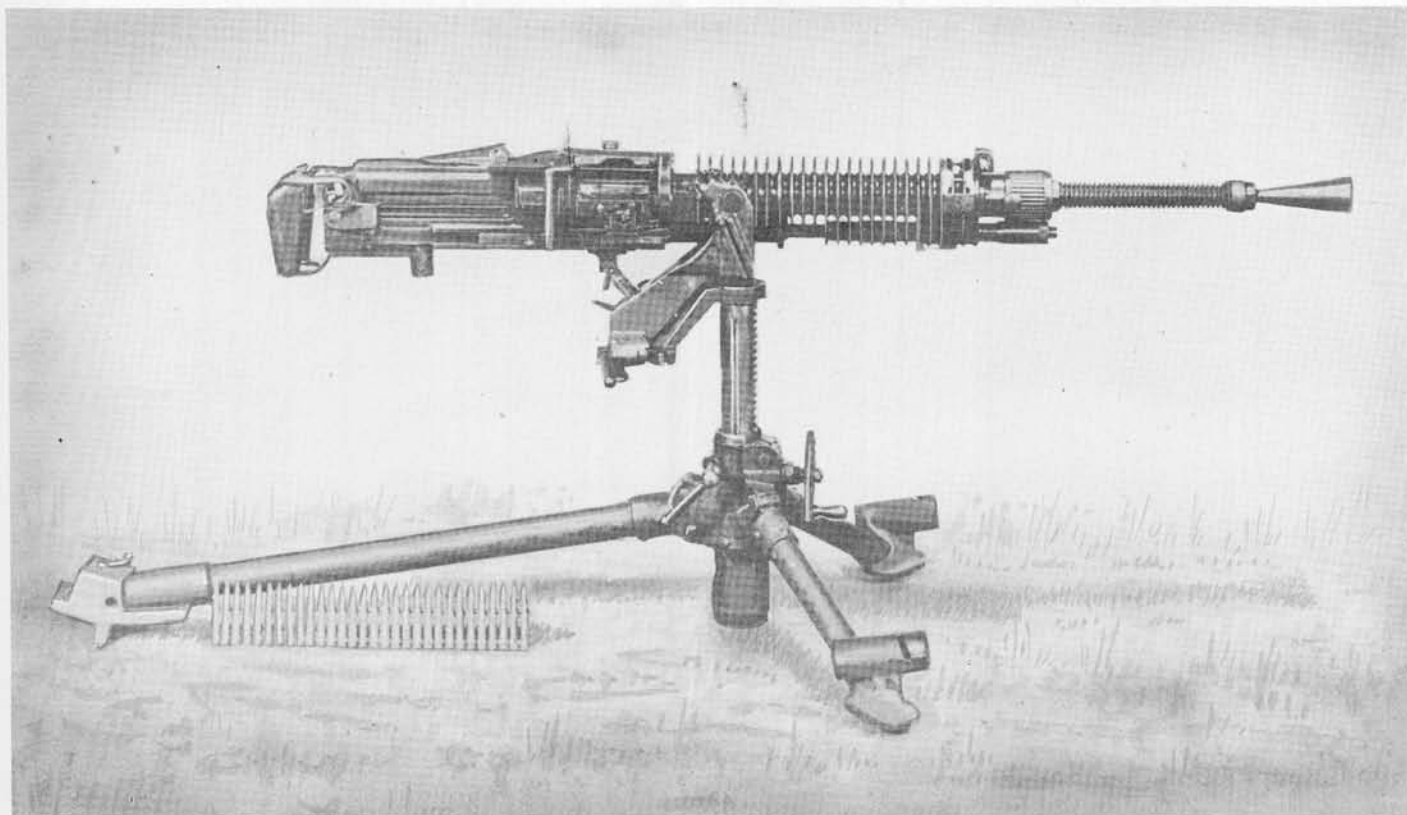
Length of barrel 150 mm—5.9"
Outside diameter of barrel 27 mm—1"
Inside diameter of barrel 21 mm—.82"
Overall length 107 mm—4.2"
Weight (complete) 15.5 ozs.

The Type 100 may be used with either the 6.5 mm Type 38 or the 7.7 mm Type 99 rifle. Ordinary ball ammunition is used to launch the grenade from the rifle (the expanding gas from the fired cartridge is utilized to expel the grenade from the launcher), a feature which enables the rifle to be carried with the launcher attached and ready for use as either a rifle or as a grenade launcher. The Type 99 smooth bodied grenade known as the Kiska grenade is the only type used with the launcher. Ranges up to 100 yards may be obtained.

Overall length 8¾ ins.
Length of grenade tube 4½ ins.
Diameter of grenade tube (interior) 1¾ ins.
Total weight 1 lb., 9 ozs.



SPIGOT TYPE LAUNCHER



The Japanese 6.5 mm Model 3 Heavy Machine Gun, a gas-operated, air-cooled, full-automatic weapon with a comparatively low cyclic rate, although obsolescent, is being recovered in small quantities from battle areas. It is similar to the 7.7 mm Model 92, but is chambered for the 6.5 mm cartridge.

The gas piston and bolt assemblies, and the barrel and barrel sleeve may be interchanged in the two weapons. However, it is impossible to convert the Model 3 for use with the 7.7 mm ammunition as the strip feed port in the Model 3 is one-eighth of an inch narrower than that in the Model 92.

Various machining cuts found in the internal parts of the Model 3 were eliminated in the later model, to provide for ease of production. The oil reservoir is of slightly different shape and probably has a lower capacity than that of the Model 92. The trunnions are of two diameters. The part of the trunnion which contacts the trunnion bearing in the mount is of smaller diameter than that portion which extends beyond the mount. The head thus formed tends to reduce transverse motion.

The weapon has conventional spade grips provided with two finger triggers fixed integrally with the trigger lever so that either or both will fire the gun. There is no safety device.

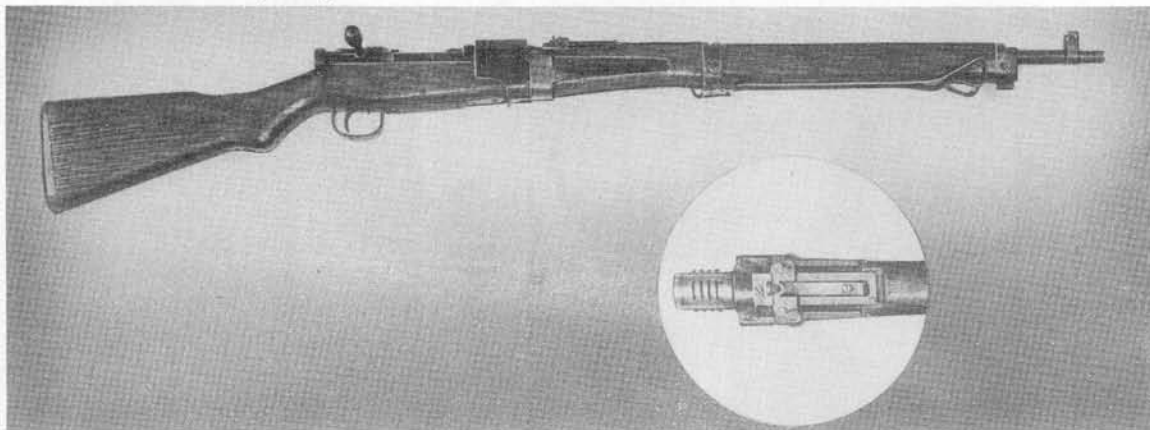
Two rear sights are provided: one, a folding ring type anti-aircraft sight, is attached permanently to the rear top of the receiver; the other, a tangent curve, radius arm type, is offset to the right. The latter sight is graduated from 300 meters to 2,200 meters (328 yards to 2,406 yards). It is believed that a cartwheel type front sight is used, as an adaptor for such a sight is riveted to the front of the cooling jacket.

SPECIFICATIONS

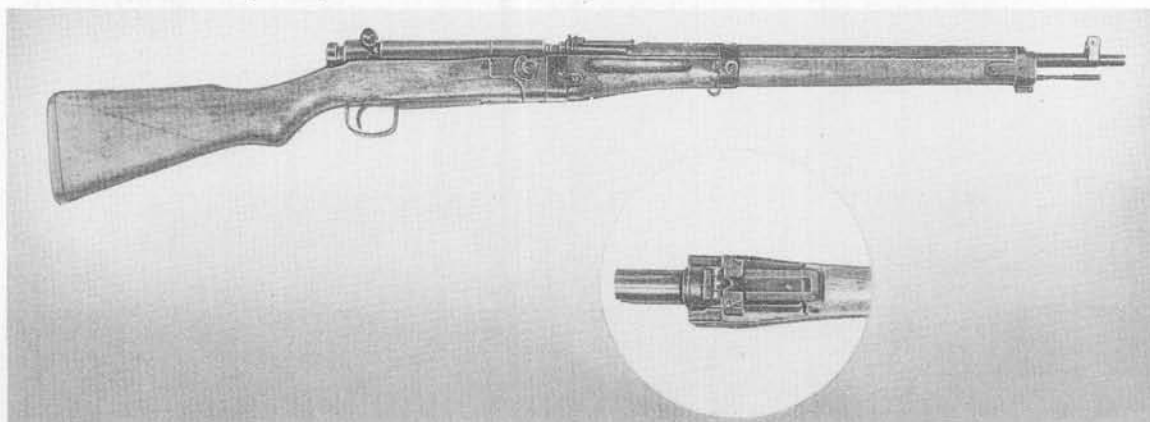
| | |
|----------------------------------|---|
| Weight (w/tripod) | 122 lbs. |
| (w/o tripod) | 61.7 lbs. |
| Length | 47.2 ins. |
| Sight radius | 23.6 ins. |
| Principle of operation | Gas |
| Feeding device | Metal strips |
| Capacity of feeding device | 30 rounds |
| Cooling system | Air |
| Ammunition types..... | Mod. 38, 6.5 mm ball ammunition |
| Rate of fire..... | Cyclic—450-500 r.p.m. Practical—200 r.p.m. |
| Type of sight..... | Two rear sights: folding ring, anti-aircraft type; tangent curve, radius arm type, grad. 328—2,406 yds. |
| Weight of barrel | |
| Length of barrel | 29.2 ins. |
| Length of rifling | 26.4 ins. |
| Rifling | |
| Twist | Uniform, R.H., one turn in 7.88 ins. |
| Form | Metford segmental |
| No. of grooves | 4 |
| Depth of grooves | |
| Width of grooves | |
| Chamber pressure | 58,800 lbs. per sq. in. |
| Muzzle velocity | 2,434 ft. per sec. |
| Muzzle energy | |
| Maximum range | 4,376 yds. |
| Effective range | 1,500 yds. |
| Type of mount | Tripod |
| Elevation | —15° to +9° |
| Traverse | 33.5° |



Model 99 (1939)



Model 2 (1942)



Both of the weapons shown above are basically the same as the Japanese 7.7 mm standard infantry rifle, Model 99. They have been designed, however, to incorporate a takedown feature which enables them to be used by paratroop units. Manufactured at Nagoya Arsenal, they are manually-operated, bolt-action, magazine-fed, clip-loaded rifles.

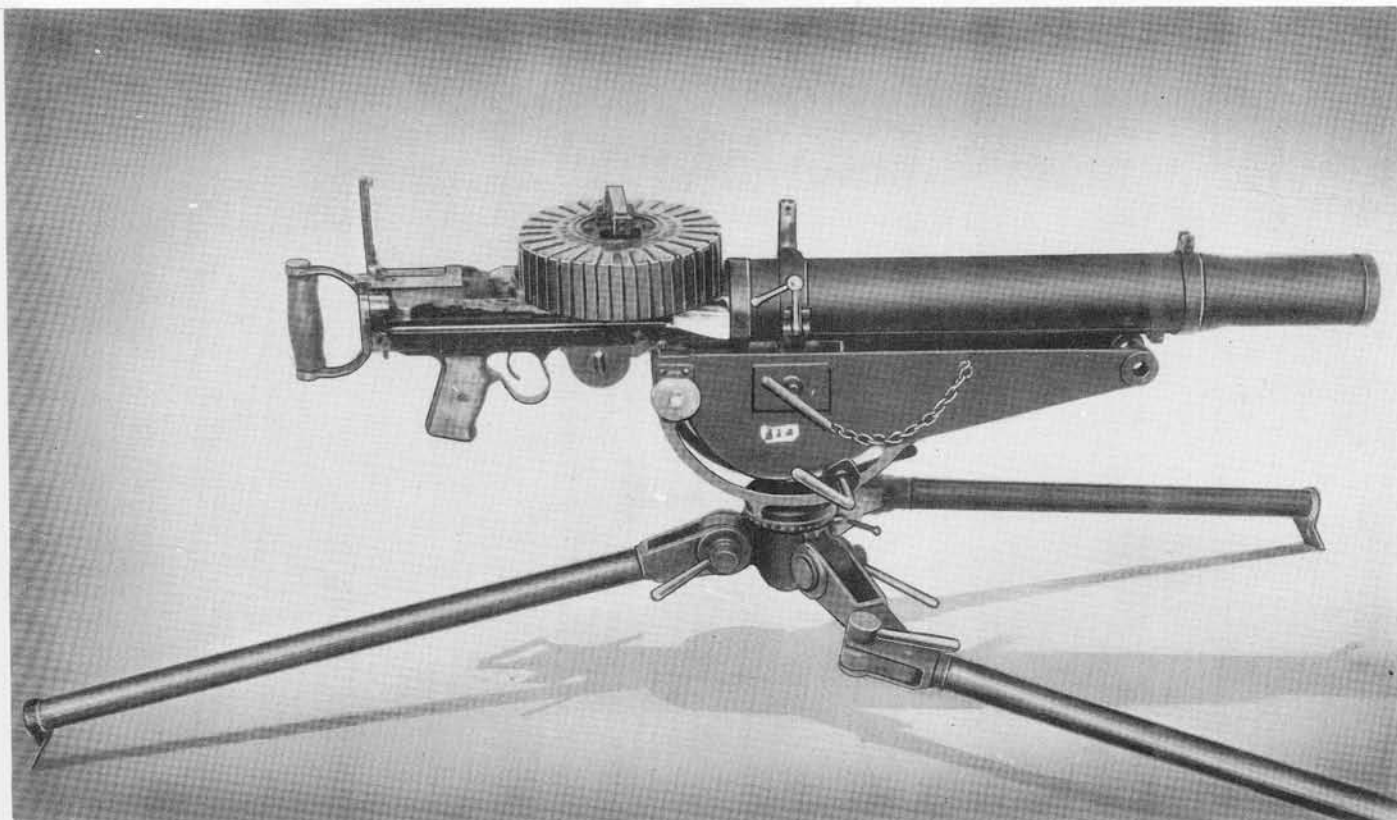
The modified Model 99 differs from the basic weapon in the following respects: the barrel locking adaptor is secured to the receiver; the barrel is secured into the adaptor by interrupted screw threads; the bolt handle is detachable; and the stock is in two parts.

The Model 2, called "Teraju" by the Japanese, is of much better workmanship than the Modified Model 99. The barrel and front end are detached from the stock at the receiver ring. When taken down, the barrel section is 25½ inches long; the stock 20¼ inches. Total weight of the loaded weapon is 8.9 pounds. The takedown system is simple and sturdy. The barrel has a straight, unthreaded shank with a lug on the bottom. The shank fits into a socket in front of the receiver. A tapered locking key passes through the receiver (from right to left) and engages in front of the barrel lug. The key cannot be taken out completely, but may be withdrawn far enough to allow removal of the barrel. It is locked in place by screwing a nut on the right side into the receiver wall.

A spring actuated plunger located in the front end of the buttstock locks the barrel and forestock in position. This plunger must be retracted before the barrel can be rotated for takedown.

SPECIFICATIONS

| | |
|---|--|
| Weight | 8.9 lbs. |
| Length | 44" |
| Principle of operation | Manual, bolt-operated |
| Feeding device | Clip |
| Capacity of feeding device | 5 rounds |
| Ammunition types | Model 99 rimless |
| Type of sight.....Front: inverted "V" blade on "T" base; Rear: leaf graduated from 328 to 1,640 yds. with aperture sight and aperture battle sight side arms for A.A. fire. | |
| Weight of barrel | |
| Length of barrel | 25½" |
| Length of rifling | |
| Rifling: | |
| Twist..... | Uniform, right hand; one turn in approx. 10 ins. |
| Form | Metford segmental |
| No. of grooves | 4 |
| Depth of grooves | |
| Width of grooves | |
| Chamber pressure | |
| Muzzle velocity | 2360 f/s |
| Maximum range | 3,000 yds. |
| Effective range | 600 yds. |



The Lewis type machine gun is used widely by the Japanese. Markings on a number of these guns found in the New Georgia area indicate that the weapon as used by the Japanese is of naval origin. It is also believed that the gun is used extensively for ship or air base protection as the tripod mount is adaptable for antiaircraft fire.

The Model 92 is of standard Lewis gas-operated, air-cooled, drum-fed design, equipped with a blade front sight and a rear peep-sight calibrated in hundreds of meters from 0 to 17. No allowance is made for windage or drift. Although no antiaircraft sight was discovered with the gun, a mount for such a sight is attached to the weapon.

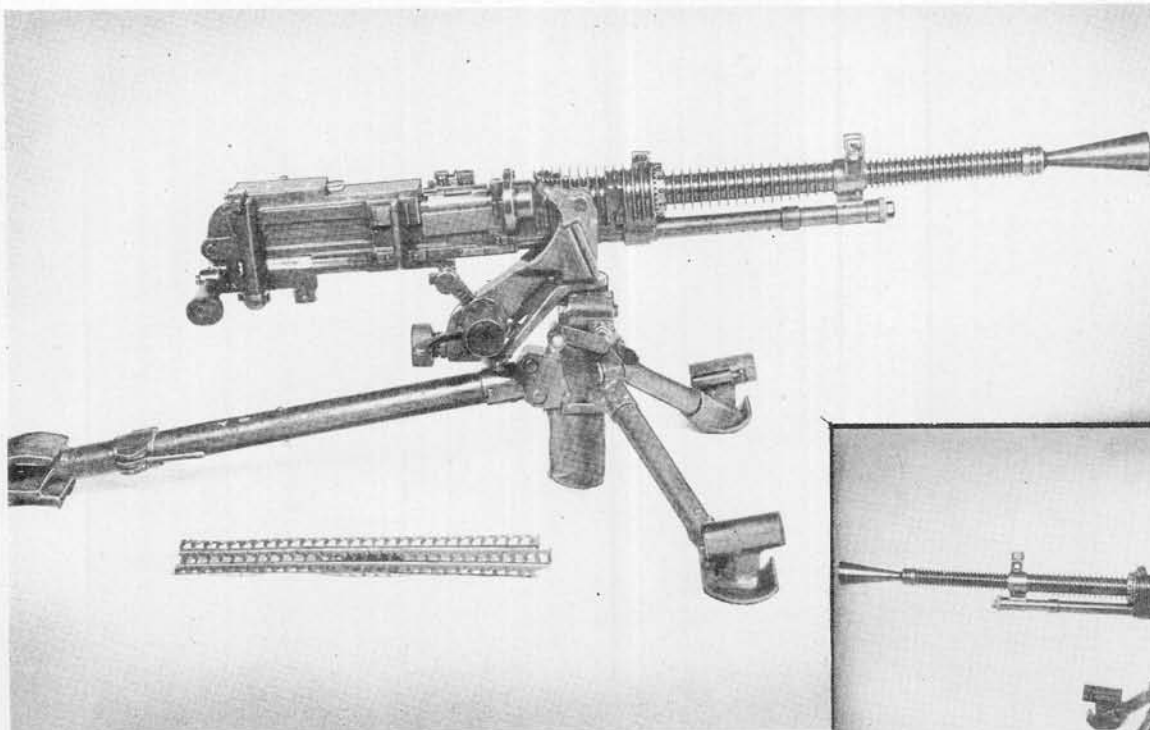
The gun is mounted on a tripod having tubular steel legs which may be locked at various angles from the vertical. The tripod legs are attached to flat square plates which have holes in the center to accommodate bolts which are used to secure the tripod to the deck of a ship.

The head of the tripod has a 360° traverse. Without removing the gun from the mount, the main portion of the tripod head can be moved from a horizontal to a vertical position, and the gun attached to the top of the head for antiaircraft use. In this position, the limits of elevation are approximately -80° to +85°. Azimuth is calibrated in 2 mil intervals from 0 to 6,400 mils.

7.7 mm rimmed Navy ammunition fed from a 47-round drum is used. Ammunition chests recovered were found to hold 21 loaded drums.

SPECIFICATIONS

| | |
|----------------------------------|--|
| Weight gun and tripod | 122 lbs. |
| Length | 39 ins. |
| Principle of operation..... | Lewis gas-operated system |
| Feeding device | Drum magazine |
| Capacity of feeding device | 47 rounds |
| Cooling system | Air |
| Ammunition types..... | 7.7 mm full-rimmed ammunition |
| Rate of fire | Cyclic—600 r.p.m. |
| Type of sight..... | Blade front sight; rear peepsight calibrated from 0 to 1700 meters |
| Weight of gun | 49 lbs. |
| Length of barrel | 24 ins. |
| Length of rifling | |
| Rifling | |
| Twist | Uniform, R.H. |
| Form | Concentric |
| No. of grooves | 4 |
| Depth of grooves | |
| Width of grooves | |
| Chamber pressure | |
| Muzzle velocity | 2411 ft. per sec. |
| Muzzle energy | |
| Maximum range | 4,000 yds. |
| Effective range | 500 yds. |
| Type of mount | Tripod |
| Elevation | |
| Ground mount | -15° — +60° |
| Antiaircraft mount | -80° — +85° |
| Traverse | 360° |



This gun incorporates most of the features of the Model 92 Heavy Machine Gun, but is smaller and lighter. A total weight saving of 41 pounds in the gun and tripod mount is achieved. The barrel of the new gun is considerably shorter than that of the Model 92; therefore, the muzzle velocity is probably lower.

Both guns feed from 30-round strips, but the 01 (1941) uses rimless ammunition. The new gun incorporates the following modifications:

The barrel of the Model 01 may be quickly removed. The flash hider is screwed onto the muzzle, eliminating the knurled locking collar used on the older gun. The gas regulating system is similar to that of the 7.7 mm Model 99 (1939) Light Machine Gun. A smaller oil reservoir is used. A new method of attaching the ejection port cover allows easier access to the receiver which should aid in clearing stoppages. Minor changes in the metal sights have been made. A crank-shaped safety is fitted through the top of the sear housing with its handle at the left rear of the receiver. The new tripod is lighter and has different type spades. It also has a different mechanism for elevating the pintle support above the tripod base. The receiver of the Model 01 is lighter.

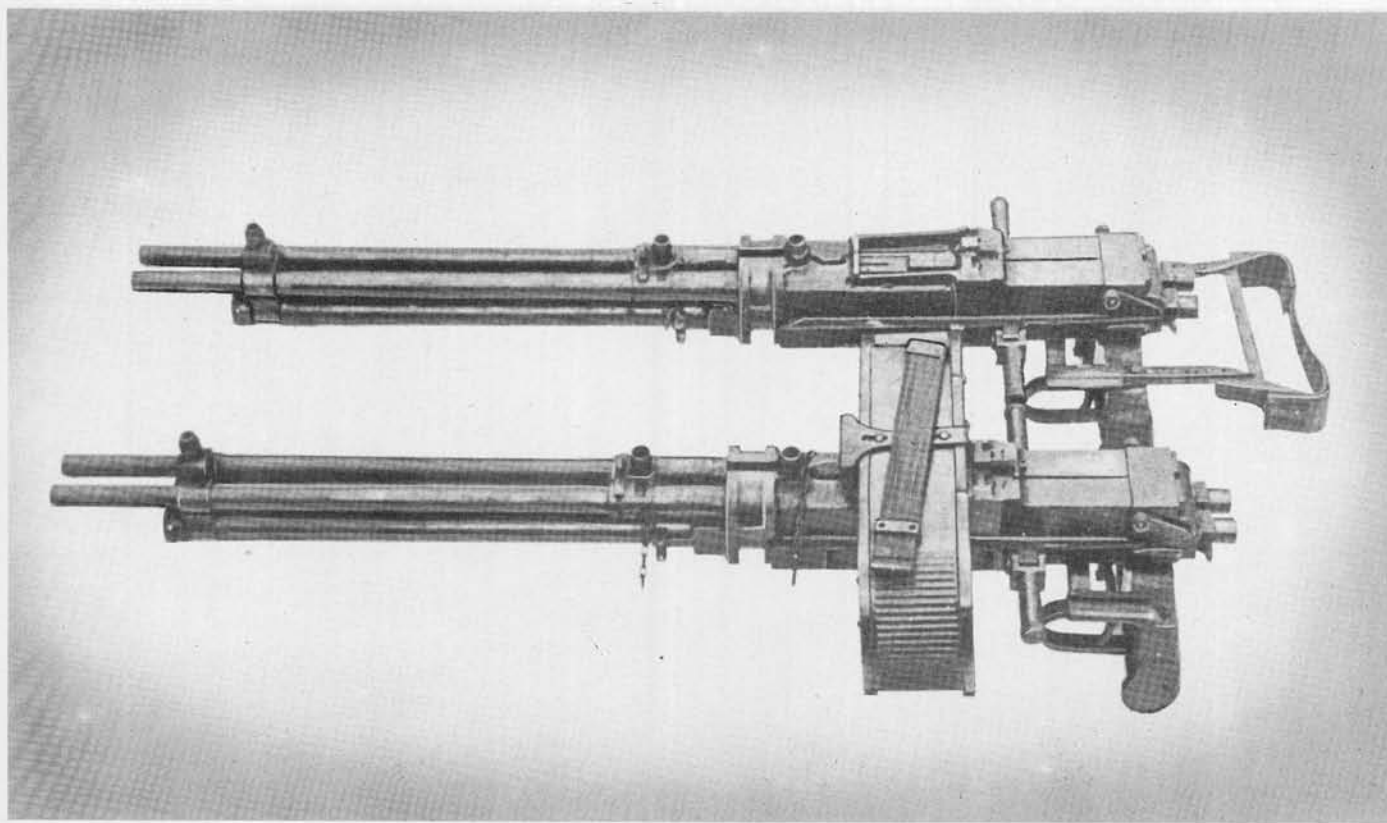
SPECIFICATIONS

| | |
|--|---|
| Weight (total) | 69.9 lbs. |
| Weight (without mount) | 34 lbs., 2 ozs. |
| Weight of mount | 37 lbs. |
| Weight of tripod | 36.3 lbs. |
| Length (overall w/flash hider) | 42 $\frac{1}{2}$ ins. |
| Length (overall w/o flash hider) | 38 ins. |
| Sight radius ..... | ..... |
| Principle of operation | Gas, full-automatic |
| Feeding device | Metal strips |
| Capacity of feeding device | 30 rounds |
| Cooling system ..... | ..... |
| Ammunition types..... | Model 92 ball, A.P. and tracer (rimless) |
| Rate of fire (estimated)..... | 450-500 r.p.m. cyclic 200-250 r.p.m. effective |
| Type of sight..... | Rear, calibrated from 100 to 2,200 meters. |
| Weight of barrel | 11 lbs., 6 ozs. |
| Length of barrel | 23-3/16 ins. |
| Length of rifling..... | 22 ins. |
| Rifling | |
| Twist | R.H. |
| Form ..... | ..... |
| No. of lands | 8 |
| No. of grooves ..... | ..... |
| Depth of grooves ..... | ..... |
| Width of grooves ..... | ..... |
| Muzzle velocity ..... | ..... |
| Maximum range ..... | ..... |
| Effective range ..... | ..... |
| Type of mount | Tripod |
| Elevation ..... | ..... |
| Traverse (total—on arc) | 45° |

DOUBLE BARREL FLEXIBLE AIRCRAFT MACHINE GUNS

MODEL 100 and MODEL 1

JAPANESE



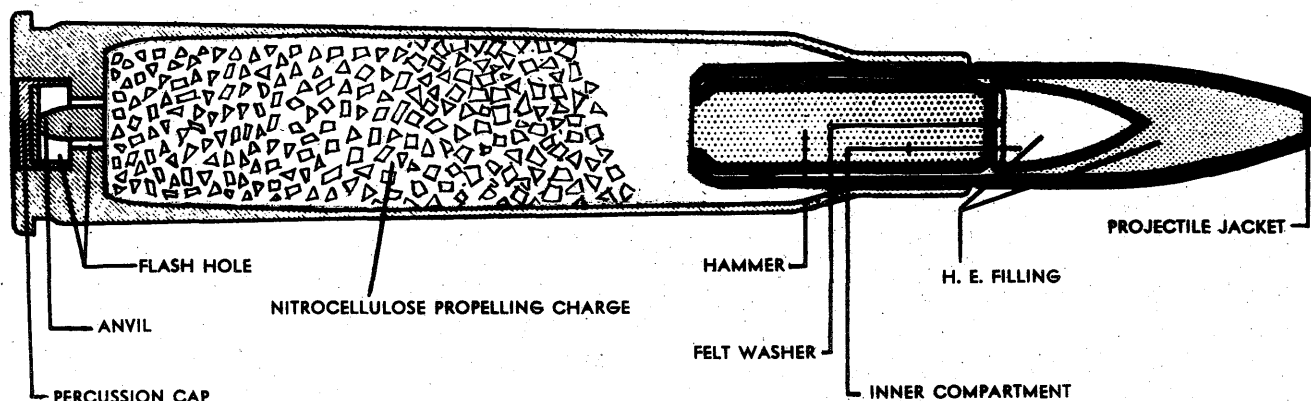
These two weapons which are very similar offer the advantage of two guns being mounted in the space occupied by one gun of normal size, thus saving weight in the gun and mount, and space in the plane. A small ammunition supply making frequent magazine changes necessary is a disadvantage partially for the advantages of the double barrel principle.

The operating mechanism for both barrels is housed in a single receiver. This is a single forging, milled to house the two separate actions. The magazine opening is cut out of the top of the receiver, the ejection slot out of the bottom. Each action has its own back plate. The gas piston group resembles the Bren light machine gun in design. The bolt is a steel forging well machined. The gas cylinder tube is constructed of seamless steel tubing and is threaded to the receiver at the rear. The trigger assembly is made up of two separate sear assemblies riveted to the pistol grip framework. Two pistol grips are located about 6 inches apart; the sears are connected to a horizontal trigger bar mounting a trigger on either end. Both guns may be fired by depressing either trigger. The magazine is the saddle-drum type. Each side holds 50 rounds and feeds one gun. Each side has its own spring so that, in the event of a jam affecting one barrel, the other gun may continue to fire.

The Model 1 (1941) gun appears to be basically the same weapon as the earlier model, Model 100 (1940) which is shown at the bottom of the illustration. The Type 1 gun shown at the top of the picture has a head or shoulder rest attached to the gun. This rest is made of wood and canvas and is attached to the gun with steel frames. The specifications were secured from the earlier weapon.

SPECIFICATIONS

| | |
|---------------------------------|----------------------------|
| Caliber | 7.92 mm |
| Weight of gun | 36 lbs. |
| Length (overall) | 37.5 ins. |
| Length of receiver | 16.25 ins. |
| Length of barrel | 24.5 ins. |
| Length of rifling | 22.37 ins. |
| Diameter of bore— | |
| across lands | 0.310 in. |
| across grooves | 0.313 in. |
| Number of lands | 4 |
| Width of lands | 0.0781 in. |
| Width of grooves | 0.1718 in. |
| Depth of grooves | 0.003 in. |
| Twist of rifling | Uniform R. H. |
| Pitch of rifling | 7° (approx.) |
| Type of operation | Gas |
| Type of fire | Automatic only |
| Type of feed | Magazine, saddle-drum type |
| Capacity of magazine | 100 rounds |
| Weight of magazine empty | 7¾ lbs. |
| Weight of magazine filled | 13¾ lbs. |
| Ammunition | A. P.—Incendiary |
| Rate of fire (estimated) | 400–600 r.p.m. |
| Range | 250 to 350 meters |



This fixed round of ammunition consists of a brass cartridge case and a high explosive projectile. The semi-rimless case is tapered, forming a neck which fits over the projectile. The top of the neck is coned into the cannellure of the bullet. The base of the case is recessed to take a simple percussion type primer, and the rest of the case is filled with a propelling charge of graphited nitrocellulose grains, about half of which, in the specimens examined, had a very fine axial perforation.

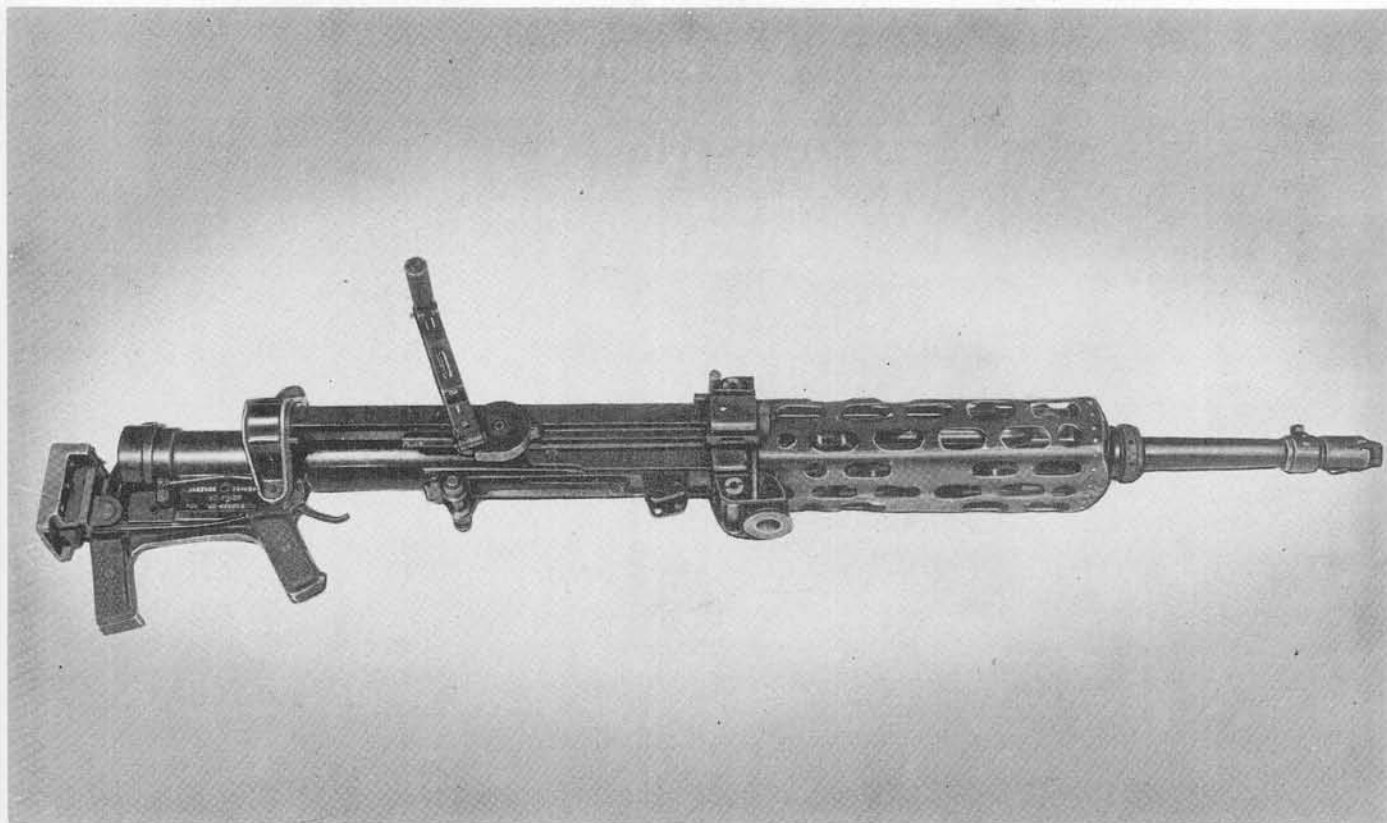
The brass projectile is cylindrical in shape with a truncated ogival nose. It contains a brass inner compartment, ogival in shape and open at the base, and a hammer consisting of a lead antimony plug encased in a brass sheath. The rear of the projectile is also open, the walls being turned in to retain the hammer. Both the main projectile and the inner compartment are filled with the explosive charge, a mixture of PETN and RDX. A white felt washer pressed into the base of the inner compartment protects the explosive charge from the effect of setback when the round is fired.

When the projectile strikes a target, the hammer in the rear end sets forward crushing the explosive against the walls of both the inner and main compartments, causing the projectile to explode.

SPECIFICATIONS

| | |
|--|----------------------|
| Caliber | 7.7 mm (.303 in.) |
| Weight of complete round.... | 26.15 grms.—.915 oz. |
| Length of complete round | 3 3/32 ins. |
| Length of cartridge case | 2 9/32 ins. |
| Weight of cartridge case (without percussion cap) | 14.93 grms.—.523 oz. |
| Weight of projectile | 10.69 grms.—.374 oz. |
| Length of projectile | 1 15/32 ins. |
| Maximum diameter | 0.310 in. |
| Thickness of main compartment walls..... | 0.021 in. |
| Weight of main compart- ment | 2.95 grms.—.103 oz. |
| Thickness of inner compartment walls.... | 0.008 in. |
| Weight of inner compartment.. | 0.20 grms.—.007 oz. |
| Height of inner compartment | 0.390 in. |
| Length of hammer | 0.700 in. |
| Weight of hammer | 6.65 grms.—.233 oz. |
| Diameter of hammer | 0.258 in. |

20 mm AIRCRAFT AUTOMATIC CANNON, MODEL 99 Mk 1 FLEXIBLE



This weapon is an air-cooled, blowback-operated, Oerlikon type machine cannon. It operates on the same basic principle as all Oerlikon cannons of this type. The Japanese gun is a close copy of the Swiss gun, in that it is designed for full automatic fire only. The gun is manufactured in Japan on Swiss machinery. The above illustration shows the flexible version.

A significant feature is that the parts which are subjected to little wear, such as the grips, mounts, gunners' shoulder rest, and other exterior parts are generally made of light weight metal.

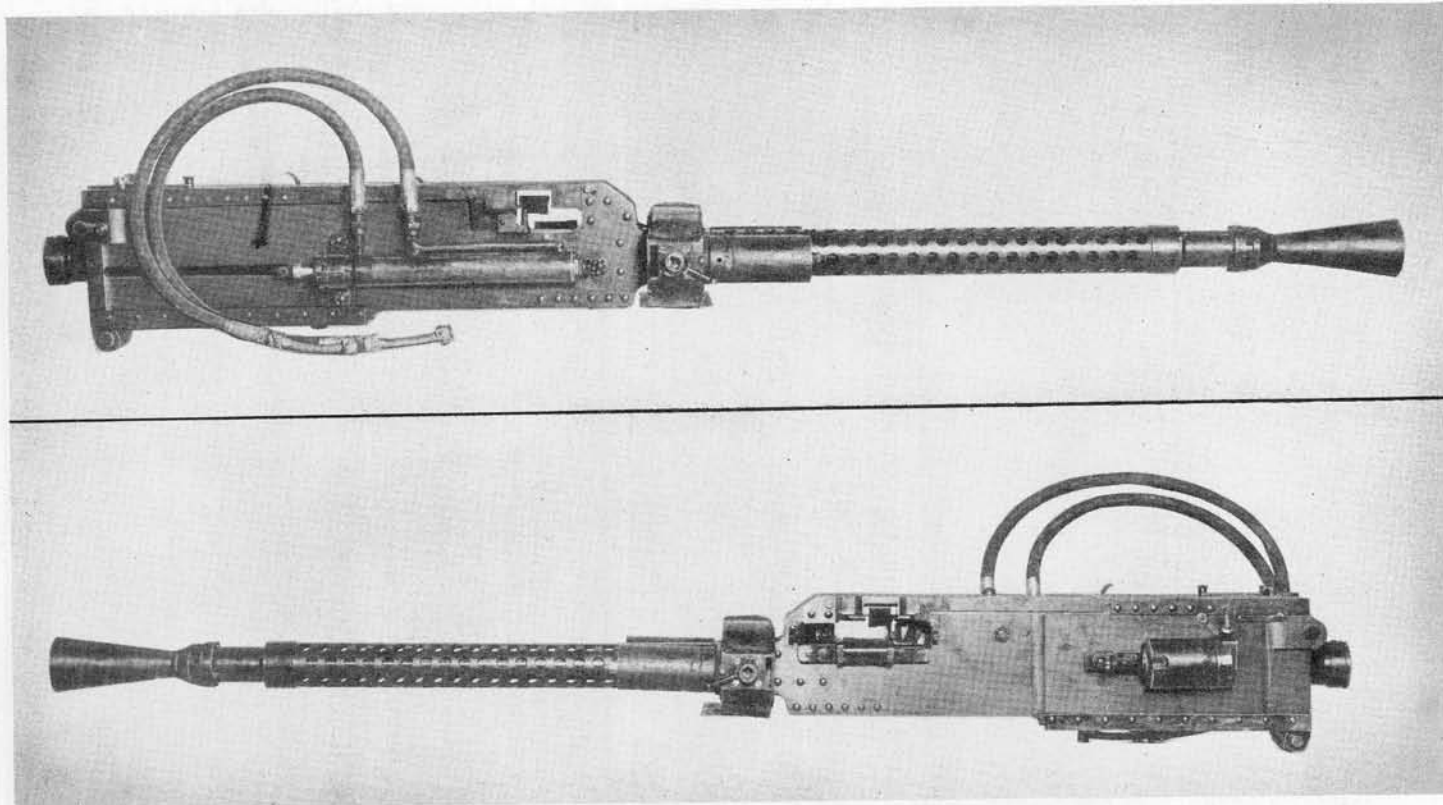
This weapon is almost identical with other Model 99 (1939), 20 mm aircraft cannon reported to be used in the majority of Japanese planes, both as fixed guns in fighter craft, and as flexible guns in bombing planes. The weapon is fed from a drum type magazine. It is cocked or charged by manual means, and has no semiautomatic charger or rounds counter. The cocking handle is rotated to draw the recoiling parts to the rear and cock the gun for the first shot, the gun firing from an open bolt. Cocking operations for succeeding shots are performed by the blowback operation of the gun itself.

SPECIFICATIONS

| | |
|---|--|
| Caliber | 20 mm—0.87 ins. |
| Weight (without magazine) | 62 lbs. |
| Weight of 60 rd. magazine (empty)..... | 20 lbs. |
| Length (overall) | 55 ins. |
| Length of barrel | 30 ins. |
| No. of grooves | 9; Uniform right hand twist |
| Width of grooves | |
| Depth of grooves | 0.022 in. |
| Width of lands | |
| Muzzle velocity (shell) | 1,930 f/s. |
| Cyclic rate | 510 r.p.m. |
| Traverse | Flexible aircraft |
| Length of recoil | |
| Turns of cocking handle required to cock piece | 11½ ins. |
| Ammunition..... | HE; HE with tracer; HE with self- destroying tracer; HE-I; AP; AP tracer; AP-HEI; Long burning tracer; Practice |
| Wt. of HE projectile | 4.50 ozs. |
| Type of feed | 60 rd. drum |

20 mm AIRCRAFT CANNON Ho 5 (BROWNING PRINCIPLE)

JAPANESE 



This weapon, an improvement on the 12.7 mm Japanese copy of the U. S. Cal. .50 aircraft machine gun, is a recoil-operated, disintegrating metallic link belt-fed, air-cooled, aircraft machine cannon. It is mounted as a fixed weapon and as such it is fired electrically by remote control.

The recoil mechanism consists of a metal cylinder into which is fitted a coil spring. Through the center of this extends a 5/16-inch rod which screws into a brass bushing. The rod extends through the spring follower which rests on the coil spring and is secured by two lock nuts. Buffering action takes place in the recoil direction only. There is no quick change barrel. Because of the weight of the bolt and the heavy recoil spring, a booster is used, this being found in the flash hider.

The gun has a high cyclic rate of fire, muzzle velocities of 2,304 f/s (A.P.), 2,430 f/s (H.E.), and a penetration performance of 7/8-inch homogenous plate at 20° at 200 yards; 1/2-inch at 20° at 580 yards. The maximum weight lifting capacity of the belt is 62 pounds.

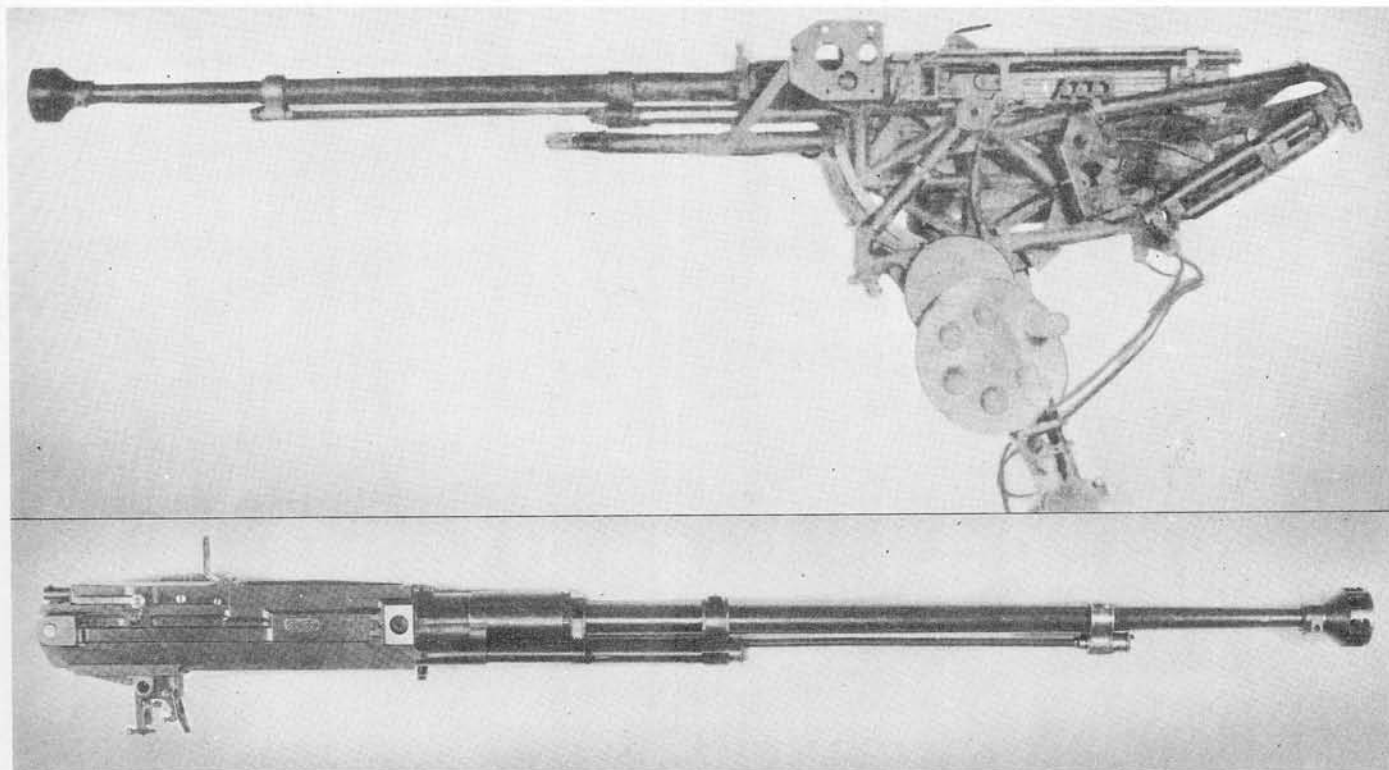
The disassembly of the weapon is the same as the Browning Cal. .30 and Cal. .50 machine guns with a few minor exceptions. The Japanese weapon has no back plate latch. The back plate is held in place by two pins, one at the top, and one at the bottom.

SPECIFICATIONS

| | |
|-----------------------------------|------------------------|
| Caliber | 20 mm (0.79 in.) |
| Weight w/accessories | 104-11/16 lbs. |
| Weight w/o accessories | 86 3/4 lbs. |
| Length (overall) | 63 3/4 ins. |
| Sight radius | |
| Principle of operation..... | Recoil with muzzle cup |
| Feeding device | Metal link belt type |
| Capacity of feeding device | 100 rounds |
| Cooling system | Air |
| Ammunition types | A.P., H.E., Incendiary |
| Cyclic rate | 950 r.p.m. |
| Type of sight | Reflector |
| Weight of barrel | 12 1/4 lbs. |
| Length of barrel | 35.4 ins. |
| Length of rifling | 31.5 ins. |
| Rifling | |
| Twist | R.H. |
| Form | |
| No. of grooves | 8 |
| Depth of grooves | |
| Width of grooves | |
| Chamber pressure | |
| Muzzle velocity (A.P. Shot) | 2,304 f/s |
| (H.E. Shell)..... | 2,430 f/s |
| Effective range | 600 yds. |

20 mm AIRCRAFT MACHINE GUN (MODIFIED MODEL 97 ANTITANK GUN)

JAPANESE 



This Japanese 20 mm aircraft gun is a modified version of the Model 97 antitank gun described on page 101. It is a gas-operated, full-automatic, magazine-fed, air-cooled weapon. The barrel, of monobloc construction, is fitted with a muzzle brake and attached to the receiver by means of a bushing of the interrupted screw type. The magazine fits into a rectangular opening in the top of the receiver, and the empty cartridge cases are ejected from a similar opening in the bottom. The ejector is secured to the underside of the receiver top just behind the magazine opening.

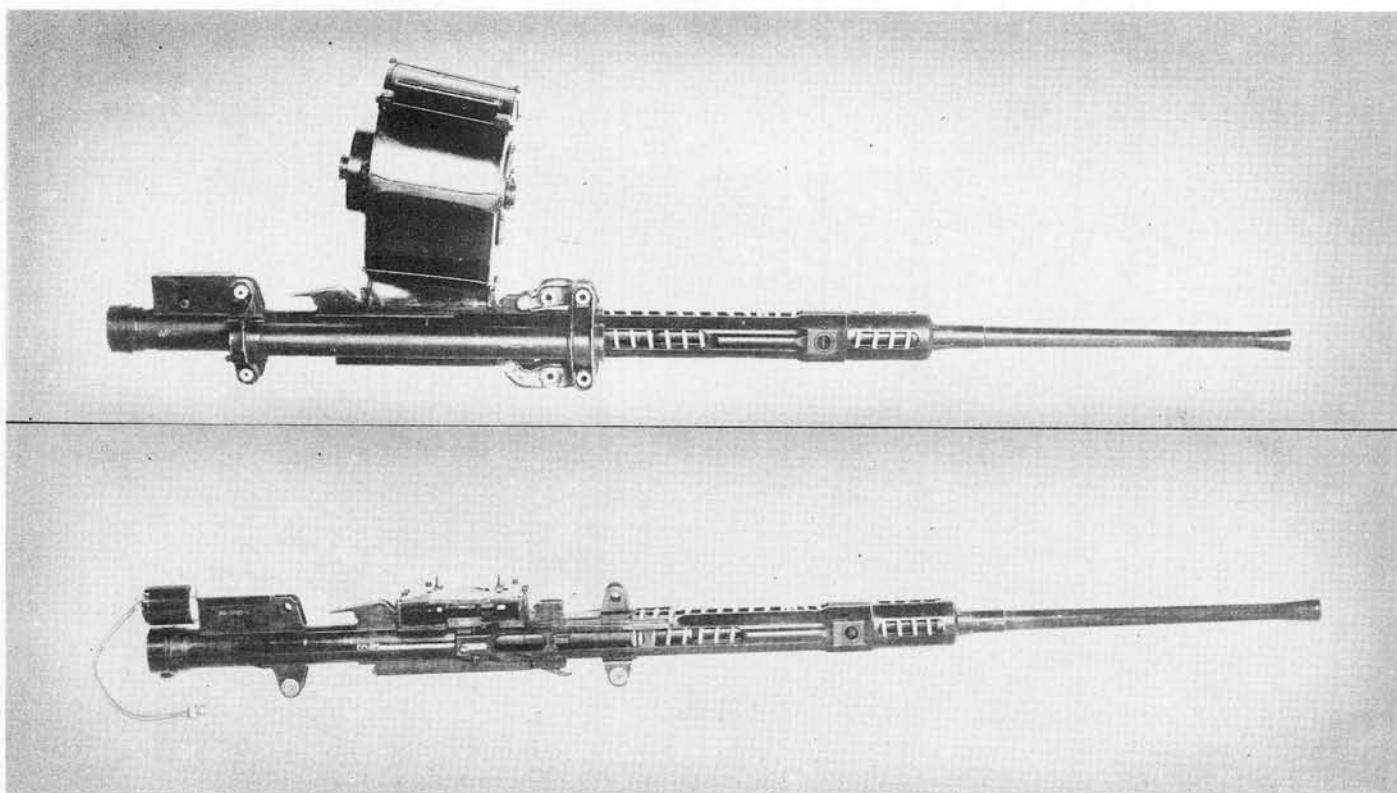
The operation of the aircraft version of this gun is similar to that of the antitank rifle. The six phases are: loading, locking, firing, unlocking, extraction, and ejection.

The first three occur on the counterrecoil, and the last three on the recoil. The gun is cocked the first time by pulling the retracting handle to the rear. This retracts the operating group to the position where the sear will engage the gas piston and hold it to the rear. After the magazine is inserted and locked in place, the gun is ready to fire.

The gun was mounted in the dorsal turret of the Bomber "Helen" on a semicircular-shaped rack, and is fixed to the rack by the lower left hand edge of the receiver. The rack is used for elevating the gun. The gun and mount are in turn mounted on the turret ring. The sight used on this gun is a reflector type sight and it is believed that there is provision made for deflection shooting. A fixed version has also been reported. Documentary evidence discloses that the ammunition for the turret gun is referred to as HO1 and the fixed as HØ3.

SPECIFICATIONS

| | |
|-----------------------------------|--------------------------|
| Caliber | 20 mm (.79 in.) |
| Weight (without mount) | 74 lbs. |
| Length (with muzzle brake) | 68 7/8 ins. |
| (without muzzle brake) | 67 1/4 ins. |
| Sight radius | |
| Principle of operation | Gas |
| Capacity of feeding device | |
| Magazine, 15 rds. | |
| Inverted saddle type, 50 rds. | |
| Cooling system | Air |
| Ammunition types | AP/T; HE/T; HE/I; Ball |
| Rate of fire (estimated) | 300 rds. per min. |
| Type of sight | Reflector |
| Weight of barrel | |
| Length of barrel | 47 ins. |
| Length of rifling (approx.) | 42 ins. |
| Rifling | |
| Twist | |
| Form | |
| No. of lands & grooves | 8 |
| Depth of grooves | |
| Width of grooves | |
| Chamber pressure | |
| Muzzle velocity (estimated) | 2,500-2,900 ft. per sec. |
| Muzzle energy | |
| Effective range | 1,000 yds. |
| Type of mount | Dorsal turret and fixed |



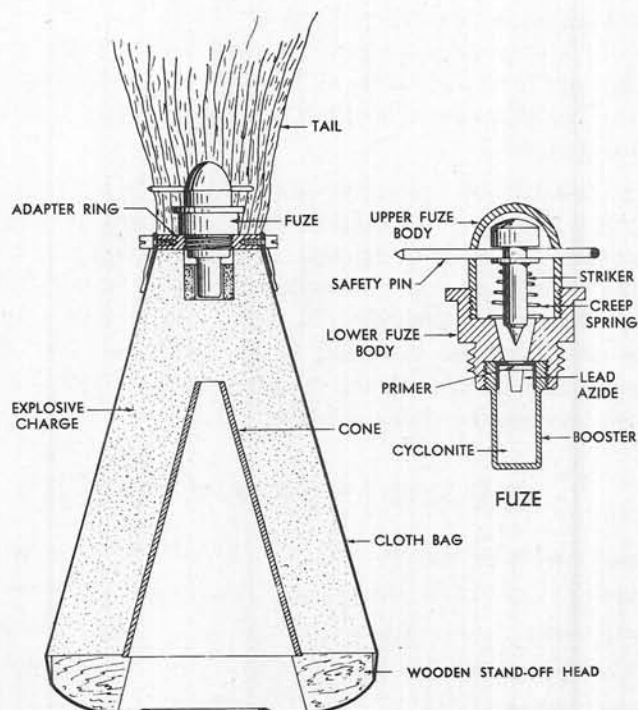
This is a gun of higher power than the Type 99 Mk. I, 20 mm cannon. Like the earlier gun, it operates on the Oerlikon principle and is found both with drum type magazine feed (Mod. III—top photo) and with belt feed (Mod. IV—lower photo).

The principal differences between this model and the Mk. I consist of a longer barrel and a longer chamber. The barrel protrudes 18 inches beyond the leading edge when mounted in the wings of fighter aircraft. The projectiles used are identical to the Mark I, but the cartridge employed contains approximately 40% more propellant than the older type, thereby increasing the velocity of the Mk. II 500 to 700 foot seconds. The muzzle velocity of the weapon varies from 2,500 to 2,700 foot seconds depending upon the type of projectile used. The gun has been found in ZEKES and HAMPs. It is probably fitted in RUFES and as a flexible gun in the tail turret of BETTY.

SPECIFICATIONS

| | |
|-------------------------------|--|
| Caliber | 20 mm (.787 in.) |
| Weight of gun | 67 lbs. |
| Length of gun (overall) | 73 ins. |
| Length of barrel | 47 ins. |
| Length of rifling | 41.5 ins. |
| Number of grooves | 9 |
| Depth of grooves | 0.026 in. |
| Twist of rifling | Right hand |
| Principle of operation | Blow back |
| Feeding device | French drum or belt |
| Capacity of drum | 100 rds. |
| Cooling system | Air |
| Sights | Reflector type |
| Charging mechanism | Pneumatic |
| Firing system | Flexible cable |
| Effective range (est.) | 600-700 yds. |
| Rate of fire (est.) | 400-500 r.p.m. |
| Ammunition..... | Ball, A.P., A.P./I., T., H.E., H.E./T., H.E./I. |

CONICAL ANTITANK HOLLOW CHARGE HAND GRENADE



This Japanese antitank grenade consists of a Pentolite (50/50 TNT & PETN) explosive charge cast around a thin aluminum cone, a wooden stand-off head, a fuze, and a tail attachment.

The explosive charge, which is shaped in the form of a hollow truncated cone, has a covering of thin waxed paper and a well in the upper end to receive the booster of the fuze. A cast ring pellet surrounds the cyclonite booster. The fuze, an all-ways impact type, is constructed in two parts which are threaded together. It will not function unless the mine has attained a velocity of approximately forty feet per second, and strikes a hard surface. The wooden base provides proper stand-off distance and has a central hole of slightly smaller diameter than that of the cone.

The grenade is encased in a silk bag, either white or olive drab in color, and closed by a draw-string at the bottom. A tail made of hemp is tied around the top of the grenade to provide stability in flight. The device, which will penetrate about 2¾ inches of armor plate, should be thrown from a distance of approximately ten meters.

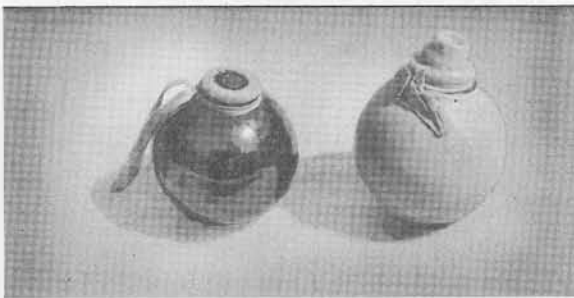
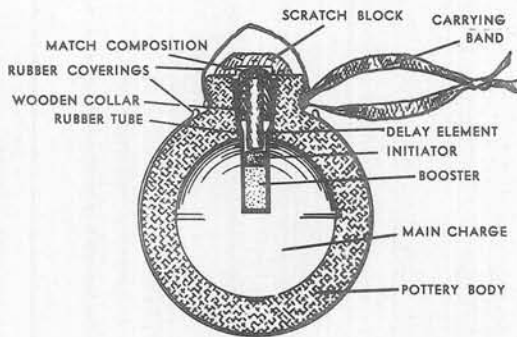
A modified version of this grenade, referred to as the Type B, has been recovered. It differs from the grenade previously encountered in the Philippines in the following respects: it is smaller, the cover is yellow silk instead of canvas, the fuze is screwed into a metal seat on top of the mine, the fuze body is metal with a single-pronged safety pin, and the detonator tube is larger.

According to reports, there is also a larger grenade of the same type which has a Type 94 explosive charge.

SPECIFICATIONS

Large Grenade Small Grenade

| | | |
|---------------------------|-------------|------------|
| Length of grenade..... | 6¾ ins. | 5½ ins. |
| Length of tail..... | 14 ins. | |
| Diameter at base..... | 4¾ ins. | 4 ins. |
| Length of fuze..... | 1½ ins. | 1½ ins. |
| Length of cone..... | 3¾ ins. | 2½ ins. |
| Diameter of cone..... | 2½ ins. | 2 ins. |
| Cone angle, apex..... | 30° | 38° |
| Weight complete | 1.25 kg. | .84 kg. |
| Weight of grenade | 1.14 kg. | .76 kg. |
| Weight of fuze | 42.3 grams | 42.3 grams |
| Weight of explosive | .87 kg. | .60 kg. |
| Weight of cone | 141.7 grams | 42.5 grams |
| Weight of base | 56.7 grams | 50.0 grams |
| Weight of booster | 5.1 grams | 5.1 grams |



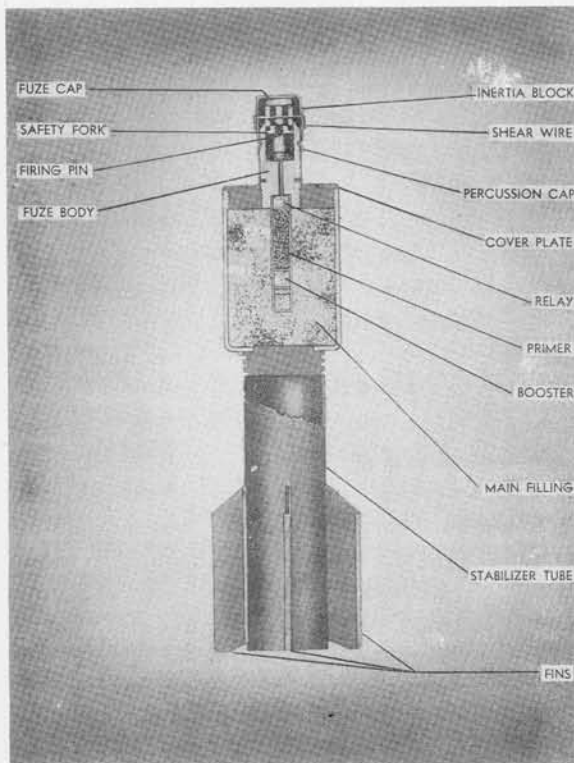
This hand grenade, made of terra cotta, and, like the Model 3 Flower Pot Land Mine, filled with Type 88 explosive, is assumed to be a Navy weapon. Except for the neck at the top, it is spherical, consisting of two halves baked together. It is light brown in color, and lightly glazed both inside and out. The grenade is encased in a straw-colored, waterproof rubber sack.

The ignition system consists of a match composition and scratch block, a 4-5-second delay element, a lead azide initiator, and a tetryl booster. All are encased in a rubber tube except the match composition which is lacquered into the neck of the grenade. In order to operate the grenade, the small rubber covering is removed from the top and the scratch block is struck on the protruding match composition, igniting the delay element.

SPECIFICATIONS

| | |
|------------------------------------|--------------------|
| Height (base to top of neck) | 99 mm—3.9 ins. |
| Diameter | 79 mm—3.1 ins. |
| Total weight | 1 lb. |
| Weight of explosive | 100 grams—3.5 ozs. |
| Pottery thickness | 7/16 inch |

HIGH EXPLOSIVE RIFLE GRENADE MODEL 3

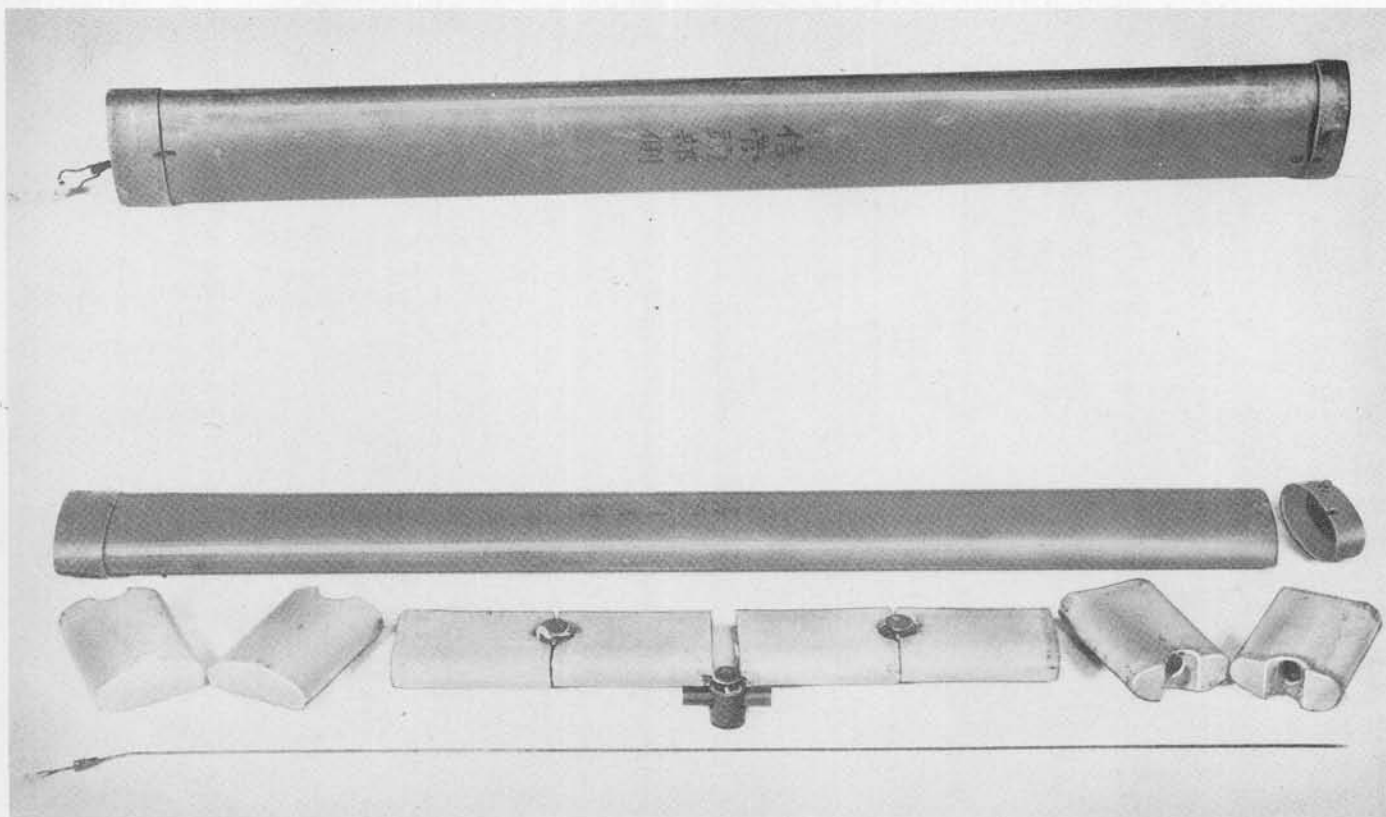


This grenade, designed to be fired from Models 38 and 99 rifles by means of a spigot launcher and wooden bullet, is similar in use and operation to the Model 91 rifle grenade. However, it is smaller and has a smooth-wall body rather than the serrated type. It contains a cyclonite primer enclosed in a brass container, a tetryl booster, and a three-ounce bursting charge of cast TNT; it is also fitted with an instantaneous fuze and a tail assembly with four fins spot welded to the rear part of the tube.

The grenade is armed by the removal of a safety fork. On impact, an inertia block is forced into the fuze body shearing a brass shear wire and driving the firing pin into the detonator.

SPECIFICATIONS

| | |
|--|--------------|
| Diameter of grenade body | 1.63 ins. |
| Length of grenade body | 2.43 ins. |
| Wall thickness | 1/8 in. |
| Overall length of grenade | 7.88 ins. |
| Weight of grenade without explosive | 14 ozs. |
| Weight of explosive body without explosive | 10 ozs. |
| Length of fin assembly | 4 15/16 ins. |
| Outside diameter of tube | 1 13/16 ins. |
| Inside diameter of tube | 1 1/16 ins. |
| Width of tail assembly | 2 1/2 ins. |
| Length of tail fin | 2 3/4 ins. |
| Width of tail fin | 1/4 in. |
| Material of construction | Steel |
| Weight of main charge | 3 ozs. |
| Weight of primer | 3 gr. |
| Weight of booster | 1 gr. |



This Japanese land mine, of Naval origin, is usually found buried in landing strips. Almost any vehicle will activate the mine, but its use as an anti-personnel device is limited since a pressure of approximately 336 pounds is necessary to set it off.

The mine consists of an oval shaped tube of sheet metal with a cap on both ends; an explosive charge comprising eight blocks of picric acid, each cast in a paper container and coated with paraffin; and four percussion type fuzes.

The picric acid blocks which are flattened on one side do not fill the mine completely. The space between the flat side of the blocks and the wall of the case accommodates the protruding heads of the fuzes which are inserted between blocks.

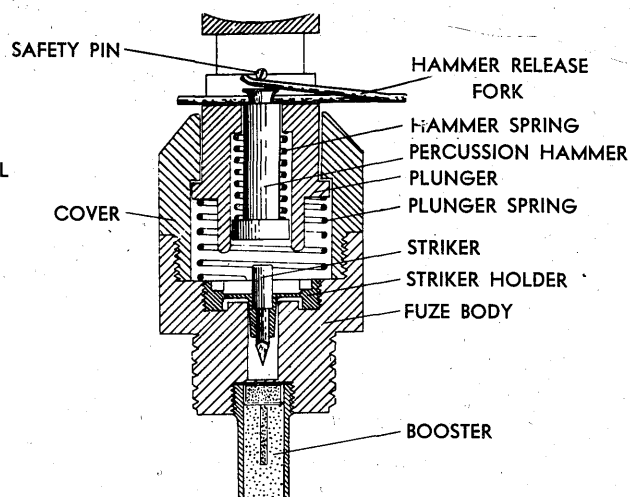
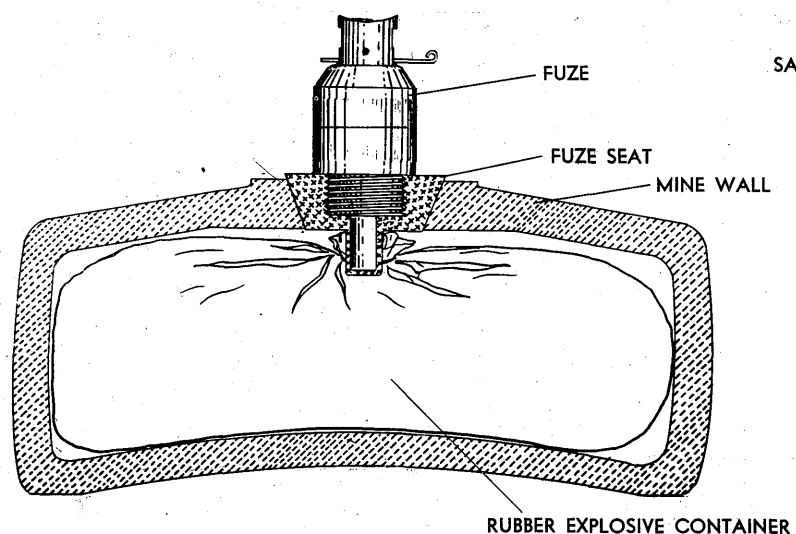
The percussion type fuze consists of a cylindrical body which houses the striker release plunger, a booster housing, and a striker housing. The two latter parts are identical in external appearance and screw into the sides of the main body diametrically opposite each other.

The striker release plunger, a split pin with an enlarged flat head, is positioned in the fuze body by a copper shear wire. A second hole 90 degrees from the shear wire hole accommodates a safety wire. The lower end of the plunger is split by a slot, the width of which is increased on the inner end.

The mine is held in an unarmed position by the safety wire which is inserted through a hole in one of the end caps, and extends the entire length of the mine. A spring clip on the cap holds the wire in place. When the mine is to be put into operation, the safety wire is removed and a burying plug is screwed into the hole in the cap to make the assembly waterproof. A thick tarry substance is applied to the seams around the end caps probably for the same purpose.

SPECIFICATIONS

| | |
|--------------------------------------|-------------------------------------|
| Length (overall) | 36 ins. |
| Diameter (oval) | 3.35 x 1.8 ins. |
| Total weight | 10.58 lbs. |
| Weight of mine | 4.63 lbs. |
| Weight of filling | 5.95 lbs. |
| Weight of each explosive block | ¾ lb. |
| Filling | Picric acid |
| Weight of complete fuze | .29 lb. |
| Color..... | Brown outside; black lacquer inside |



The mine case, made of earth-colored terra-cotta, has a thin dull glaze on its outer surface and a highly glazed inner surface. A light rubber bag inside the body contains a Type 88 explosive filler. It is believed that the bursting charge may be a mixture of 50% ammonium nitrate and 50% TNT, or 90% ammonium nitrate and 10% dinitronaphthalene.

The fuze which is interchangeable with the standard Type 88 and Type 100 artillery fuzes (thereby permitting the use of artillery projectiles as land mines) screws into a rubber seat sealed in place in the mine. Fuze body, cover, plunger, and striker holder are made of bakelite; the springs, percussion hammer, striker, and release fork are of metal construction. Because so few of the components are made of ferrous materials, it probably would be difficult to locate the mine with a magnetic type detector.

When rigged, the fuze is fired either by pressure or by pull. The percussion hammer, located within the fuze, is held in place by a release fork to which a trip wire may be attached. When the wire is pulled, the fork releases the hammer which is forced downward by the hammer spring. The hammer comes in contact with the striker forcing it through its bakelite holder into the percussion cap.

When pressure is applied directly on the head of the fuze, the plunger spring is compressed causing the hammer release fork to bear on the cover. As the plunger spring is further compressed, the hammer head cams out the fork. It then fires as above.

SPECIFICATIONS

| | |
|--|-----------------|
| Weight of mine (fuzed) | 11 lbs., 6 ozs. |
| Diameter (maximum) | 220 mm* |
| Height (without fuze) | 105 mm |
| Height (fuzed) | 157.5 mm |
| Explosive filling | Type 88 |
| Weight of explosive | 4 lbs., 8 ozs. |
| Length of fuze | 65 mm |
| Weight of fuze (without booster) | 56 grams |

* According to reports, there is a larger mine of this same type. It is 270 mm in diameter, but has the same height as the smaller mine. It is said to contain 6½ pounds of explosive.

ANTITANK "LUNGE" MINE

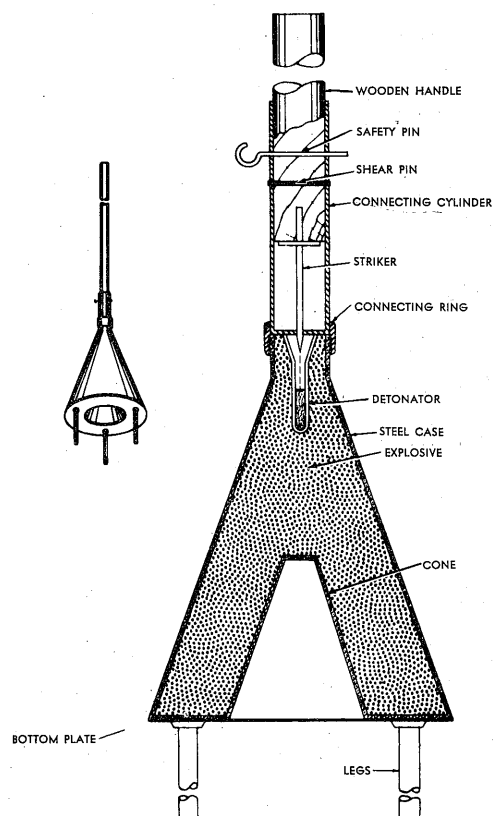


This suicide mine, an antitank device used by Japanese Close-quarter Combat Units, consists of a conical-shaped hollow charge encased in a steel container, and a wooden handle. Three legs equally spaced around the base of the charge provide proper stand-off distance. A well in the apex of the charge contains the detonator.

The firing mechanism, quite simple in construction, consisting of a needle type striker, a shear pin, and a safety pin, is housed in a metal sleeve. This sleeve, which holds the mine and the handle 2.4 inches apart, slips over the end of the handle and is held in place by the shear pin and safety pin; it is attached to the body of the mine by a threaded connecting ring.

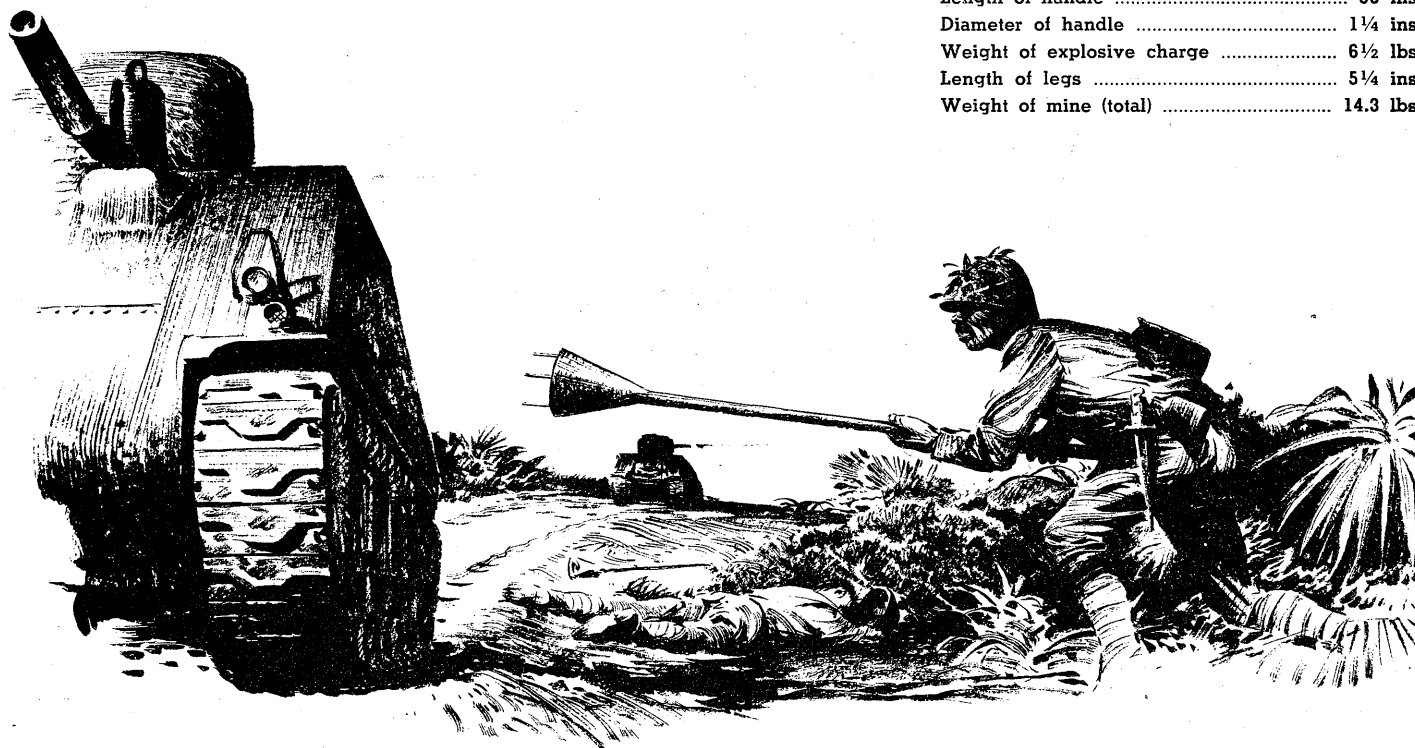
To operate the mine, the soldier must first remove the safety pin, and then, using bayonet tactics, lunge forward striking the mine squarely against the tank. When the legs of the mine strike the target, the handle is driven forward breaking the shear pin, and the striker is driven into the detonator, initiating explosion of the mine.

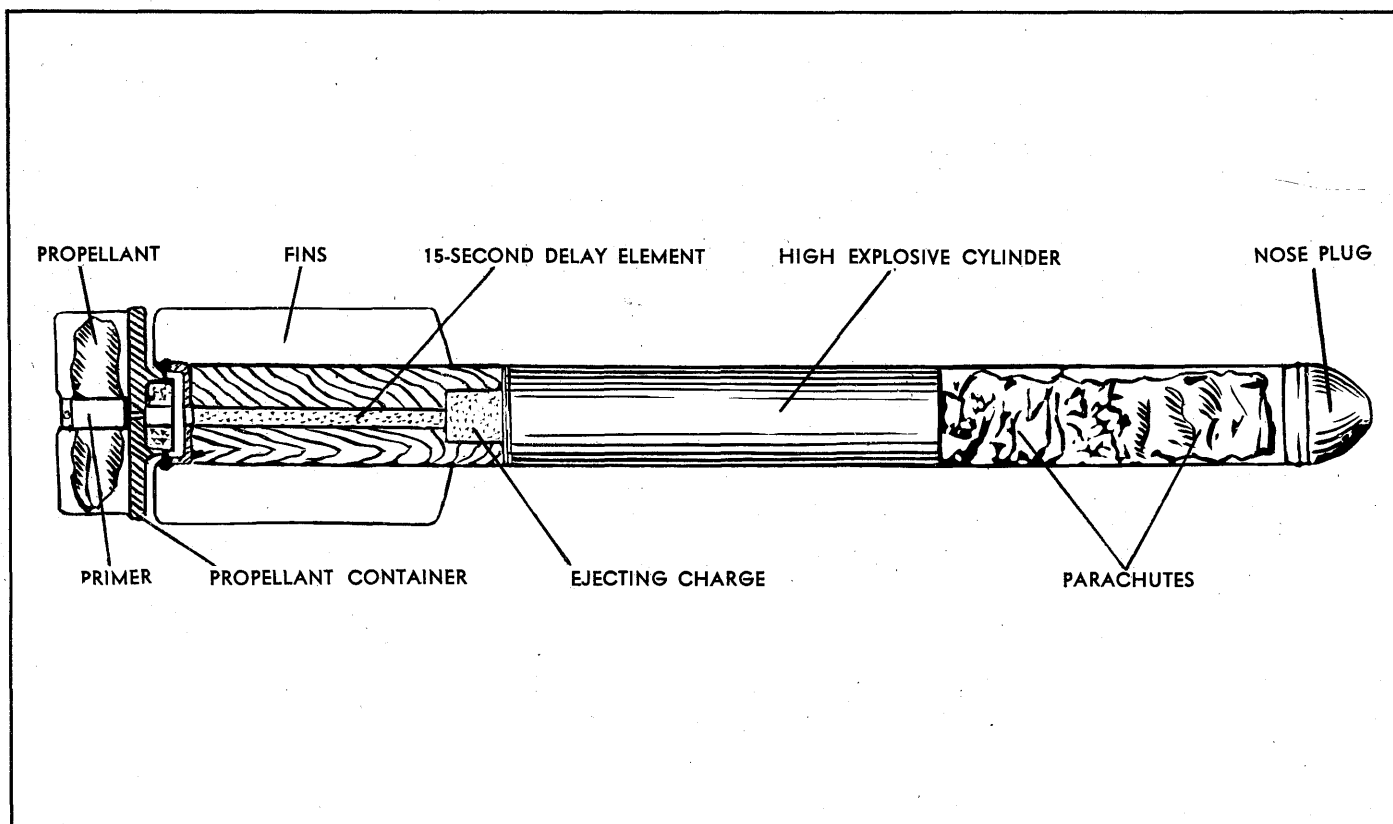
Reports indicate that when head-on contact is made, the mine will penetrate 6 inches of steel plate; with contact at a 60° angle, steel plates of approximately 4 inches can be penetrated.



SPECIFICATIONS

| | |
|------------------------------------|------------|
| Length of mine body (approx.) | 12 ins. |
| Diameter of base of body (approx.) | 8 ins. |
| Length of handle | 59 ins. |
| Diameter of handle | 1 1/4 ins. |
| Weight of explosive charge | 6 1/2 lbs. |
| Length of legs | 5 1/4 ins. |
| Weight of mine (total) | 14.3 lbs. |





This anti-aircraft projectile, fired from the 81 mm barrage mortar, is composed of three sections. The rear portion consists of a primer, black powder charge, propelling charge, 15-second delay train, and a black powder ejecting charge. The explosive cylinder, or middle section, comprises a 40-second delay pellet in a central cylinder and three H.E. pellets cast around the delay element. The forward end section contains a wooden nose plug, two parachutes, and a suspension cord.

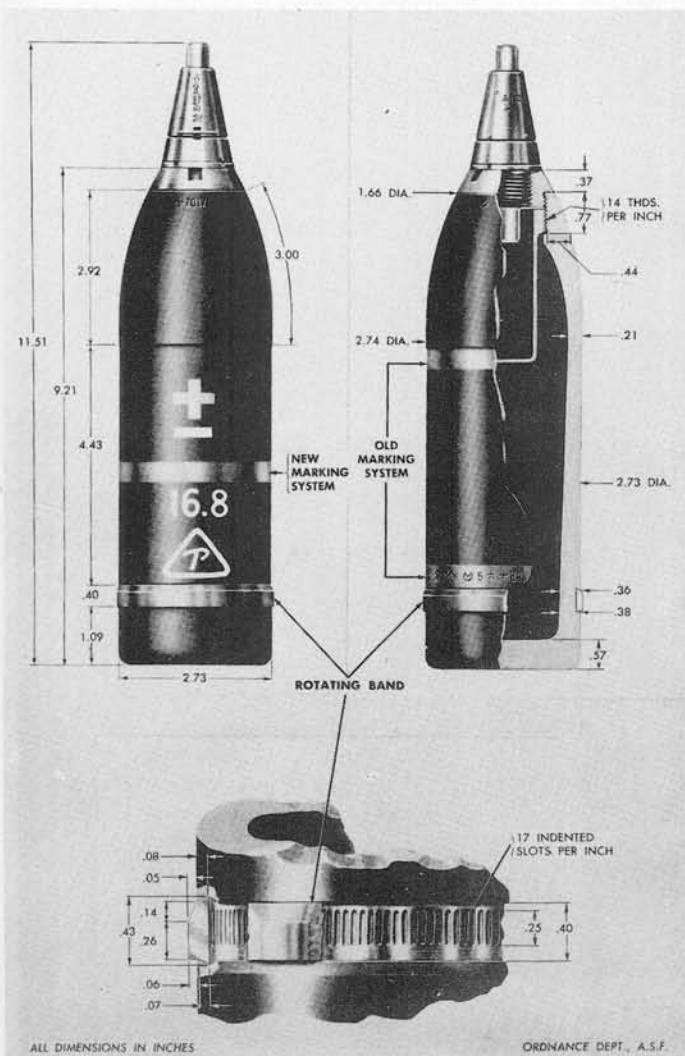
The projectile is slid down the mortar tube in a manner similar to the firing of a standard mortar shell. Upon striking the firing pin, the primer is ignited, and it, in turn, sets off the loose black powder in the base of the round. The black powder ignites the propellant and the 15-second delay train. The shell is propelled from the mortar and continues in flight until the delay train ignites the ejecting charge which forces out the wooden nose plug, the two parachutes, the suspension cord, and the explosive cylinder. At the same time, the 40-second delay pellet is ignited. The explosive cylinder is suspended by a small parachute attached to the cylinder by 12-inch strands, and by a larger parachute attached to the cylinder by the 30-foot suspension cord. The end of the suspension cord is covered with match com-

position and acts as a pull igniter. If an airplane strikes the suspension cord of the floating high explosive assembly, the jerk on the cord pulls the end of the cord through the primer, causing detonation of the high explosive. If the pull igniter is not functioned, the burning train of the 40-second delay pellet reaches the detonator and sets off the explosive cylinder.

An 81 mm flare shell, identical in external appearance except for color markings, is also used. It contains two parachutes and a flare, apparently of a magnesium composition. When the projectile is in flight, a 15-second delay train sets off an ejecting charge of black powder which forces out the nose plug, parachutes, and flare. The burning of the ejecting charge ignites the flare, which floats earthward on the parachutes.

SPECIFICATIONS

| | |
|----------------------------|--------------------------|
| Caliber | 81 mm |
| Length (overall) | 21½ ins. |
| Diameter of cylinder | 1 9/16 ins. |
| Size of fins | 7/8 in. x 4¾ ins. |
| Color | Black with tan nose plug |



7 cm (70 mm) MODEL 92 HE

WEAPONS:

7 cm Model 92 HowitzerP. 107
7 cm Model 94 Tank Gun

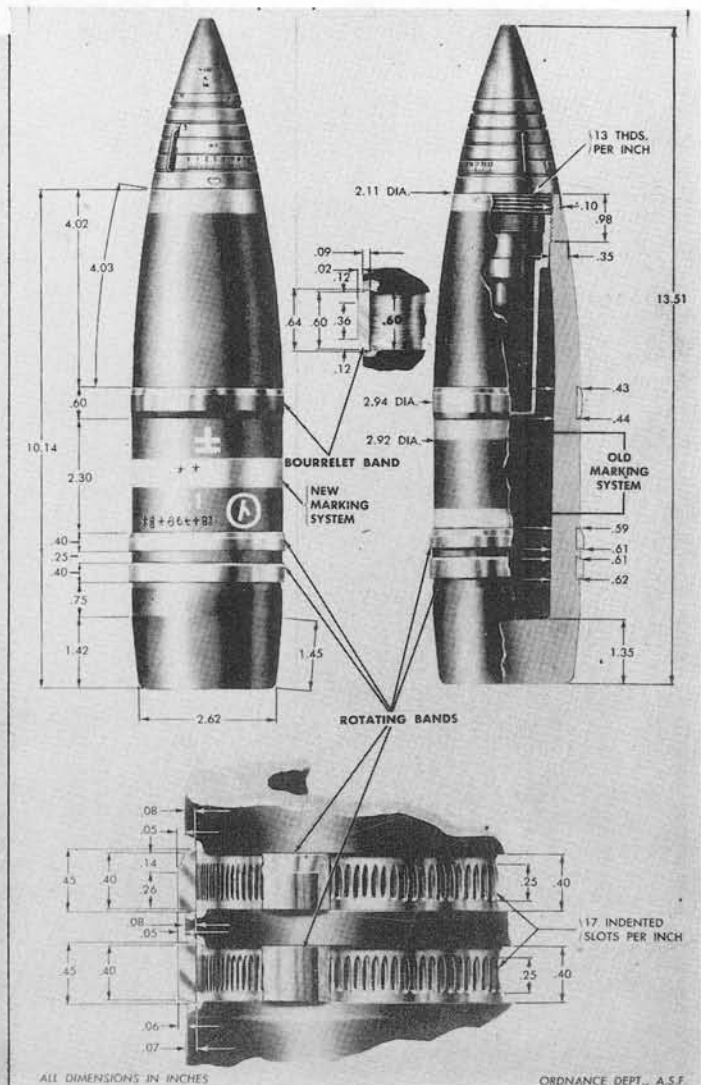
PROJECTILE:

Caliber—70 mm
Kind—Shell
Type—HE
Weight (with Fuze)—8.4 lbs.
Color—Black
Bands—One yellow or one yellow and one white
Charge:
Weight—1.30 lbs.
Kind—T.N.T. has been found
Tracer—None

FUZES:

Model 88 Instantaneous (Howitzer-Mortar Type) Nose Fuze
Model 88 Short Delay (Howitzer-Mortar Type) Nose Fuze
Model 88 Short Delay (Gun Type) Nose Fuze

REMARKS—Captured documents indicate that the Gun Type Fuze is used when this projectile is fired from the tank gun and that the Howitzer-Mortar Type Fuze is used when this projectile is fired from the howitzer.



7 cm (75 mm) MODEL 90 HE POINTED AA

WEAPONS:

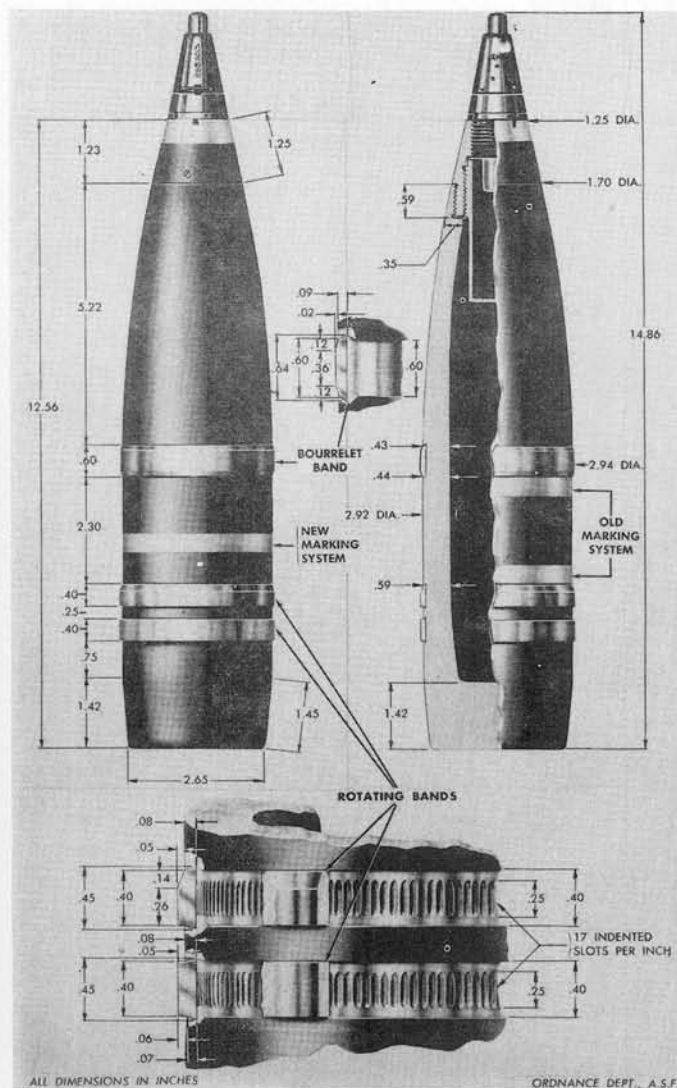
7 cm Model 88 Field AA GunP. 110
7 cm Model 88 Field AA Gun (Special)P. 110

PROJECTILE:

Caliber—75 mm
Kind—Shell
Type—HE
Weight (with Fuze)—14.4 lbs.
Color—Black
Bands—One yellow or one yellow and one white
Charge:
Weight—0.85 lb.
Kind—T.N.T. has been found
Tracer—None

FUZES:

Model 89 Time (Powder Train) Nose Fuze and Auxiliary Fuze

**7 cm (75 mm) MODEL 90 HE POINTED****WEAPONS:**

7 cm Model 90 Field GunP. 111
 7 cm Model 88 Field AA Gun (Special)P. 110

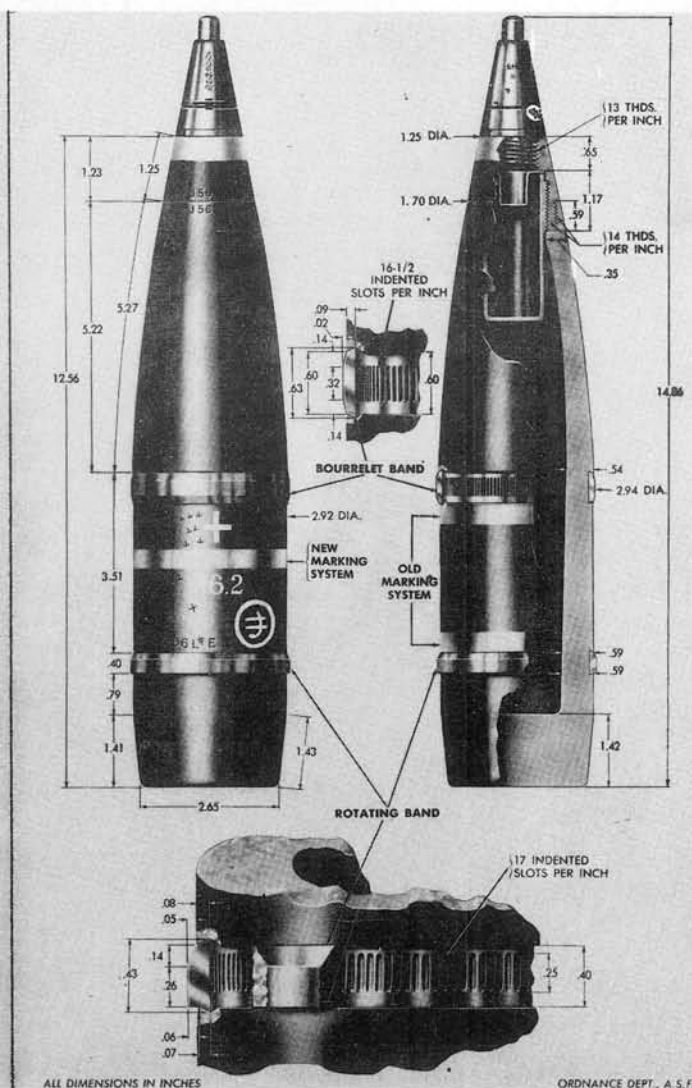
PROJECTILE:

Caliber—75 mm
 Kind—Shell
 Type—HE
 Weight (with Fuze)—14.0 lbs.
 Color—Black
 Bands—One yellow or one yellow and one white
 Charge:
 Weight—1.19 lbs.
 Kind—T.N.T. has been found
 Tracer—None

FUZES:

Model 88 Instantaneous (Gun Type) Nose Fuze
 Model 88 Short Delay (Gun Type) Nose Fuze

REMARKS—This projectile has two rotating bands and a bourrelet band.

**7 cm (75 mm) MODEL 90 HE POINTED****WEAPONS:**

7 cm Model 38 Field GunP. 108
 7 cm Model 41 Cavalry Gun
 7 cm Modified Model 38 Field GunP. 108
 7 cm Model 95 Field GunP. 113
 7 cm Model 90 Field GunP. 111
 7 cm Model 94 Mountain GunP. 112
 7 cm Model 88 Field AA Gun (Special)P. 110

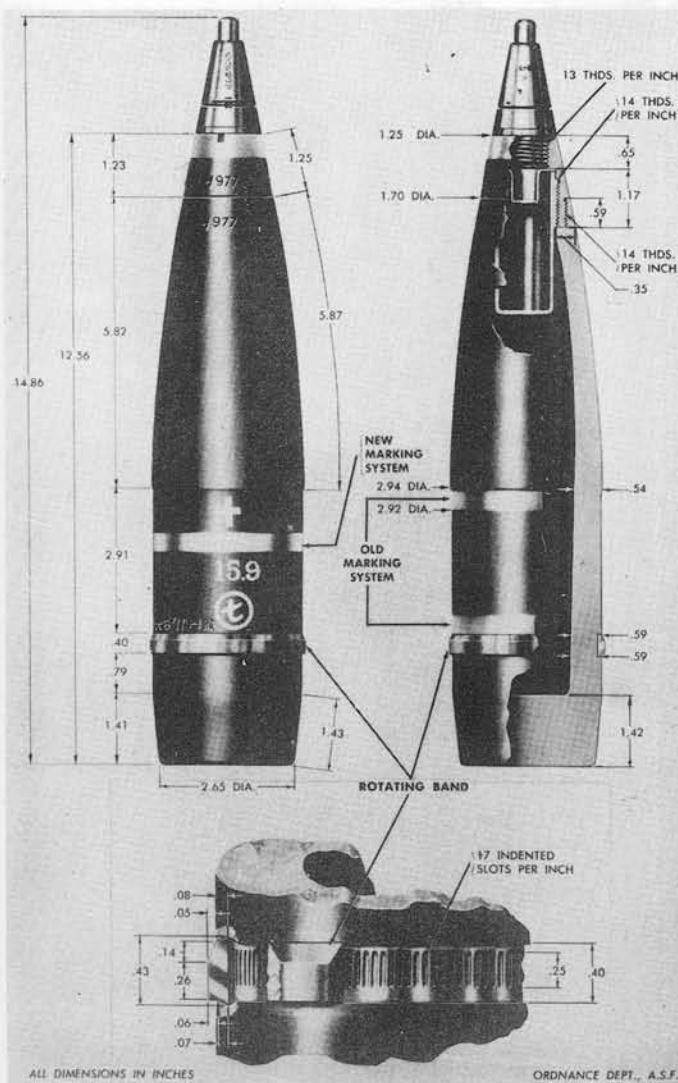
PROJECTILE:

Caliber—75 mm
 Kind—Shell
 Type—HE
 Weight (with Fuze)—14.0 lbs.
 Color—Black
 Bands—One yellow or one white and one yellow
 Charge:
 Weight—1.19 lbs.
 Kind—T.N.T. has been found
 Tracer—None

FUZES:

Model 88 Instantaneous (Gun Type) Nose Fuze
 Model 88 Short Delay (Gun Type) Nose Fuze

REMARKS—This projectile has one rotating band and a bourrelet band



7 cm (75 mm) MODEL 90 HE POINTED

WEAPONS:

| | |
|--------------------------------------|--------|
| 7 cm Model 38 Field Gun | P. 108 |
| 7 cm Model 41 Cavalry Gun | |
| 7 cm Modified Model 38 Field Gun | P. 108 |
| 7 cm Model 95 Field Gun | P. 113 |
| 7 cm Model 90 Field Gun | P. 111 |
| 7 cm Model 94 Mountain Gun | P. 112 |
| 7 cm Model 88 Field AA Gun (Special) | P. 110 |

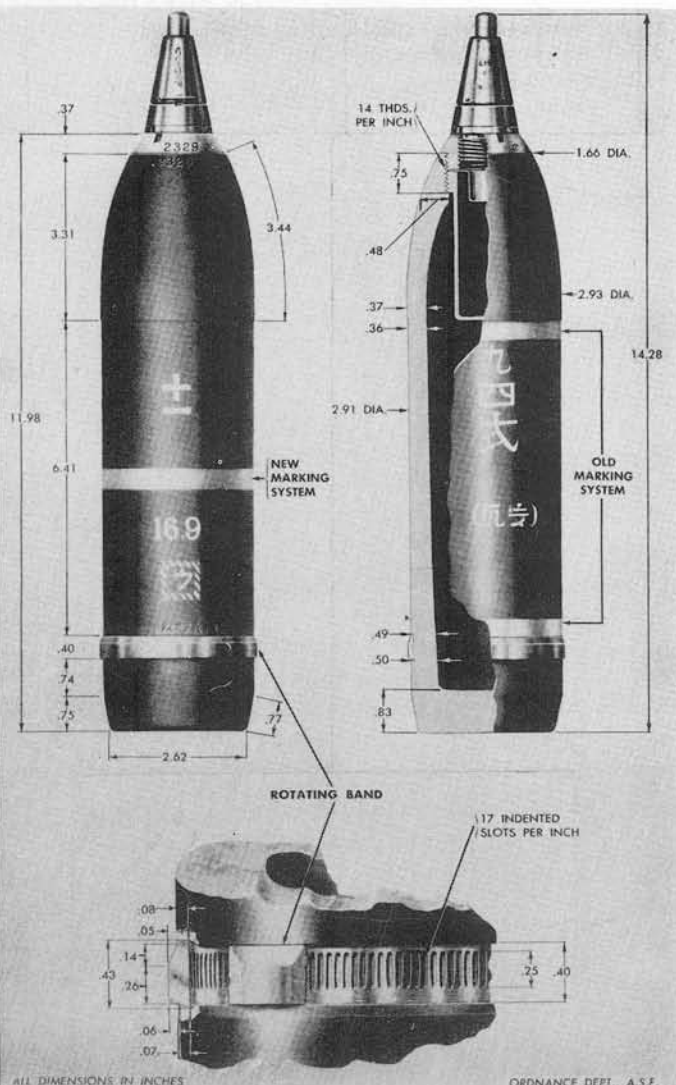
PROJECTILE:

Caliber—75 mm
 Kind—Shell
 Type—HE
 Weight (with Fuze)—14.0 lbs.
 Color—Black
 Bands—One yellow or one yellow and one white
 Charge:
 Weight—1.19 lbs.
 Kind—T.N.T. has been found
 Tracer—None

FUZES:

Model 88 Instantaneous (Gun Type) Nose Fuze
 Model 88 Short Delay (Gun Type) Nose Fuze

REMARKS—This projectile has one rotating band and does not have a bourrelet band.



7 cm (75 mm) MODEL 94 HE

WEAPONS:

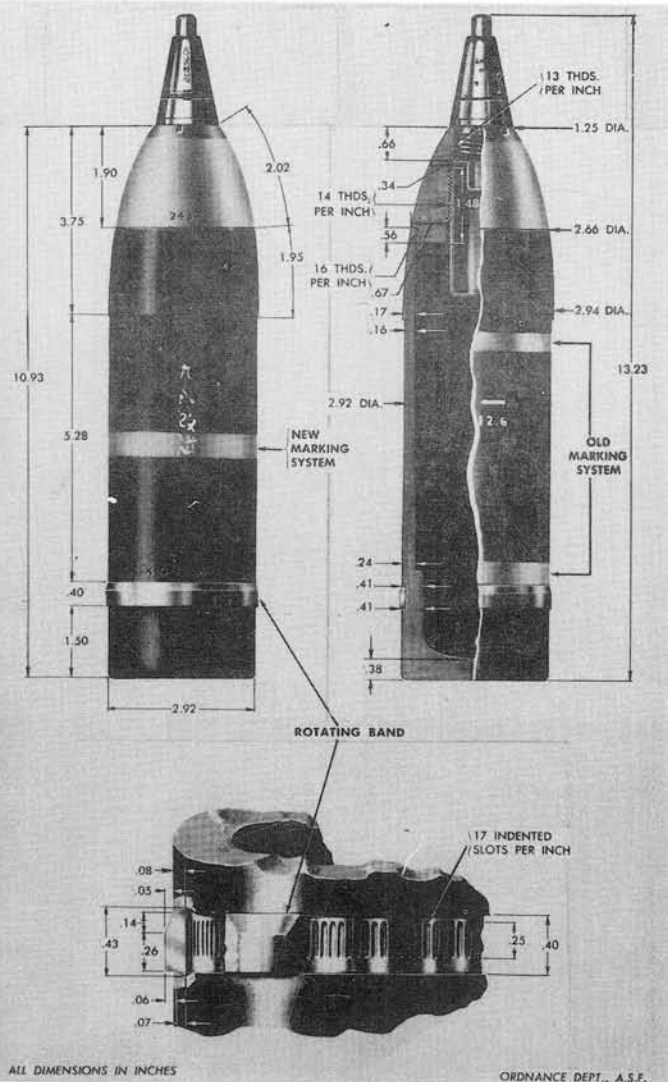
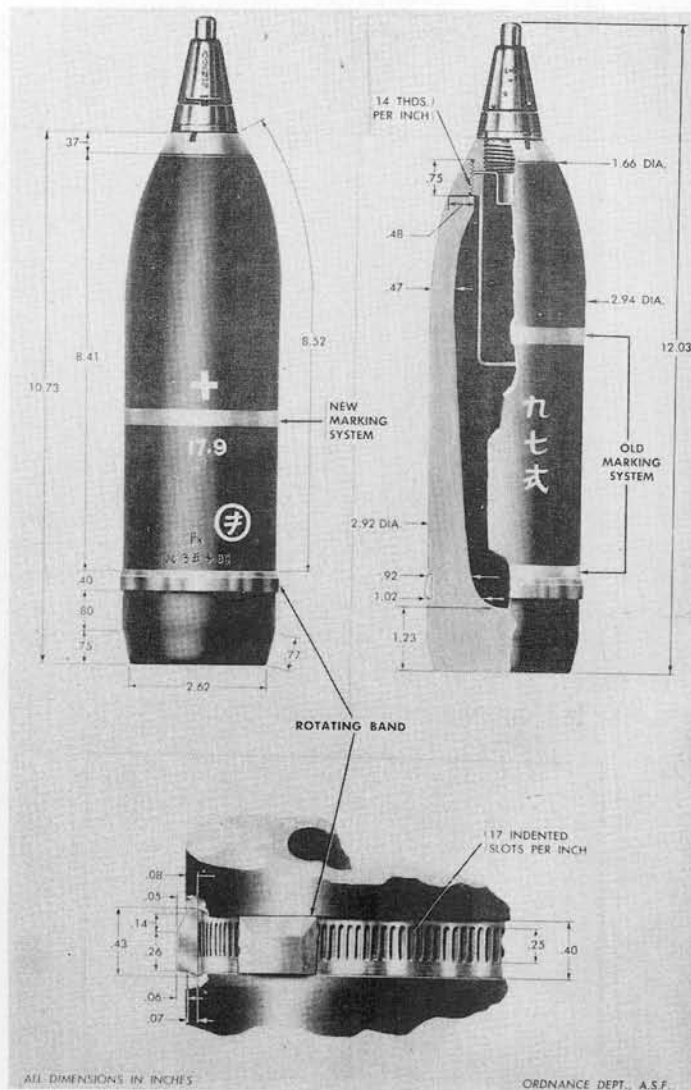
| | |
|--------------------------------------|--------|
| 7 cm Model 38 Field Gun | P. 108 |
| 7 cm 41 Cavalry Gun | |
| 7 cm Modified Model 38 Field Gun | P. 108 |
| 7 cm Model 95 Field Gun | P. 113 |
| 7 cm Model 90 Field Gun | P. 111 |
| 7 cm Model 41 Mountain Gun | P. 109 |
| 7 cm Model 94 Mountain Gun | P. 112 |
| 7 cm Model 88 Field AA Gun (Special) | P. 110 |
| 7 cm Model 11 Field AA Gun | |

PROJECTILE:

Caliber—75 mm
 Kind—Shell
 Type—HE
 Weight (with Fuze)—13.3 lbs.
 Color—Black
 Bands—One yellow or one yellow and one white
 Charge:
 Weight—1.78 lbs.
 Kind—Mixture of Ammonium Nitrate, Guanidine Nitrate, Cyclonite, or TNT
 Tracer—None

FUZES:

Model 88 Instantaneous (Gun Type) Nose Fuze
 Model 88 Short Delay (Gun Type) Nose Fuze



7 cm (75 mm) MODEL 97 HE SEMI-STEEL

WEAPONS:

| | |
|--|--------|
| 7 cm Model 38 Field Gun | P. 108 |
| 7 cm Model 41 Cavalry Gun | |
| 7 cm Modified Model 38 Field Gun | P. 108 |
| 7 cm Model 95 Field Gun | P. 113 |
| 7 cm Model 41 Mountain Gun | P. 109 |

PROJECTILE:

Caliber—75 mm
 Kind—Shell
 Type—HE
 Weight (with Fuze)—13.4 lbs.
 Color—Black
 Bands—One green or one yellow and one green
 Charge:
 Weight—0.86 lbs.
 Kind—T.N.T. has been found
 Tracer—None

FUZES:

Model 88 Instantaneous (Gun Type) Nose Fuze
 Model 88 Short Delay (Gun Type) Nose Fuze

REMARKS—Although suspected it is not known definitely that this projectile is used in the 7 cm Model 90 Field Gun, the 7 cm Model 94 Mountain Gun, and the 7 cm Model 88 Field AA Gun (Special)

7 cm (75 mm) MODEL 98 MODIFIED HE

WEAPONS:

| | |
|--|--------|
| 7 cm Model 38 Field Gun | P. 108 |
| 7 cm Model 41 Cavalry Gun | |
| 7 cm Modified Model 38 Field Gun | P. 108 |
| 7 cm Model 95 Field Gun | P. 113 |
| 7 cm Model 41 Mountain Gun | P. 109 |

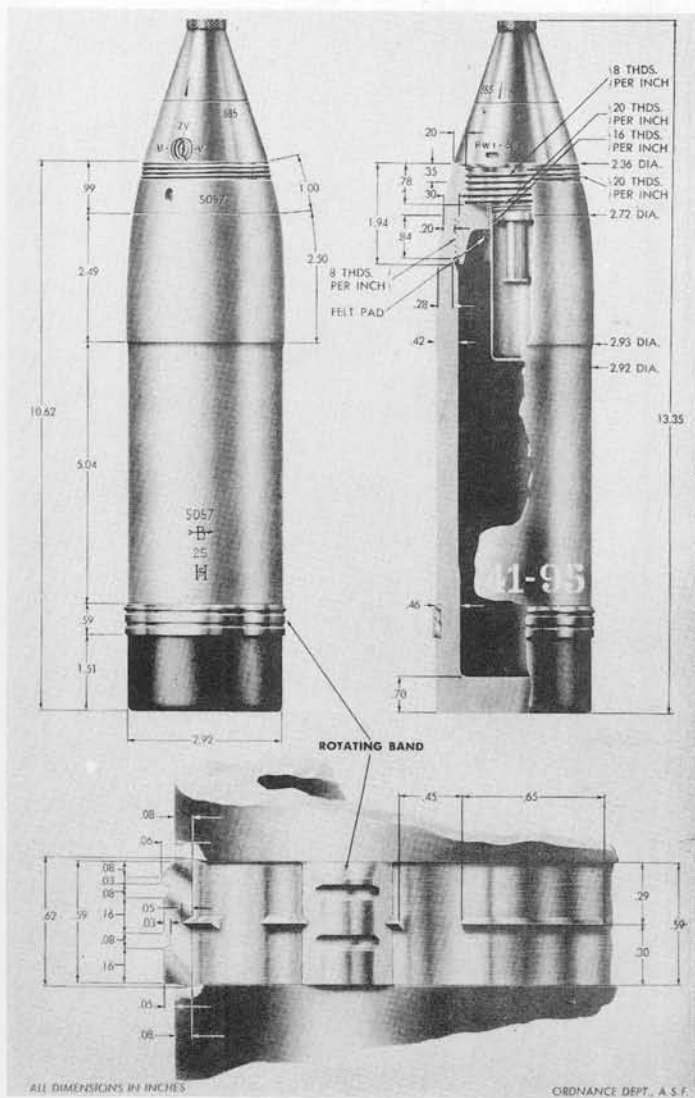
PROJECTILE:

Caliber—75 mm
 Kind—Shell
 Type—HE
 Weight (with fuze)—10.1 lbs.
 Color—Black with the nose painted white
 Bands—One yellow or one yellow and one white
 Charge:
 Weight—2 lbs.
 Kind—T.N.T. has been found
 Tracer—None

FUZES:

Model 88 Instantaneous (Gun Type) Nose Fuze
 Model 88 Short Delay (Gun Type) Nose Fuze

REMARKS—The shell body for this projectile has been converted from shrapnel to HE by the addition of a heavy steel nose. Although suspected, it is not known definitely that this projectile is used in the 7 cm Model 90 Field Gun, the 7 cm Model 94 Mountain Gun, and the 7 cm Model 88 Field AA Gun (Special)



75 mm HE (DUTCH)

WEAPONS:

75 mm Dutch Bofors

PROJECTILE:

Caliber—75 mm

Kind—Shell

Type—HE

Weight (with Fuze)—14.67 lbs.

Color—Yellow

Charge:

Weight—1.4 lbs.

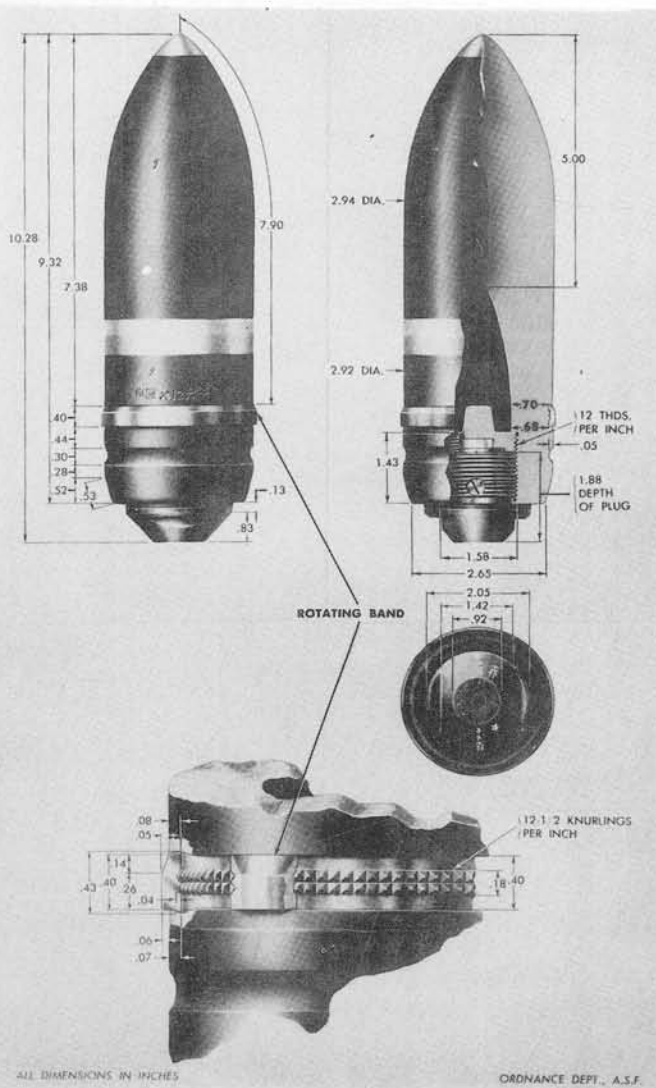
Kind—Picric

Tracer—None

FUZE:

Selective Super Quick or Short Delay Nose Fuze

REMARKS—Inasmuch as quantities of this ammunition and weapons have been captured by the Japanese, it may be used against our troops



7 cm (75 mm) MODEL 1 APHE

WEAPONS:

7 cm Model 38 Field GunP. 108

7 cm Model 41 Cavalry Gun

7 cm Modified Model 38 Field GunP. 108

7 cm Model 95 Field GunP. 113

7 cm Model 90 Field GunP. 111

7 cm Model 94 Mountain GunP. 112

7 cm Model 41 Mountain GunP. 109

PROJECTILE:

Caliber—75 mm

Kind—Shell

Type—APHE

Weight (with Fuze)—14.6 lbs.

Color—Black

Bands—One white

Charge:

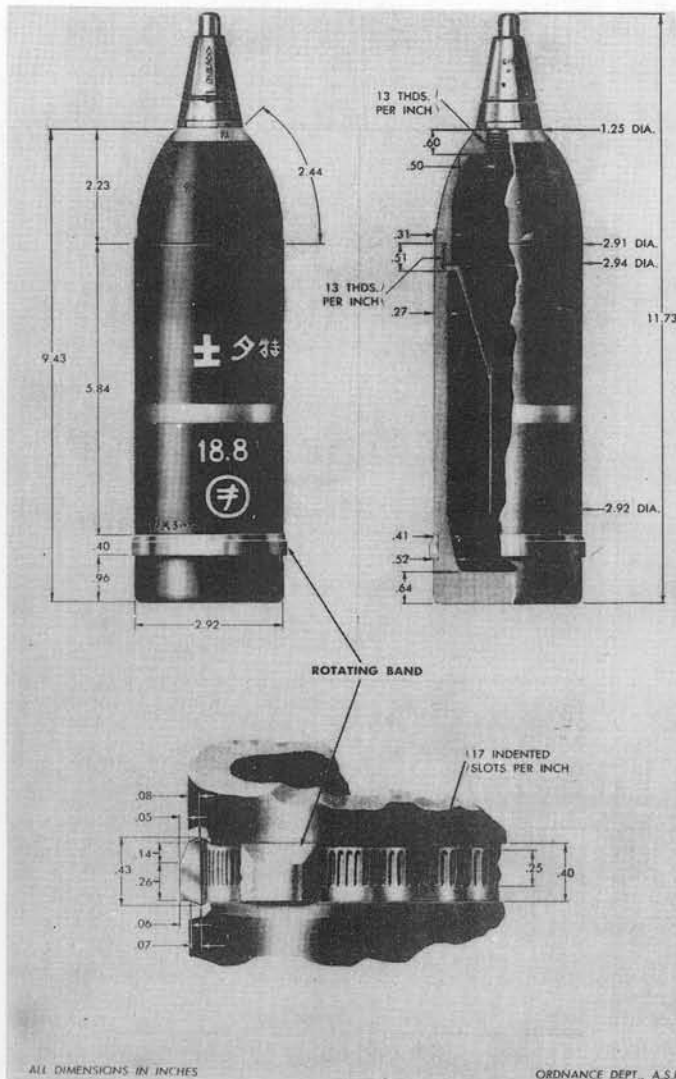
Weight—0.17 lbs.

Kind—Mixture of cyclonite and wax has been found

Tracer—Yes

FUZE:

Model 1 Medium Short Delay Base Fuze



ALL DIMENSIONS IN INCHES

ORDNANCE DEPT., A.S.F.

7 cm (75 mm) MODEL 2 HOLLOW CHARGE

WEAPONS:

7 cm Model 41 Mountain GunP. 109
7 cm Model 94 Mountain GunP. 112

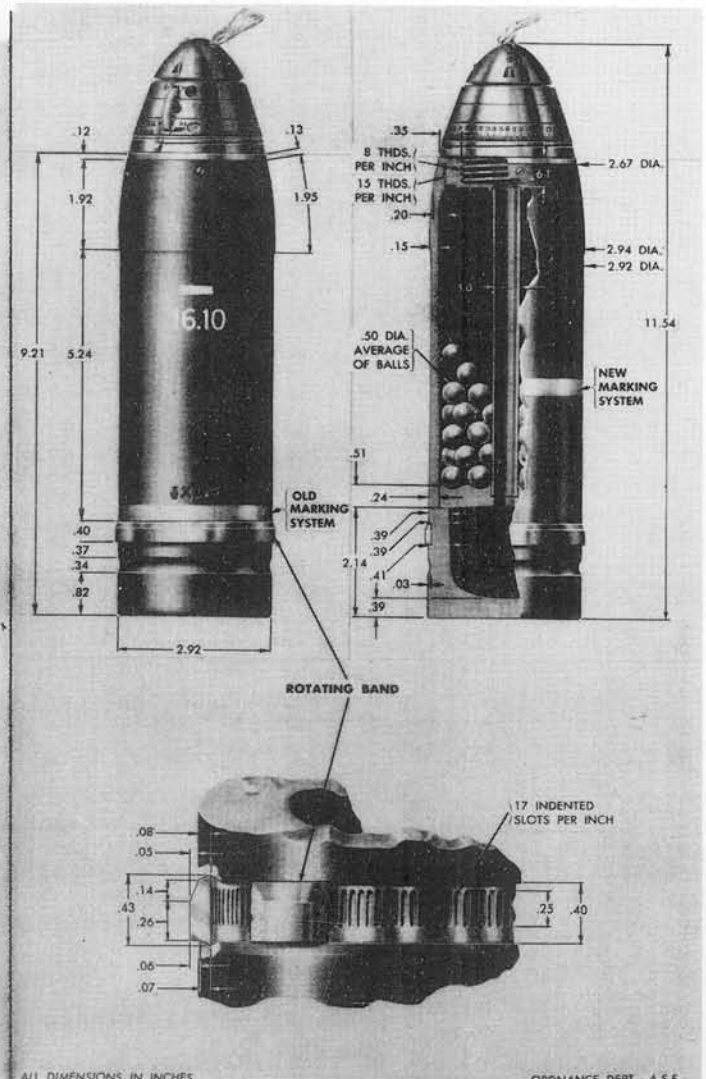
PROJECTILE:

Caliber—75 mm
Kind—Shell
Type—Hollow Charge
Weight (with Fuze)—8.21 lbs.
Color—Black
Bands—One yellow
Charge:
Weight—1.2 lbs.
Kind—Mixture of Cyclonite and T.N.T. has been found
Tracer—None

FUZE:

Model 88 Instantaneous (Gun Type) Nose Fuze

REMARKS—Although suspected, it is not known definitely that this projectile is used in the 7 cm Model 38 Field Gun, 7 cm Model 41 Cavalry Gun, 7 cm Modified Model 38 Field Gun, 7 cm Model 95 Field Gun, 7 cm Model 90 Field Gun, and 7 cm Model 88 Field AA Gun (Special)



ALL DIMENSIONS IN INCHES

ORDNANCE DEPT., A.S.F.

7 cm (75 mm) MODEL 90 SHRAPNEL

WEAPONS:

7 cm Model 38 Field GunP. 108
7 cm Model 41 Cavalry Gun
7 cm Modified Model 38 Field GunP. 108
7 cm Model 95 Field GunP. 113
7 cm Model 41 Mountain GunP. 109
7 cm Model 90 Field GunP. 111
7 cm Model 94 Mountain GunP. 112

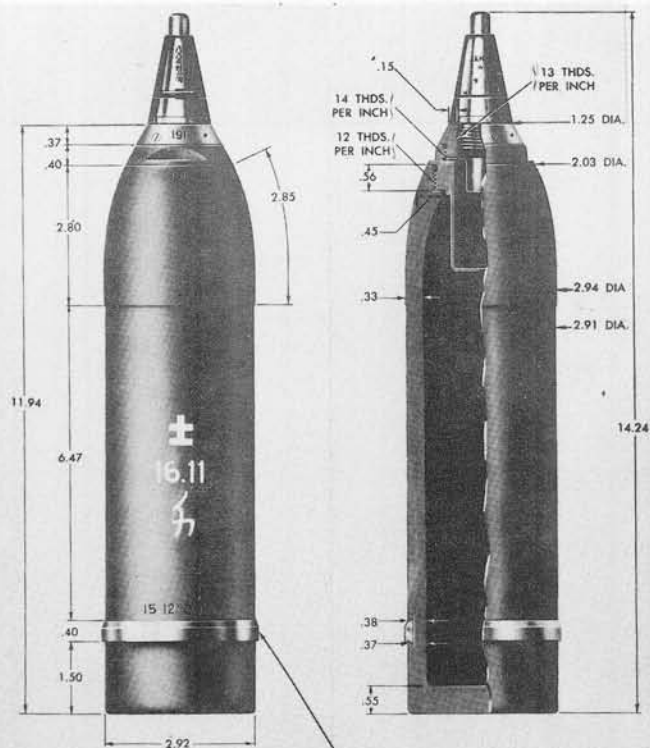
PROJECTILE:

Caliber—75 mm
Kind—Shrapnel
Weight (with Fuze)—15.4 lbs.
Color—Black
Bands—One yellow or one yellow and one white
Charge:
Weight—0.22 lb.
Kind—Black powder
Tracer—None

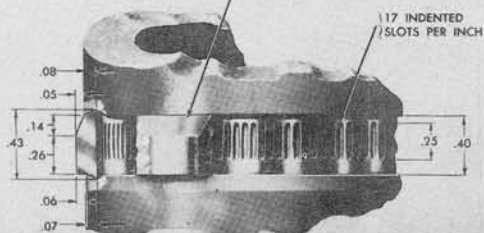
FUZE:

Model 5 Combination Time and Percussion Nose Fuze

REMARKS—This projectile contains 268 (approximately 5.5 lbs.) lead balls



ROTATING BAND



ALL DIMENSIONS IN INCHES

ORDNANCE DEPT., A.S.F.

7 cm (75 mm) INCENDIARY

WEAPONS:

| | |
|----------------------------------|--------|
| 7 cm Model 38 Field Gun | P. 108 |
| 7 cm Model 41 Cavalry Gun | |
| 7 cm Modified Model 38 Field Gun | P. 108 |
| 7 cm Model 95 Field Gun | P. 113 |
| 7 cm Model 90 Field Gun | P. 111 |
| 7 cm Model 41 Mountain Gun | P. 109 |
| 7 cm Model 94 Mountain Gun | P. 112 |

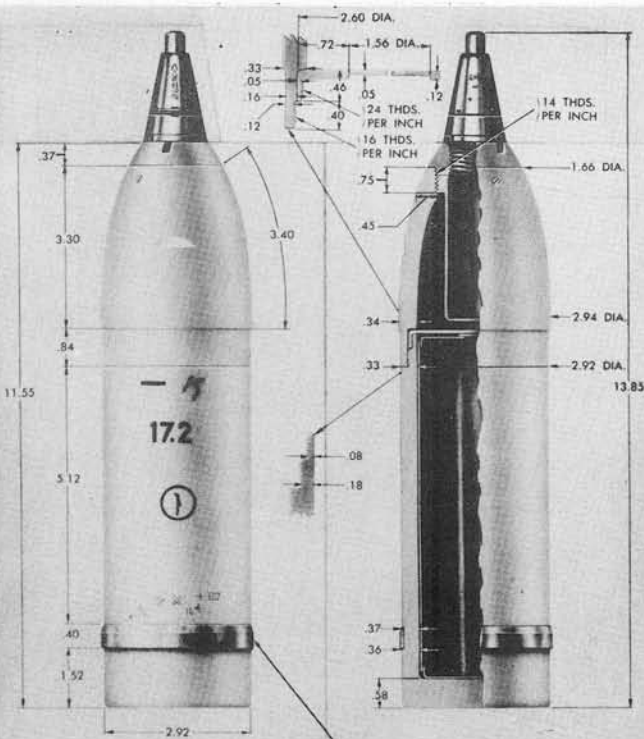
PROJECTILE:

Caliber—75 mm
 Kind—Shell
 Type—Incendiary
 Weight (with Fuze)—12.1 lbs.
 Color—Gray
 Bands—None
 Charge:
 Weight—Approx. 1.5 lbs.
 Kind—Solution of white phosphorus and rubber pellets in carbon disulphide
 Tracer—None

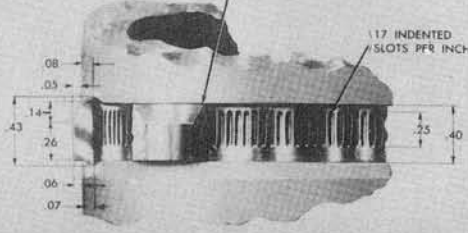
FUZE:

Model 88 Instantaneous (Gun Type)

REMARKS—The model number of this projectile has not been determined



ROTATING BAND



ALL DIMENSIONS IN INCHES

ORDNANCE DEPT., A.S.F.

7 cm (75 mm) MODEL 90 SMOKE (WP)

WEAPONS:

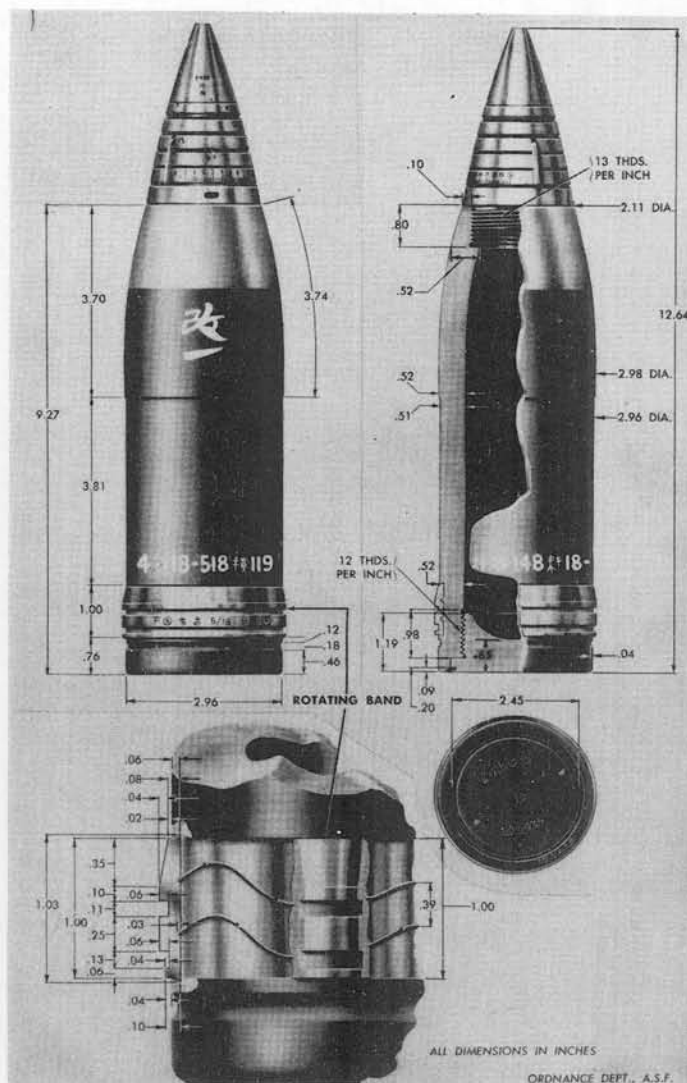
| | |
|----------------------------------|--------|
| 7 cm Model 38 Field Gun | P. 108 |
| 7 cm Model 41 Cavalry Gun | |
| 7 cm Modified Model 38 Field Gun | P. 108 |
| 7 cm Model 95 Field Gun | P. 113 |
| 7 cm Model 90 Field Gun | P. 111 |
| 7 cm Model 41 Mountain Gun | P. 109 |
| 7 cm Model 94 Mountain Gun | P. 112 |

PROJECTILE:

Caliber—75 mm
 Kind—Shell
 Type—Smoke
 Weight (with Fuze)—12.6 lbs
 Color—White
 Bands—None
 Charge:
 Smoke—1.54 lbs. of white Phosphorus
 Bursting—0.22 lb. of Picric Acid and Dinitronaphthalene
 Tracer—None

FUZE:

Model 88 Instantaneous (Gun Type)

**8 cm (3 inch) HE AA [NAVAL]****WEAPONS:**

8 cm AA Gun [Naval]

PROJECTILE:

Caliber—3 inches

Kind—Shell

Type—HE

Weight (with Fuze)—13.5 lbs.

Color—Maroon body with green nose

Charge:

Weight—0.97 lb.

Kind—Picric has been found

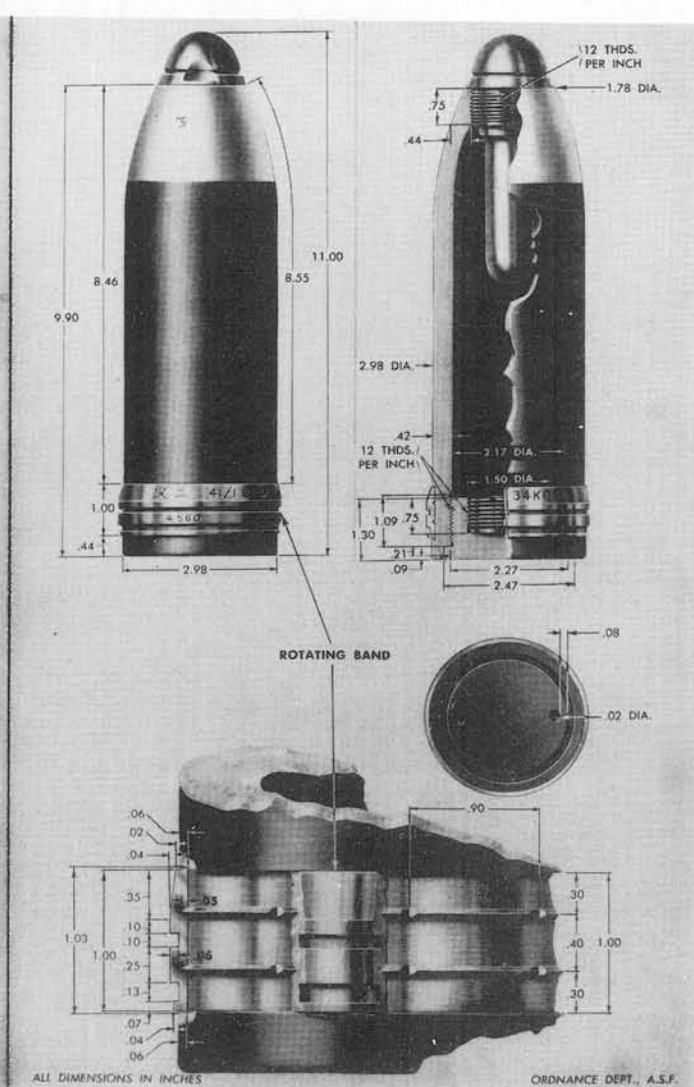
Tracer—None

FUZE:

Navy Time Nose Fuze (Powder train)*

REMARKS—The model number of the projectile and that of the gun from which fired have not been determined.

* The model number of the fuze has not been determined. However the design is identical to the Army Type 89 fuze, the only difference being that this fuze has Navy inspection stampings.

**8 cm (3 INCH) HE [NAVAL]****WEAPONS:**

8 cm Low Angle Gun [Naval]

PROJECTILE:

Caliber—3 inches

Kind—Shell

Type—HE

Weight (with Fuze and booster)—13.8 lbs.

Color—Maroon body with green nose

Charge:

Weight—1.38 lbs.

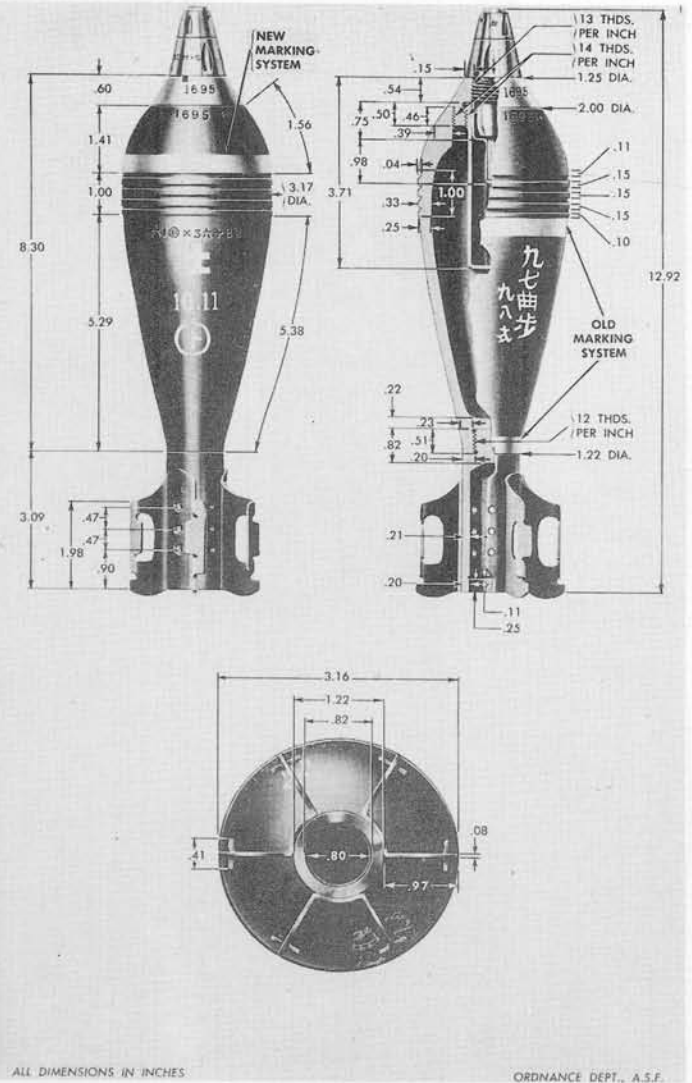
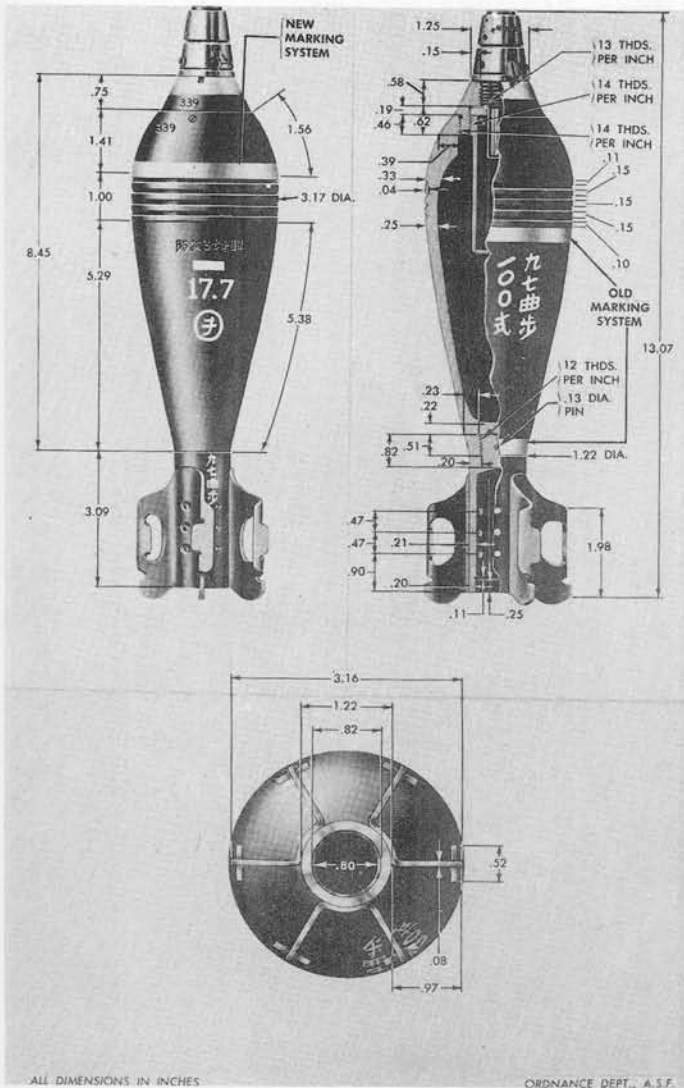
Kind—Picric has been found

Tracer—None

FUZE:

Navy Model 5 Nose Fuze

REMARKS—The model number of the projectile and that of the gun from which fired have not been determined.



8 cm (81 mm) MODEL 100 HE MORTAR

WEAPONS:

8 cm Model 97 MortarP. 122

PROJECTILE:

Caliber—81 mm
Kind—Mortar Shell
Type—HE
Weight (without Fuze and propelling charge)—6.75 lbs.
Color—Black
Bands—One yellow
Charge:
Weight—1.18 lbs.
Kind—T.N.T. has been found

FUZE:

Model 100 Mortar Fuze

8 cm (81 mm) MODEL 98 HE MORTAR

WEAPONS:

8 cm Model 97 MortarP. 122

PROJECTILE:

Caliber—81 mm
Kind—Mortar Shell
Type—HE
Weight (without Fuze and Propelling Charge)—6.84 lbs.
Color—Black
Bands—One yellow or one yellow and one white
Charge:
Weight—1.09 lbs.
Kind—T.N.T.

FUZE:

Model 93 Mortar Fuze