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JAPANESE TANK AND ANTITANK WARFARE

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SECTION I

JAPANESE ARMORED FIGHTING VEHICLES

1. INTRODUCTION TO JAPANESE ARMORED FIGHTING VEHICLES

Apparently the main Japanese emphasis in tank development prior to 1935 was laid on experimentation. Numerous European tanks of varying designs had been bought, and from them the Japanese had evolved a considerable number of different models and types, particularly in vehicles ranging from 4 to 15 tons. None of these vehicles could be considered a potent factor in present-day warfare.

In 1935 the Japanese produced the Type 95 (1935) light tank. Subsequently this vehicle was standardized and manufactured in large numbers. Owing to its improved suspension and hull design, together with the mounting of a Type 94 (1934) 37-mm. high velocity gun in the turret, it represented a considerable improvement in Japanese tank design. However, in common with all earlier models, the protective armor of this tank is extremely light, having a maximum thickness of only 0.5 inch.

In 1937 the Japanese produced an improved medium tank, known as the Type 97 (1937), weighing approximately 15 tons. Its general design is satisfactory, but as engagements with United States tanks have shown, the maximum armor thickness of only 1 inch is inadequate to withstand high-velocity projectiles. Furthermore, its primary armament consists of a turret-mounted 57-mm low-velocity gun, a weapon unsuited for tank-versus-tank fighting. Since the original Type 97 was produced it has been modified and now has a high velocity 47-mm gun in place of the 57-mm gun, and this new weapon should prove to be more satisfactory. This vehicle mounting the 47-mm gun was first observed in Corregidor in 1942. Although the substitution of this weapon necessitated the redesigning of the turret, the armor was not increased, nor was any other major improvement effected. Recent combat reports indicate, however, that the quality of the 47-mm armor-piercing, high-explosive projectile has been improved. Previously, tests had shown that the metal was brittle and tended to break up. Tanks of this type have been encountered in Burma and the Pacific theaters.

Apart from the improved version of the Type 97 (1937) medium tank, the Type 2 (1942) amphibious tank is the latest and only other modern Japanese tank encountered to date. While the method of flotation is extremely interesting (being achieved by means of detachable pontons), the most significant trend in this model is the coaxial mounting of the 37-mm gun, Type 1 (1941) and the 7.7-mm machine gun, Type 97 (1937) in the turret, as in no other vehicle have the Japanese been known to mount coaxially their primary and secondary armament. In addition, the chamber capacity of the 37-mm gun, Type 1 (1941), has been increased, indicating that it would have a somewhat higher velocity than previously encountered Japanese tank-mounted guns of this caliber. The hull design of the amphibious tank shows considerable improvement, particularly in regard to the elimination of re-entrant angles. The armor, however, is consistently light, the maximum thickness varying from 0.47 to 0.52 inch, being on the sides of the turret. Tanks of this type were first encountered at Kwajalein and since then have been found elsewhere in the Pacific area.

Complete details will be given in this survey where available. In the case of the early light tanks and medium tanks there is not adequate evidence, documentary or otherwise, to allow a complete presentation.

2. TYPE 92 (1932) TANKETTE

The Type 92 tankette represents the earliest model tankette which is still operational in the Japanese Army. This vehicle has the turret mounted to the rear of the chassis, giving it a bootlike appearance. Both welded and riveted construction are used throughout the hull. Suspension is four-point, with the use of bell cranks resisted by armored compression springs on each side. A front sprocket drive is used. There are four rubber-tired bogie wheels in pairs and two return rollers on each side. Tracks are the outside center-guide type. The long sloping glacis plate is a prominent identification feature. A light machine gun, ball-mounted in the turret, is the only armament.

Approximate specifications:

Weight	3 tons.
Length	10 feet 3 inches.
Width	5 feet 3 inches.
Height	5 feet 4 inches.
Clearance	13½ inches.
Crew	2 men.
Armor	6- to 14-mm (0.24 to 0.55 inch).
Armament	1 x 6.5-mm machine gun ball-mounted.
Engine	4-cylinder, 32 horsepower.
Transmission	4 speeds forward, 1 reverse.
Ground contact	6 feet.
Width of track	5 inches.
Track pitch	3 inches.
Diameter of sprocket	21 inches.
Diameter of bogie wheel	15 inches.
Diameter of rear idler	15 inches.
Height to center of sprocket	25 inches.
Performance:	
Speed	25 miles per hour.
Range of action	100 miles.
Gradient	27°.
Obstacles:	
Trench	4 feet 6 inches wide
Step	2 feet 1 inch high
Ford	2 feet deep.

3. TYPE 94 (1934) TANKETTE

The Type 94 tankette embodies the general design features of the Type 92 tankette with one major exception. The small rear idler on the Type 92 has been replaced by a large trailing idler on this more recent modification. The suspension is bell crank resisted by armored compression springs. The engine is reported to be a Ford type tractor motor of 32 horsepower. It is armed with one machine gun.

Turret:

The turret is constructed of rolled armor plate. It is mounted on a ball-race and forms a cover for the fighting compartment. It consists of a mantlet for the machine gun, a turret traverse lock, an entrance hatch, two vision apertures, a gun-sighting aperture, and an aerial opening.

The interior of the armor of the turret is lined with asbestos to afford protection from heat radiation. The turret is supported on a ball-race which enables it to be rotated quickly. Since there is no provision for a traversing gear it is probably traversed by shoulder pressure against the machine gun. The ball-mounting for the machine gun is constructed in two sections.

Hull:

The hull is constructed of light armor plate. The inner surface of the plates surrounding the driving and fighting compartments is lined with

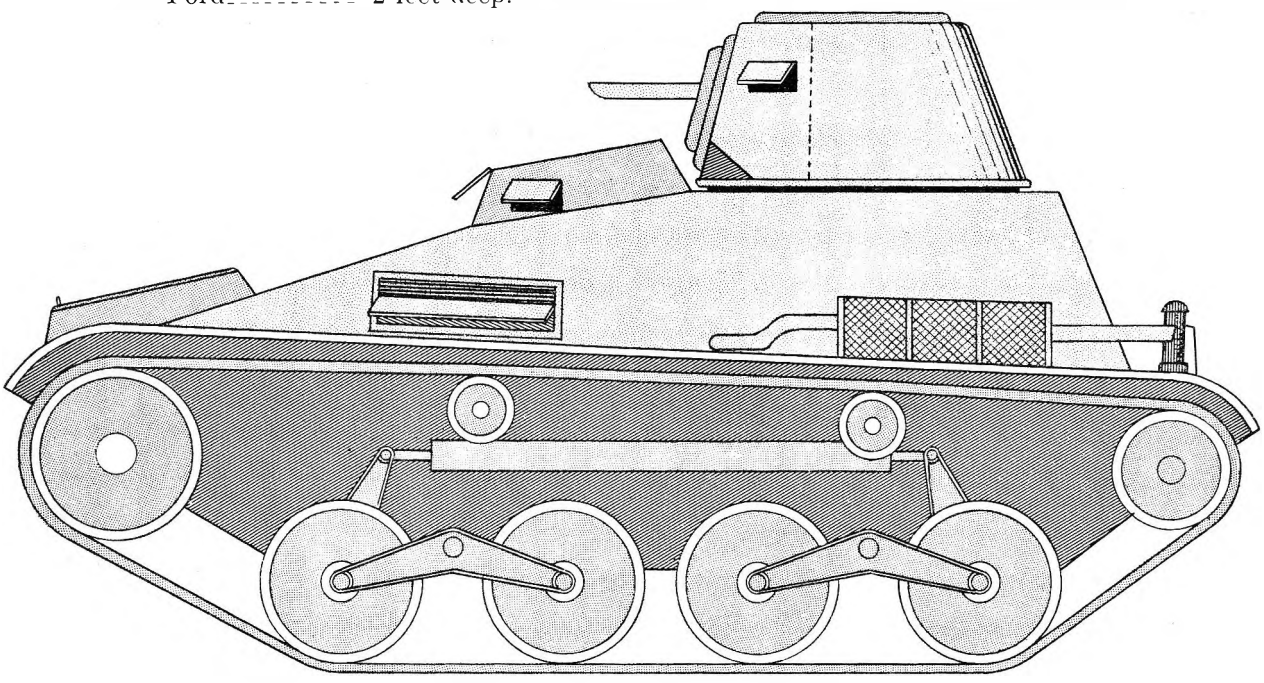


FIGURE 1.—Type 92 (1932) Tankette.

asbestos which acts as a protective measure against the heat radiation, both from the engine and the climate. On the inside of the front plate of the driving compartment, there are vision slits to the right and left; and in front of the inner flap door there is another vision aperture fitted with bullet-proof glass. There is also a sighting and firing aperture for a small arms weapon.

In the front there is a square access plate which can be lifted for checking the transmission. During travel this is kept locked.

Power unit:

The engine and the gasoline tank are located in the fighting compartment. Thus the engine auxiliaries are readily accessible from the driver's seat. The engine itself appears to be decidedly "old-fashioned" in design; it has, for example, splash lubrication. This vehicle employs controlled differential steering. The design is quite straight forward, but the method of carrying the differential housing is worthy of notice—it is supported in plain bush bearings inside the sleeves of the control bevel wheels which, in turn, are carried in ball bearings in the walls of the brake housing; separate taper roller thrust bearings are provided. The steering brakes are of conventional toggle operated two-shoe type. Since they are totally enclosed in a cast housing it would be expected that trouble would arise from overheating.

Suspension:

The suspension of this vehicle is a modification of the Carden-Lloyd type suspension. It employs front-sprocket drive, a large trailing idler, and two return rollers. The four dual bogie wheels are resisted by armored compression springs. It would appear that the lateral rigidity of the bogie assembly would not be very great and severe stresses might arise under adverse steering conditions.

Crew:

The crew consists of two men: a driver and a machine gunner, who is also the tankette commander.

Weapons:

The tankette is armed with a ball-mounted Type 91, 6.5-mm machine gun and possibly one other light weapon.

Approximate specifications:

Weight	3.4 tons.
Length	11 feet.
Width	5 feet 3 inches.
Height	5 feet 4 inches.
Clearance	12 inches.
Crew	2 men.
Armor	4 to 12 mm (0.16 to 0.47 inches).
Armament	1 x 6.5-mm Type 91 tank machine gun.
Engine and power plant	4-cylinder, air-cooled, in-line gasoline engine.
Horsepower	32.
Normal engine speed	1,800 revolutions per minute.
Maximum engine speed	2,700 revolutions per minute.
Firing order	1—2—4—3.
Carburetor	"Tokiwa" model NV.41.
Fuel pump	"Autopulse" electric pump.
Ignition	Magneto and additional hand-operated impulse magneto (Model BH2).
Generator	12 volts, 75 watts.
Starter	12 volts, 1.4 horsepower.
Battery	Stowed on the right side behind the driver's seat; capacity: 12 volts, 60 watt/hours.
Cooling	Fan running at engine speed with cowl.
Lubrication	Splash system w/gear type pump.
Turret traverse	360°.

Approximate specifications—Continued

Performance:

Speed	26 miles per hour.
Range of action	100 miles.
Obstacles:	
Trench	4 feet 6 inches wide.
Step	No details.
Ford	2 feet deep.

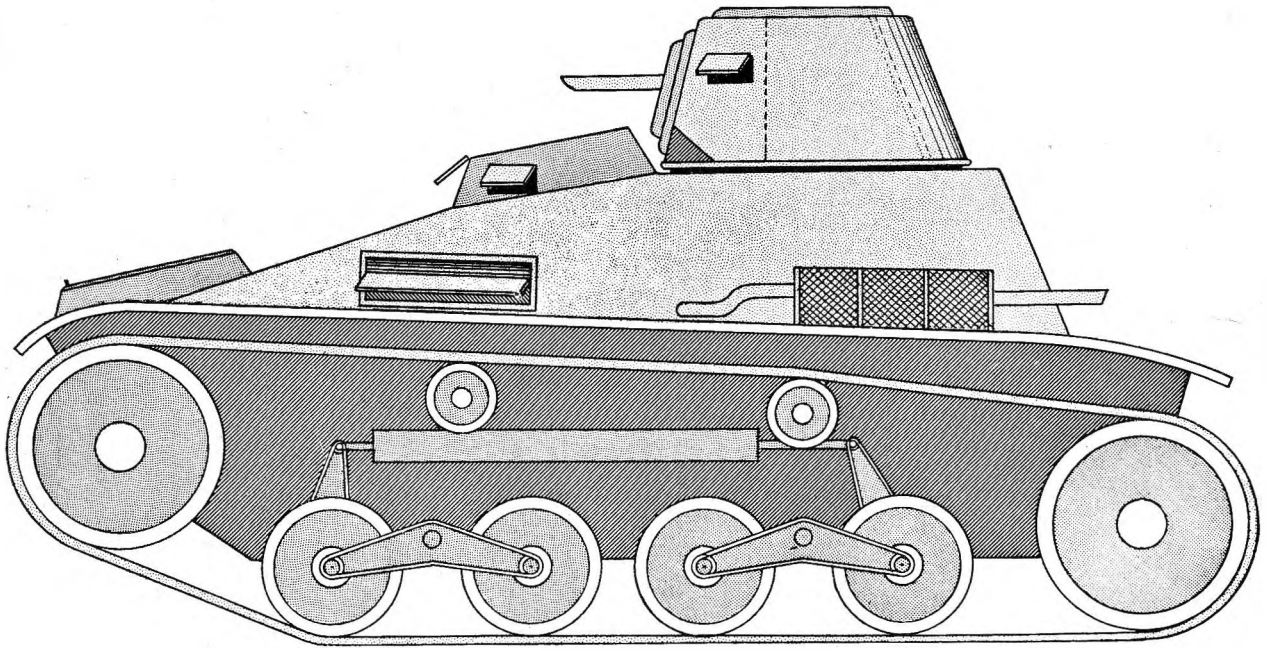


FIGURE 2.—Type 94 (1934) Tankette.

4. TYPE 97 (1937) TANKETTE

The Type 97 tankette is a light mechanized reconnaissance vehicle powered by a 48-horsepower, 4-cylinder, air-cooled, valve-in-head, Diesel engine. This tankette has retained practically the identical suspension of the Type 94 tankette. The hull and turret, however, have been completely redesigned. More room has been provided in the turret to accommodate a 37-mm tank gun. As an alternative, a machine gun is sometimes mounted in place of the 37-mm weapon. This tankette shows a definite attempt on the part of the Japanese to design a simpler front plate and to improve the deflection angles of the armor. The whole appearance of this tankette is one of better design and cleaner features in comparison with its predecessors, the Types 92 and 94 tankettes. It employs front sprocket drive.

Turret:

The turret of the Type 97 tankette is mounted on a ball-race and is constructed of rolled armor plate. It has an all-round armor thickness of 0.39 inch. A Type 94 37-mm tank gun or a Type 97 7.7-mm tank machine gun is mounted in the turret. It is lined with asbestos to protect the crew from heat radiation.

Hull:

The hull is also made of armor plate which is riveted and bolted together. The front plate has an armor thickness of 0.47 inch and other thicknesses vary from 0.16 to 0.47 inch.

Power unit:

The engine is located in the fighting compartment. It is a Diesel engine which reduces to some extent the fire risks involved in having the engine located in the fighting compartment. The Types 92 and 94 had the gasoline engine in the fighting compartment which was somewhat of a fire hazard.

Suspension:

The suspension for the Type 97 tankette is a modification of the Carden-Lloyd type. It employs front sprocket drive, a large trailing idler,

and two return rollers. The four dual bogie wheels are resisted by armored compression springs.

Crew:

The crew consists of two men; a driver and a turret gunner, who is also the tankette commander.

Weapons:

This tankette is armed with either a Type 94 (1934) 37-mm tank gun or a Type 97 7.7-mm machine gun. The armament is mounted in the turret. Extra grenades may be carried in the tank.

Detailed specifications:

Weight		4.2 tons.
Length		12 feet.
Width		6 feet 4 inches.
Height		5 feet 11 inches.
Clearance		13½ inches.
Crew		2 men.
Armor:	*mm*	*inches*
Gun mantlet	--	----
Turret sides	10	0.39
Turret top	8	0.31
Hull front	12	0.47
Hull glacis	4	0.16
Hull nose	6	0.23
Hull side	10	0.39
Hull lower side	6	0.23
Hull rear	10	0.39
Hull top	8	0.31
Armament		1 x Type 94 (1934) 37-mm gun or 1 x Type 97 (1937) 7.7-mm tank machine gun.
Ammunition		54 rounds of 37-mm or 1,200 rounds of 7.7-mm.
Engine and power plant		4-cylinder, air-cooled, valve-in-head, Diesel engine.
Horsepower		48.
Bore		115-mm.
Stroke		150-mm.
Compression ratio		15.2.
Standard rpm		1,500.
Maximum horsepower		60 at 2,700 rpm.
Valve clearance:		
Intake valve		.20-mm (warm).
Exhaust valve		.25-mm (hot).
Valve timing:		
Inlet valve opens		At top dead center.
Inlet valve closes		50° after bottom dead center.
Exhaust valve opens		45° before bottom dead center.
Exhaust valve closes		15° after top dead center.
Fire order		1—2—4—3.
Ignition		Bosch model automatic.
Generator		24 volts, 300 watts.
Storage battery		12-volt, 120-amp hours.
Starter motor		1 x 24-volt, 6-horsepower.
Reduction gear		3.05.
Steering		Clutch brake.
Transmission		Conventional sliding gear type, 4 speeds forward, 1 reverse.
Brake system		Foot- and hand-operated.
Fuel pump		IKEGAKI type fuel injection pump.

Detailed specifications—Continued

Fuel tank capacity	Main, 18.21 gallons. Aux. 8.45 gallons. 26.66 gallons total.
Cooling system	Air-cooled, 2 fans.
Clutch	Dry multiple-disk type.
Performance, obstacles:	
Fording depth	32 inches.
Trench	5 feet 8 inches.
Step	No details.
Speed	28 miles per hour.
Range of action	100 miles.

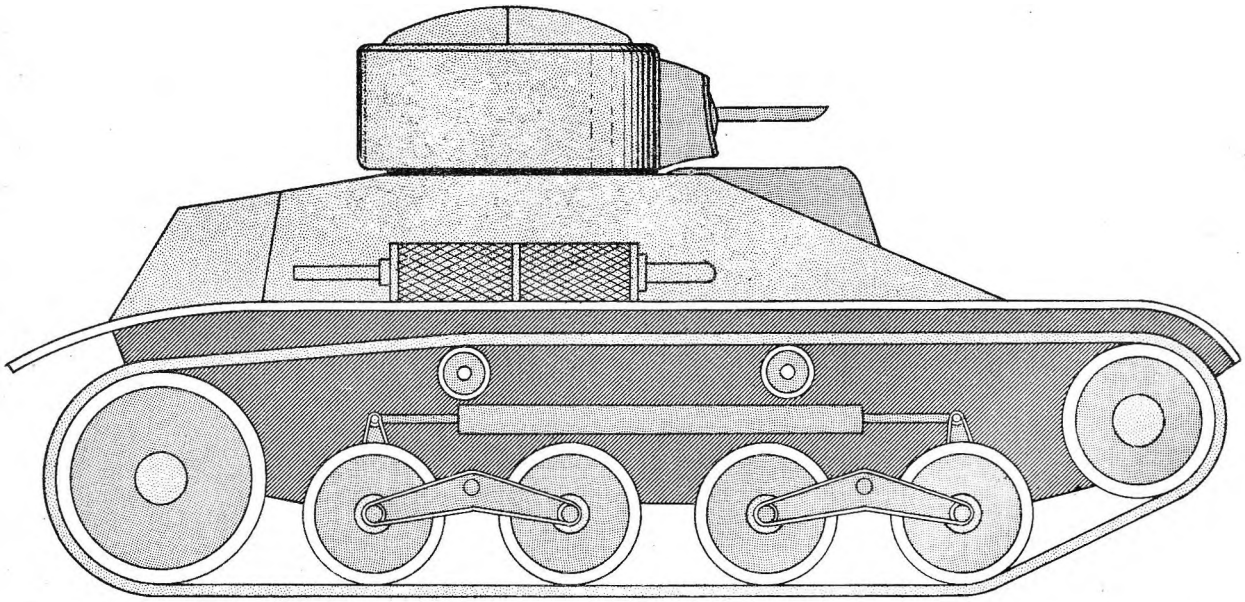


FIGURE 3.—Type 97 (1937) Tankette.

5. TYPE 93 (1933) LIGHT TANK

This tank represents the early development of the light tank series. The box type hull is divided into three compartments. The center compartment is the fighting compartment, the superstructure of which overhangs the tracks. The right-hand side of the front of this compartment is extended forward to form a sponson for the ball-mounted machine gun. In the forward compartment the driver sits on the left and the gunner on the right. Suspension is by six small rubber-tired bogie wheels mounted on three semielliptic springs on each side. There are three return rollers on each side. This light tank employs front sprocket drive, and has a center-guide track. The turret mounts one machine gun to the front, and some pictures show a similar weapon mounted to the rear of the turret. The turret is small, high, and rounded with tapered sides.

Approximate specifications:

Weight	7.8 tons.
Length	14 feet 8 inches.
Width	5 feet 11 inches.
Height	6 feet.
Clearance	15 inches.
Crew	3 men.
Armor	Up to 22-mm (0.87 inch) (reported).
Armament	1 machine gun (hull) 1 machine gun (turret).

Approximate specifications—Continued

Steering	Clutch brake.
Ground contact	10 feet.
Engine	6-cylinder, air-cooled, 85-horsepower, Mitsubishi gasoline engine.
Cooling	Air.
Width of track	7½ inches.
Pitch of track	3½ inches.
Diameter of sprocket	1 foot 6 inches.
Diameter of rear idler	1 foot 3 inches.
Height of sprocket center	1 foot 8 inches.
Performance:	
Speed	28 miles per hour.
Obstacles:	
Trench	5 feet 8 inches wide.
Step	1 foot 6 inches high.
Ford	2 feet 8 inches deep.

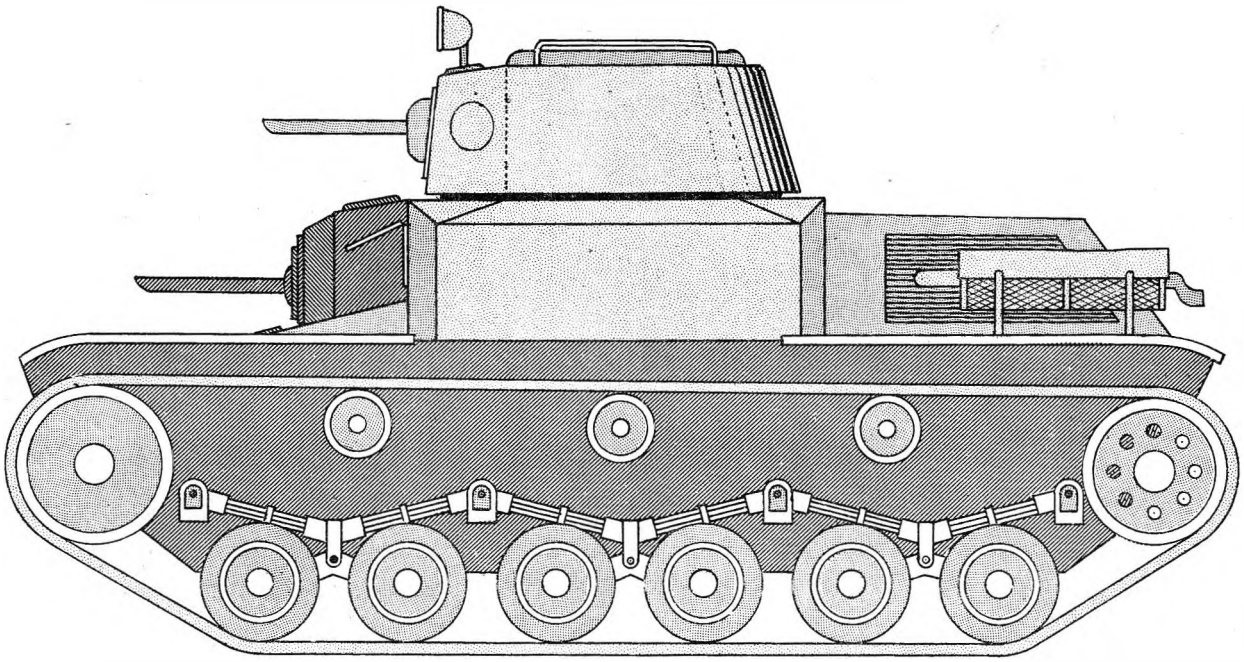


FIGURE 4.—Type 93 (1933) Light Tank.

6. TYPE 93 (1933) LIGHT TANK (IMPROVED VERSION)

This tank is an improvement of the tank described in paragraph 5. Although it is reported to be armed with a 37-mm gun, photographs show that the turret and hull have not been changed enough to accommodate that weapon. The major change is in the suspension. The suspension has been changed from the semielliptical springs to the conventional Japanese light tank suspension, that of the bell crank, resisted by armored compression springs. There are four bogies in pairs on each side and a large rear idler which acts as a bogie This vehicle also employs front sprocket drive.

Approximate specifications:

Weight	7.8 tons.
Length	14 feet 8 inches.
Width	5 feet 11 inches.
Height	6 feet.
Clearance	15 inches.

Approximate specifications—Continued

Crew	3 men.
Armor	Up to 22-mm (0.87 inch) (reported).
Armament	1 machine gun (hull) 1 machine gun (turret).
Engine	6-cylinder, 85-horsepower air-cooled, Mitsubishi, gasoline.
Ground contact	9 feet 6 inches.
Width of track	7½ inches.
Diameter of bogie wheel	15 inches.
Track pitch	3½ inches.
Steering	Clutch brake.
Speed	25 miles per hour.
Range of action	120 miles.
Obstacles:	
Trench	5 feet 8 inches wide.
Step	1 foot 6 inches high.
Ford	2 feet 10 inches deep.

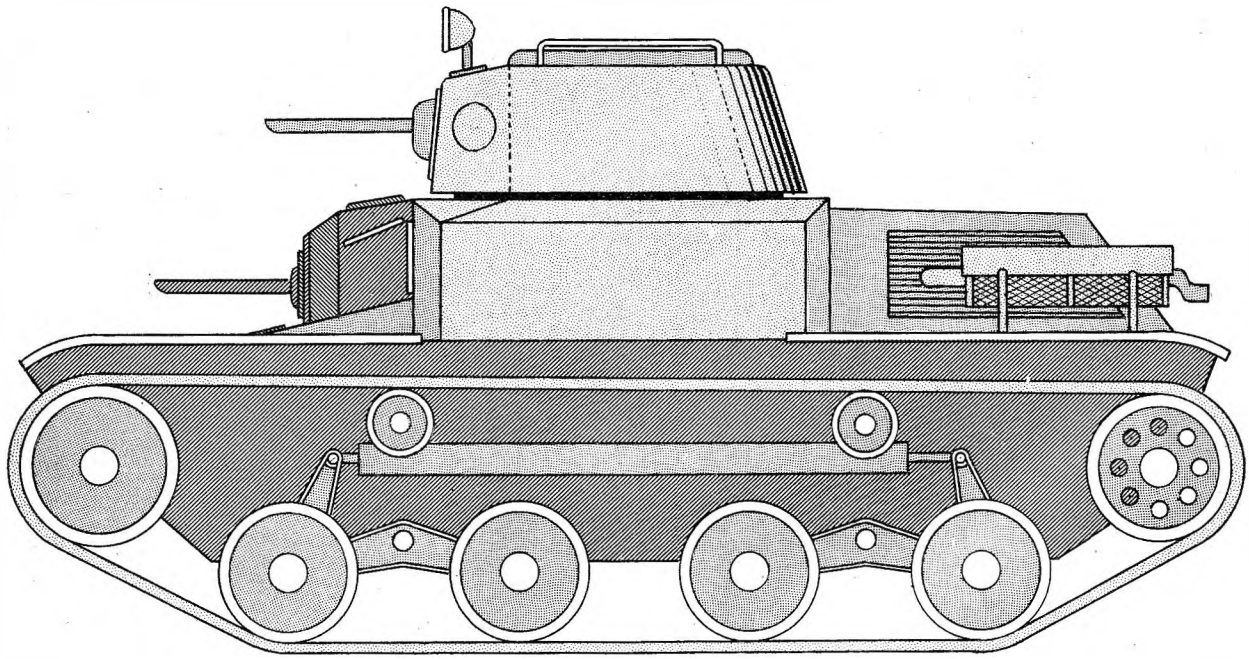


FIGURE 5.—Type 93 (1933) Light Tank (Improved Version).

7. TYPE 95 (1935) LIGHT TANK

The Type 95 light tank is a full-track, combat vehicle. It is powered by a single, six-cylinder, Diesel engine of 90 to 110 horsepower. The armament consists of one Type 94 (1934) 37-mm tank gun mounted in a steel turret and two Type 97 (1937) 7.7-mm machine guns, one mounted in the turret and one mounted forward in the hull. The crew consists of three men; a driver, an engineer, and a turret gunner.

Turret:

The turret is manually-operated and may be traversed 360° in either direction. It is riveted, bolted, and welded and has an all-round armor thickness of 0.47 inch. The top of the turret consists of two hatches which have an armor thickness of 0.35 inch.

Hull:

The hull is riveted and bolted armor plate. On the front slope plate and on the engine compartment covering, this plate is 0.25 inch thick; on all other parts of the hull it is 0.47 inch thick. There are two hatches on the front slope plate and another hatch to the right of and below the turret. When the latter hatch is closed the only vision

devices provided for the driver and engineer are small vertical and horizontal slots.

Power unit:

The engine is located in the right rear of the tank, in a well-constructed compartment which is accessible from the driving compartment by a hatch which may be opened or closed at will from inside. This facility enables the engineer to work on the motor without gettting out of the tank while under fire. The engine is air-cooled. Fuel and oil tanks are located at the rear of the engine compartment.

The engine is started by pulling the compression release lever on the right rear of the driver's seat and pressing the starter button on the dashboard. After the engine has started turning over, the compression release lever is pushed forward.

The tank is equipped with both hand and foot throttles.

Suspension system:

The all-steel tracks are driven by front drive sprockets. There are two bogies (held together by a large armored compression spring and also resisted by this spring) and four rubber-covered bogie wheels. The track is supported by two rubber-covered return rollers and a rear idler wheel made of steel. Tracks may be tightened by two ratchet wheels and lugs located on the right and left rear of the tank.

The tracks are full-locking, enabling the tank to make turns in a radius of 8 feet.

Crew:

The driver's seat is on the right side of the tank, slightly forward of the center of the turret. He is concerned only with the driving of the tank under the instructions of the tank commander.

The engineer's position is to the left of the driver. In addition to his responsibility as engineer, he acts as bow gunner.

The turret gunner is tank commander. He carries out communications with other tanks by means of flags; the tank usually has no radio. He has a speaking tube through which he gives orders and relays instructions to the driver. He fires both the 37-mm gun and the turret machine gun, which is not coaxially mounted.

Weapons:

The 37-mm gun is the principal armament. The gun may be elevated 24° and depressed 20° from the horizontal. It has a free traverse of 10° to right or left when the turret is stationary and is equipped with a telescopic sight (probably 8-power) graduated in 10 mil increments. The 37-mm gun fires high-explosive and armor-piercing ammunition. Racks are provided inside the turret for the transportation of 119 rounds of ammunition. Cases for both type projectiles are identical and are suitable for reuse.

The 7.7-mm machine guns are gas-operated, Bren-type guns, modified to be mounted in tanks. They are equipped with conventional open sights and, in some cases, with telescopic sights. *These guns fire only rimless ammunition.*

The portion of the barrel forward of the mounting ring is inclosed in a hinged steel jacket to prevent injury to that part of the barrel which is extended outside the tank. The shoulder piece is mounted on a pivot which allows it to be dropped out of the way when not in use. It is adjustable as to length and is held in one of four positions by a spring catch located on the under side of the stock.

Both guns can be elevated 25° and depressed 10° from the horizontal. The turret machine gun has a free traverse of 25° in either direction; the hull gun has a free traverse of 35° in either direction.

Besides the 37-mm gun and the two machine guns, tank personnel may be equipped with hand grenades. In a tank captured on Tarawa the turret wall was fitted with cloth pockets which held eight grenades.

Detailed specifications:

Weight	Loaded 16,800 pounds (approximately 85 percent stowed).
	Unloaded 16,200 pounds (less ammunition).
Length	14 feet 4.5 inches.
Width	6 feet 9 inches.
Height	7 feet 2 inches.
Clearance	1 foot 3.5 inches.
Crew	3 men.

Detailed specifications—Continued.

Armor:	*mm*	*inch*	*angle*
Gun mantlet			
Turret front	12	0. 47	----
Turret sides	12	0. 47	11°
Turret rear	12	0. 47	7°
Turret top	9	0. 35	90°
Hull front	12	0. 47	90°
Hull glacis	9	0. 35	72°
Hull nose	12	0. 47	18°
Hull side	12	0. 47	34°
Hull lower side	12	0. 47	0°
Hull rear	12–6	0. 47–0. 23	26°
Hull top	9	0. 35	90°
Hull floor	9	0. 35	90°

Armament	1 x 37-mm Type 94 (1934) tank gun. 2 x 7.7 mm Type 97 (1937) machine guns.
Ammunition	119 rounds of 37-mm ammunition. 2,940 rounds of 7.7-mm ammunition.
Engine and power plant	6-cylinder, air-cooled, Diesel with overhead valves.
Horsepower	110 at 1,400 revolutions per minute.
Bore and stroke	130-mm x 180-mm.
Cooling	Air, turbo impeller type.
Fuel pump	Bosch type.
Generator	24-volt, Bosch type, w/floating armature.
Lubrication system	Pressure from three oil pumps.
Air cleaner	Combination oil bath and filter.
Fuel capacity	23 gallons with 6 gallons reserve.
Transmission	Straight, sliding gear, 4 speeds, forward, 1 reverse.
Final drive	Double spur reduction.
Steering	Clutch brake.
Suspension	Modified Carden-Lloyd type with one armored helical compression spring per side acting against bell cranks on each of two bogies.
Height of track at sprocket	2 feet 7 inches.
Center distance between sprocket and rear idler.	11 feet 11½ inches
Diameter of sprocket (inside tooth diameter).	21½ inches.
Diameter of bogie wheel	22½ inches.
Diameter of rear idler	21½ inches.
Diameter of track support (or return) roller	9¾ inches.
Bogie tire size	570-mm x 70-mm.
Track	Center guide, steel blocks with dry pin. Tread (center to center) 5 feet 11½ inches.
Length of block	3 13/16 inches.
Width of block	9 15/16 inches.
Track contact with ground	8 feet 1½ inches.
Ground pressure	8.7 lb/sq. in. (approx.).
Bridge class	9.

Detailed specifications—Continued

Location of instruments and controls:	
Clutch pedal	Operated by left foot.
Accelerator	Operated by right foot.
Parking and stopping brake	Operated by right foot with hand lock.
Steering levers	Operated by right and left hand.
Decompression lever	Operated by right hand on hull.
Tachometer	On extreme left front dash board 0 to 2,400 revolutions per minute.
Oil pressure gauge	0 to 7 kg/cm².
Headlight and generator switch	On panel to right of driver.
Starter switch	Push button on front panel.
Speedometer	On front panel, 0 to 60 km. per hr.
Ammeter	On right panel, 0 to 30+.
Temperature gauge	In engine compartment, 0° to 120° C.
Oil pressure gauge	In engine compartment, 0 to 7 kg/cm².
Oil temperature gauge	In engine compartment, 0° to 120° C.
Gear shift lever	On transmission to left of driver.
Performance:	
Obstacles:	
Trench	6 feet.
Step	2 feet 8 inches.
Ford	3 feet 3 inches.
Gradient	30° to 45°.
Speed	28–30 miles per hour.
Range of action	90–110 miles.

The vulnerable points of this tank are: the underside of the sponson plate, the louvres on the right rear side of the engine compartment, and all vision slits throughout the vehicle.

The Type 95 light tank is quite vulnerable to close-in attack with small weapons such as sticky grenades and Molotov cocktails. It can be set afire. Thus, making use of incendiary weapons is particularly valuable against this tank. *No weapon on the tank can be depressed lower than 20° below the horizontal, thereby leaving a "dead space" extending 23 feet in all directions from the tank.* A man within this distance of the tank not only is in favorable position to utilize his weapons, but is comparatively safe from fire by the tank itself.

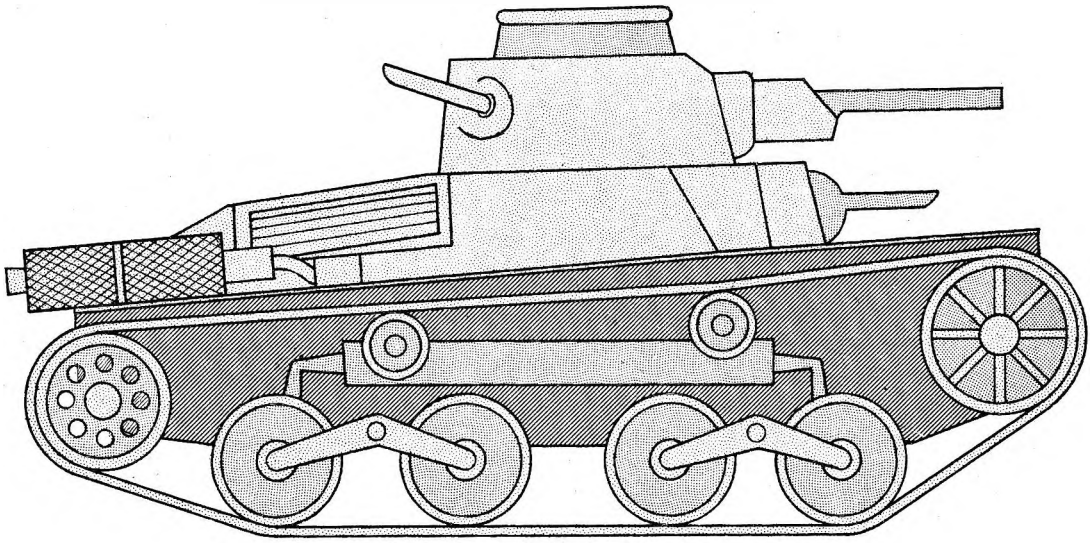


FIGURE 6.—Type 95 (1935) Light Tank.

8. TYPE 98 (1938) LIGHT TANK

The Japanese have consistently referred to the Type 98 light tank in their documents. To date, no recovery has been made of this vehicle in the field. Documentary evidence regarding this vehicle indicates that it is slightly similar to the standard Type 95 (1935) light tank.

Documentary Specifications:

Weight	6.2 tons (metric).
Total length	13 feet 6 inches.
Total width	7 feet.
Total height	5 feet 11 inches.
Clearance	14 inches.
Crew	3 men.
Armor	6- to 12-mm.
Armament	1 x 37-mm tank gun.
	2 x 7.7-mm tank machine guns.
Ammunition	100 rounds of 37-mm ammunition.
	3,000 rounds of 7.7-mm ammunition.
Type of engine	Air-cooled, 100-horsepower Diesel, 6-cylinder.
Fuel capacity	34.56 gallons.
Performance:	
Speed	31 miles per hour.
Gradient	Long 2/3.
Trench	6 feet 7 inches.
Ford	31½ inches.

9. "KENI" LIGHT TANK

It must be noted that the dimensions of this tank are very much like those of the Type 98 light tank and it may be that this tank is a subsequent version of the Type 98. However, this tank is reported to be armed with a 47-mm tank gun and must be considered as a modern Japanese light tank. The armor of this vehicle is slightly heavier than that of the Type 98 light tank and the documentary evidence relating to the engine would indicate that this tank has a somewhat improved performance.

Approximate specifications:

Weight	7.6 tons.
Length	13 feet 6 inches.
Width	7 feet.
Height	5 feet 11 inches.
Belly clearance	12 inches (also reported as 14 inches).
Crew	3 men.
Armor	6- to 16-mm (0.23 to 0.62 inch).
Armament	1 x 47-mm tank gun.
	1 x 7.7-mm machine gun.
Engine	140-horsepower.
Performance:	
Speed	31 miles per hour.
Gradient	34°.
Obstacles:	
Trench	6 feet 7 inches wide.
Step	No details.
Ford	2 feet 3 inches deep.

10. TYPE 89A (1929) MEDIUM TANK

The oldest model medium tank which has been employed by the Japanese in the current war is the Type 89A (1929). This tank has a box-shaped hull which has a short front plate with a door on the right-hand side. Above this short front plate is a vertical front plate, with a machine gun protruding from the right side. There is a small hinged cupola on the top of the turret. The suspension has nine small bogie wheels on each side with the leading ones independently mounted. There are five return rollers on each side which are mounted on a form of girder, and the vehicle is driven by the rear sprocket. The suspension is almost entirely covered by a protective skirting. This tank is powered by a gasoline engine. A 57-mm low velocity tank gun is the main armament of this vehicle and the gun is mounted in a turret capable of 360° traverse. In addition to the machine gun mounted in the front plate of the vehicle, there is also a turret-mounted machine gun. This turret-mounted machine gun is in the rear of the turret.

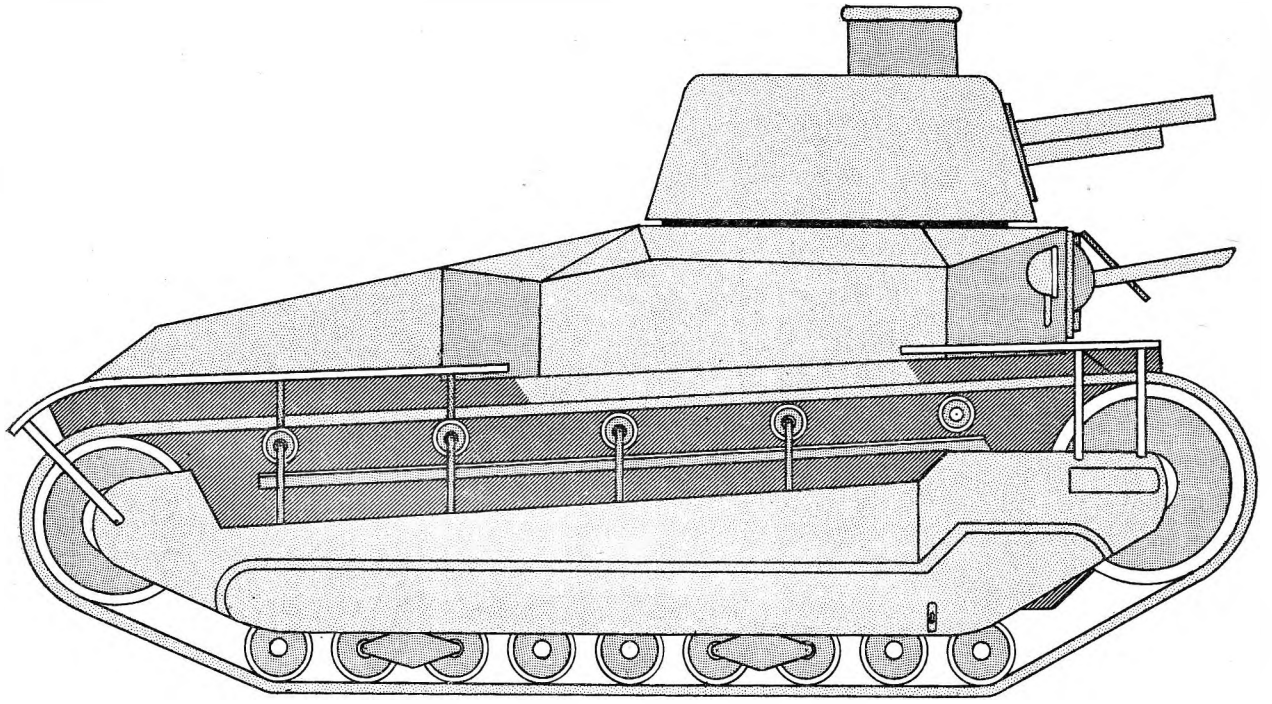


FIGURE 7.—Type 89A (1929) Medium Tank.

Approximate specifications:

Weight	13 tons.
Length	19 feet 3 inches.
Width	7 feet 1 inch.
Height	8 feet 6 inches.
Clearance	19 inches.
Armor	6- to 17-mm (0.24 to 0.67); (also reported as 17- to 25-mm (0.67 to 0.98 inch).
Crew	4 men.
Armament	1 x 57-mm tank gun, 2 machine guns.
Engine	136-horsepower gasoline engine.
Ground contact	12 feet.
Width of track	12 inches.
Track pitch	6 inches.
Diameter rear sprocket	30 inches.
Diameter bogie wheel	9 inches.
Diameter front idler	36 inches.

Approximate specifications—Continued

Height to center of idler	33 inches.
Performance:	
Speed	15 miles per hour.
Range of action	100 miles.
Gradient	34°.
Obstacles:	
Trench	8 feet 3 inches wide.
Step	2 feet 9 inches high.
Ford	3 feet 3 inches deep.

11. TYPE 89B (1929) MEDIUM TANK

This tank is a modification of the original Type 89A (1929) medium tank. However, there are several important changes in this model. It has a longer front plate which is combined with the driver's front plate. The turret has been completely redesigned to accommodate a new type of cupola and to provide a more satisfactory aperture for the 57-mm tank gun. The gasoline engine has been replaced by a Diesel engine. The armor and armament is the same as in the Type 89A.

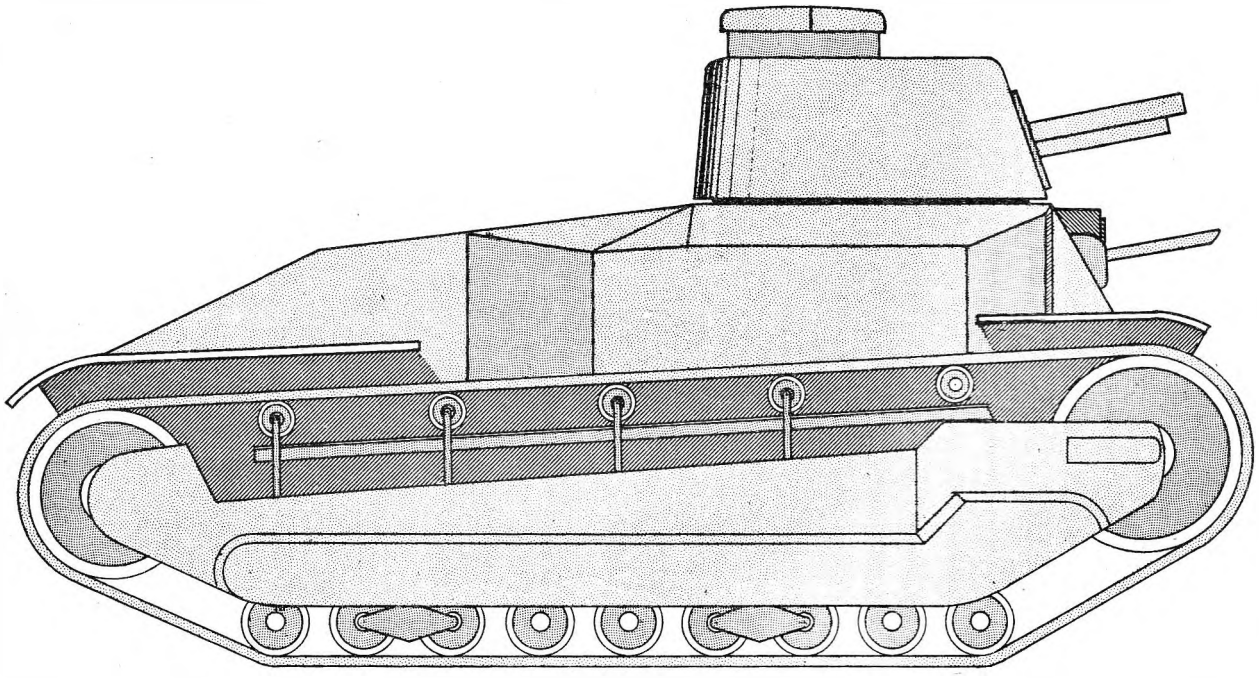


FIGURE 8.—Type 89B (1929) Medium Tank.

Approximate specifications:

Weight	13 tons.
Length	19 feet 3 inches.
Width	7 feet 1 inch.
Height	8 feet 6 inches.
Clearance	19 inches.
Crew	4 men.
Armor	Same as Type 89A.
Armament	Same as Type 89A.
Engine	120-brake-horsepower Diesel.
Ground contact	12 feet.
Width track	12 inches.
Track pitch	6 inches.

Approximate specifications—Continued

Diameter of rear sprocket	30 inches.
Diameter of bogie wheel	9 inches.
Height to center of idler	33 inches.
Performance:	
Speed	15 miles per hour.
Range of action	100 miles.
Gradient	34°.
Obstacles:	
Trench	8 feet 3 inches wide.
Step	2 feet 9 inches high.
Ford	3 feet 3 inches deep.

12. TYPE 94 (1934) MEDIUM TANK

Although this tank is being reported as the Type 94 medium tank, there appears to be some doubt as to whether the Type number of 94 is correct. The 57-mm gun has a free traverse of 20° right and left and free elevation of −8° to +25°.

Comparison with the Types 89 A and B shows that the number of return rollers has been reduced to four, the girder has been removed, and the skirting redesigned. The long front plate has a door on the left, above which has been mounted a hull machine gun. The driver sits to the right. Power of the Diesel engine has been increased to 160-brake horsepower. With the above exceptions the Type 94 is practically identical with the Type 89 B. This tank is often seen with a ditching tail.

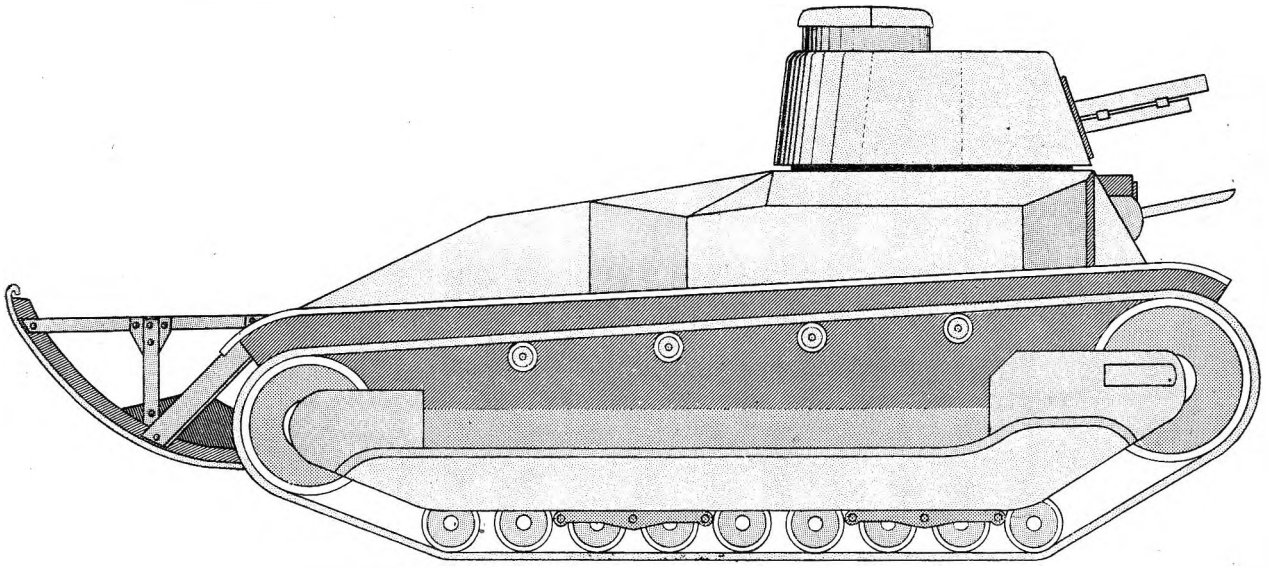


FIGURE 9.—Type 94 (1934) Medium Tank (W/Ditching Tail).

Approximate specifications:

Weight	15 tons.
Length (including ditching tail)	23 feet.
Width	7 feet 1 inch.
Height	8 feet 6 inches.
Clearance	19 inches.
Crew	4 men.
Armor	6- to 17-mm (0.24 to 0.67 inch).
Armament:	
Main	1 x 57-mm tank gun.
Machine guns	1 hull machine gun and 1 rear turret machine gun.

Approximate specifications—Continued

Engine	160-brake horsepower, air-cooled Diesel.
Ground contact	12 feet.
Width of track	12 inches.
Track pitch	6 inches.
Diameter of rear sprocket	30 inches.
Diameter of front idler	36 inches.
Height to center of front idler	33 inches.
Diameter bogie wheel	9 inches.
Performance:	
Speed	18 to 20 miles per hour.
Range of action	100 miles.
Obstacles:	
Trench	9 feet wide.
Step	2 feet 9 inches high.
Ford	3 feet 3 inches deep.

13. TYPE 97 (1937) MEDIUM TANK

The Type 97 medium tank is a full-track AFV which is classed by the Japanese as a medium tank although it fights at about the same weight as the United States light tank M5 A1. It is powered by a V–12 cylinder, air-cooled Diesel engine with overhead valves. The armament consists of one Type 97 57-mm tank gun in the turret, one Type 97 7.7-mm machine gun in the rear of the turret, and one Type 97 7.7-mm machine gun in the front superstructure. This 15-ton tank has a crew of four men; the tank commander, the turret gunner, the driver, and the hull machine gunner.

Turret:

The turret is manually operated and may be traversed 360° right or left. It is constructed of bolted and riveted armor plate of 1 to 1.29 inches in thickness in front and 1 inch on the sides and rear. The top of the turret consists of a flat plate and a cupola with an armor thickness of 0.75 inch.

Hull:

The hull is also constructed of riveted and bolted armor plate with a variation of thicknesses from 0.31 to 1.01 inches. The fighting compartment of the vehicle is lined with asbestos padding believed to be an insulation against heat. In most cases two smoke generator dischargers will be found on the glacis plate, one on the right and one on the left.

Power unit:

The engine is a V–12, air-cooled, valve-in-head Diesel with removable cylinder heads. There appear to be two different types of engines for this tank, one "A" which has been examined in captured tanks, the other "B" which is referred to in documents. (See detailed characteristics.)

Suspension system:

The suspension system consists of two bogies of two wheels each and an independently sprung bogie in the front and in the rear. These bogie wheels are rubber-tired. The bogies are resisted by coil springs. There are three return rollers. Like other Japanese suspensions, this too is a modification of the Carden-Lloyd suspension.

Crew:

The crew consists of four men. The driver sits on the right side of the tank slightly forward of the turret and drives the tank under the supervision of the tank commander.

The hull gunner sits to the left of the driver; in addition to being bow gunner, he acts as engineer.

The turret gunner and the tank commander ride in the turret and fight from the turret. The tank commander controls the tank and carries out communication with other tanks by means of hand signals, flags, and in cases where a radio is installed, uses that as a means of communication.

Weapons:

The tanks mount a low-velocity Type 97 (1937) 57-mm tank gun in the turret as well as one Type 97 (1937) 7.7-mm machine gun which is mounted in a ball mounting to the rear of the turret. There is another Type 97 7.7-mm machine gun mounted in the left front of the vehicle for the bow gunner.

In addition to the 57-mm tank gun and the two machine guns, recent Type 97 medium tanks have been found to be mounting six smoke generator dischargers, four on the right wall of the turret

and one on either side of the front glacis plate. The smoke generators are of the carbon tetrachloride, base-emission type, and consist of a cardboard-covered metal canister. The burning time is estimated at about 2 minutes and the distance of projection about 50 yards.

Detailed characteristics:

Weight	29,685 lbs.
Length	18 feet 2 inches.
Width	7 feet 7 inches.
Height	7 feet 9 inches.
Clearance	13½ inches.
Crew	4 men.

Armor:

	mm	*inches*	*angle*
Gun mantlet			
Turret front	33	1. 29	
Turret sides	26	1. 0	11°
Turret rear	26	1. 0	11°
Turret top	19	. 75	90°
Hull front	25	. 98	11°
Hull glacis	16	. 62	82° and 30°
Hull nose	20	. 78	30° (armor thickness may vary 5- to 10-mm)
Hull side	26	1. 0	25°
Hull lower side	9	. 33	0°
Hull rear	20	. 78	curved
Hull top	13	. 51	90°
Hull floor	8	. 31	90°

Armament	1 x 57-mm Type 97 tank gun. 2 x 7.7-mm Type 97 machine guns.
Ammunition	121 rounds of 57-mm ammunition. 3,825 rounds of 7.7-mm ammunition.
Engine and power plant	V–12, air-cooled, Diesel w/O. H. V.
Horsepower	150 at 1,500 revolutions per minute.

Engine A (captured tank):

Type	V–12, air-cooled, O. H. V., Diesel, removable cylinder heads.
Bore	107-mm.
Stroke	166-mm.
Piston displacement	17.9 liters.
Max. rated output	150 B. H. P. (from a captured document) cylinder heads, crank case, w/cooling fins, and clutch housing made of cast aluminum.

Valve data:

Number and arrangement	2 inlet and 2 exhaust, spaced at 4 corners.
Diameters (inlet ports)	11/32 inch (8.7-mm).
Diameters (exhaust ports)	15/32 inch (11.9-mm).
Width of seating (inlet and exhaust)	1/8 inch (3.17-mm).
Angle of seating (inlet and exhaust).	45°.
Valve guides	Exhaust valves have bronze guides.
Injection and combustion chambers.	Injector arranged directly over each piston; piston heads are recessed to form turbulence chambers.
Cooling	Centrifugal blowers.

Detailed specifications—Continued

Engine B (captured document):

Type	V–12, air-cooled, Diesel, w/O. H. V.
Bore	120-mm.
Stroke	160-mm.
Swept volume (piston displacement).	21.7 liters.
Compression ratio	17.8:1.
Rated max. power output	170 B. H. P.
Normal power output	150 B. H. P. at 1,500 revolutions per minute.
Firing order	1-12-5-8-3-10-6-7-2-11-4-9.
Valve clearances:	
Inlet valves	0.28-mm-9.30-mm (cold).
Exhaust valves	0.30-mm (cold).
Valve timing:	
Inlet valve opens 20° before T. D. C.	
Inlet valve closes 40° after B. D. C.	
Exhaust valve opens 45° before B. D. C.	
Exhaust valve closes 15° after T. D. C.	
Fuel system:	
Injector nozzles	Closed overhead type, automatic.
Injection pressure	2,840 pounds per square inch.
Injection pump	Mitsubishi Type C pump.
Fuel feed	
Fuel tank capacity:	
Main tank right	25.3 gallons.
Main tank left	26.4 gallons.
	51.7 gallons (also 6 auxiliary tanks).
Fuel consumption	3.7 gallons per hour at 9.3 mph.
Lubrication system:	
Type	Force feed by gear pump.
Normal pressure	3.56 to 56.9 pounds per square inch.
Instruments	Level, pressure and temperature gauges.
Oil capacity	70–88 pints (approx.).
Number of cooling fans	4.
Starting arrangements	Electric starter motor and decompressing gear provided.
Electrical:	
Generator—volts	24.
Generator—watts	500
Batteries—number	4
Batteries—volts	12
Batteries—amp/hrs	180
Starter motor—volts	24
Starter motor—hp	6
Clutch	Dry, multiplate, similar to American tanks.
Reduction gear	A small ribbed gear casing integral with the clutch housing contains two gears giving a ratio of approximately 20:7, and also lowers transmission line by approximately 5 inches.

Detailed specifications—Continued

Engine B (captured document)—Continued

Transmission:

Type	Sliding pinion, with high-low transfer case.
Speeds	4 speeds forward, 1 reverse.

Steering:

Reported to be a combination of epicyclic for normal steering and clutch-brake for skid turns. Control by steering levers.

Tracks:

Type	Single pin, open.
Width	12 inches.
Pitch	15 inches.
Number of links per track	97.
Angle of approach	31°.
Angle of departure	24°.
Ground contact	12 feet 2 inches.
Ground pressure	8.5 pounds per square inch.
Drive	Front sprocket.

Drivers Controls.

Controls from right to left are: gear lever, transfer case lever, left steering lever, left skid brake lever, clutch pedal, hand brake, foot brake, throttle, right skid brake lever, right steering lever. Also, left of the driver's seat: decompression lever; right of driver's seat: hand throttle.

Performance:

Speed	25 miles per hour.
Range of action	150 miles.
Obstacles:	
Trench	8 feet 3 inches.
Ford	3 feet 3 inches deep.
Gradient	30° to 45°.

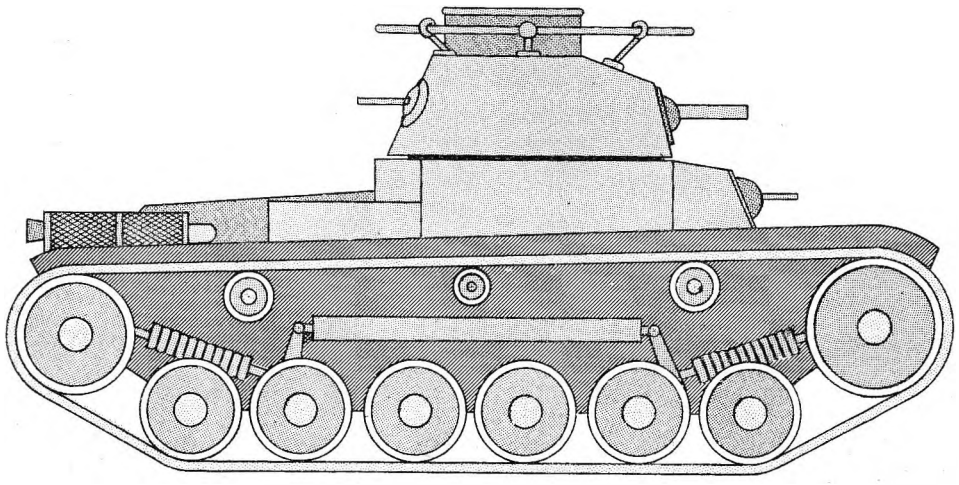


FIGURE 10.—Type 97 (1937) Medium Tank.

14. TYPE 97 (1937) MEDIUM TANK (IMPROVED VERSION)

The improved version of the Type 97 medium tank is identical to the original Type 97 in many respects. As far as can be determined, the hulls of the original and the improved tanks are identical, and the modifications have been restricted to the turret. However, the width of the track on the improved version has been widened from 12 to 13 inches.

15. NEW TANK TRENDS

For some considerable time there have been indications that the Japanese were possibly developing a medium to heavy tank. Reports, however, have been conflicting in this connection, but nevertheless it is felt that they have at least afforded some evidence of the production of a more significant tank, both in regard to armor and armament, than anything yet encountered; namely, Type 97 (1937) improved medium tank.

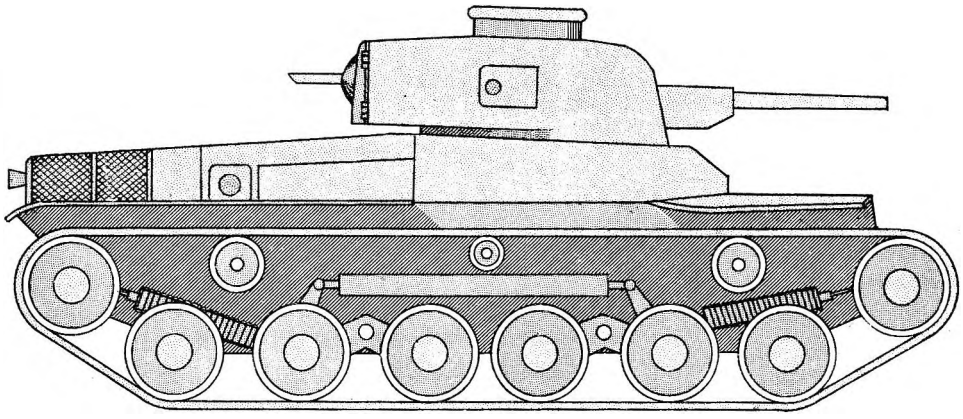


FIGURE 11.—Type 97 (1937) Medium Tank (Improved Version).

The turret has been changed from a generally circular type to a semirectangular over-hanging type. This gives the turret a long, low appearance. The turret is 76 inches long and 56 inches wide at its widest point. There is no provision for a hand ring such as is provided on the original Type 97 medium tank. The mantlet is of the same general type as that used on the regular 97.

The change in the armament is another very important change in this improved version of the Type 97 medium tank. The low-velocity Type 97 57-mm tank gun has been replaced by the Type 1 (1941) 47-mm tank gun.

As on the original Type 97, there are smoke candles mounted in racks on the side of the turret for use with the Type 94 self-projecting smoke candles. The racks are rigidly mounted on the turret in such a manner that a crew member can ignite the expelling charges in the bottom of the candle without exposing more than one hand and arm. The smoke candles must be manually ignited in the normal manner, as there is no provision for remote-control ignition. The candles are mounted at an angle of approximately 45°, and tests have shown that these candles, as mounted on the launcher, have a range of approximately 300 yards.

16. TYPE 2 (1942) AMPHIBIOUS TANK

The Type 2 amphibious tank is a full-track amphibious vehicle for use in landing and land operations. It is powered by a six-cylinder, air-cooled Diesel engine. It is armed with one 37-mm gun in the turret and two 7.7-mm machine guns, one of which is mounted forward in the hull and the other mounted coaxially with the 37-mm gun. There is a crew of five men including a commander, a gunner, driver, hull machine gunner, and engineer.

Turret:

The turret is constructed of rolled armor plate with an all-around thickness of 0.52 inch. The turret hatch armor is 0.24 inches thick and is also constructed of rolled armor plate. There is one Type 1 (1941) or one Type 94 (1934) 37-mm gun and one Type 97 7.7-mm machine gun coaxially mounted in the turret.

Hull:

The hull is constructed of rolled armor plate which is bolted and riveted together. The tank hull is not compartmented and the engineer has working space completely around the engine except

where the mounting is attached to the back of the hull. All openings up to and including the turret ring are sealed with rubber seals. The armor of the hull is from 8- to 12-mm thick at various places around the hull.

Power unit:

The engine is located in the rear of the vehicle and is easily accessible due to the fact that the hull is not compartmented. The power plant is a six-cylinder, air-cooled Diesel. It drives the transmission through a transfer case arranged with two propelling shafts extending to the rear, one on each side of the engine. Engagement for water travel is made from a handle on the transfer case for each propeller. The transfer case also contains a built-in bilge pump for discharging hull leakage.

Suspension:

The suspension of this vehicle is a modification of the Carden-Lloyd type of suspension. It employs front sprocket drive and two return rollers. The four dual bogie wheels and the trailing idler are resisted by armored compression springs which are located on the inside of the hull. The two track return rollers are mounted more forward than is usual in Japanese tanks.

Crew:

The five-man crew, consisting of the tank commander, the gunner (turret), the driver, the hull machine gunner, and the engineer all have designated positions. The tank commander is in complete charge of the vehicle and the crew. He rides in the turret with the turret gunner and gives instructions via a radio set which is installed in this vehicle in most cases. The engineer rides in the hull. The driver sits on the right front in the hull, and the bow or hull machine gunner sits to his left.

Weapons:

The 37-mm gun is the primary armament of the vehicle. The gun may be elevated 5½° and depressed 11½° from the horizontal. It has a very limited, if any, free traverse when the turret is stationary and is equipped with a telescopic sight. The weapon fires both high-explosive and armor-piercing ammunition. There is ample storage space for machine-gun ammunition, although the exact number of rounds carried is not known. Approximately 3,500 to 3,900 rounds may be expected to be the amount of 7.7-mm ammunition carried.

The machine guns are mounted in two ways. The hull machine gun is mounted in a cast armor plate ball mount. The cast plate in this ball mount is one of the two places where rolled armor plate is not used; the other is the turret gun mantlet which is also cast. The second machine gun is mounted coaxially with 37-mm gun. This is an innovation in Japanese tanks. The hull machine gun has a free traverse of 35° in any direction.

There is a provision for extra grenades to be carried in this vehicle.

Pontoons:

There are two pontoons constructed of ⅛-inch soft plate. The bow pontoon weighs 2,300 pounds and is divided into six compartments with a total estimated volume of 220 cubic feet. The stern pontoon weighs 1,515 pounds with an estimated cubic volume of 105 cubic feet. It incorporates twin rudders 20 inches high placed 16 inches forward of the rear pontoon wall. The control is taken through a shaft into the hull by means of ⅜-inch cable. Steering in the water is accomplished by a horizontal hand wheel at the tank commander's position in the turret. The pontoons may be released from within the tank by the operation of hand wheels controlling split-finger type clamps.

Detailed characteristics:

Weight distribution:	
Weight w/ pontoons	24,915 pounds.
Weight w/o pontoons	21,100 pounds.
Weight front pontoons	2,300 pounds.
Weight rear pontoons	1,515 pounds.
Length over-all	24 feet 4 inches.
Length w/o pontoons	15 feet 10 inches.
Width	9 feet 2 inches.
Height	7 feet 8 inches
Ground clearance	14 inches.

Detailed specifications—Continued

Crew			5 men.
Armor:	*mm*	*inches*	*angle to vertical*
Turret top	6	0.23	90°
Turret rear	12	0.47	9°
Turret sides	12	0.47	9°
Turret front	12	0.47	9°
Superstructure front	12	0.47	28°
Hull nose	12	0.47	6° and 36°
glacis	6	0.23	83°
Superstructure sides	10	0.39	0°
Hull sides	10	0.39	0°
Engine compartment sides.	8	0.32	17° (approx.)
Rear deck	6	0.23	60°
Belly plate	6	0.23	
Tail plate	10	0.39	10°
Armament			1 x 37-mm Type 1 tank gun.
			1 x 7.7-mm Type 97 machine guns.
Ammunition			132 rounds of 37-mm ammunition.
Engine and power plant			6-cylinder, air-cooled Diesel with overhead valves.
Horsepower			120 at 1,400 revolutions per minute.
Cooling			Centrifugal blowers.
Fuel pump			Bosch type.
Generator			24 volt, Bosch type, w/floating armature.
Fuel capacity			53 gallons.
Transmission			Conventional sliding gear, 4 speeds forward, 1 reverse; high- and low-range transfer case.
Drive:			
On land			Front sprocket.
In water			Twin propellers behind lower tail plate which may be disengaged separately to assist steering.
Steering:			
On land			Clutch brake.
In water			Rudder and propeller.
Suspension			2 bogies and trailing idler are mounted to compression springs located within the hull.
Distance between track centers.			8 feet ¼ inch.
Distance between sprocket and rear idler.			12 feet 8 inches.
Diameter of rear idler			26 inches.
Diameter of bogie wheel			22 inches.
Diameter of front sprocket			19½ inches.
Diameter of return roller			12 inches.
Height of sprocket to ground			2 feet 5 inches.
Track			Steel, link and pin engaging with 4 and 3 points.
Length over-all			32 feet+.
Ground contact			10 feet 10 inches.
Length of link			3.7 inches.
Width			12 inches.
Angle of approach			56.25°.
Angle of departure			Accurate, on circumference of rear bogie idler.
Bridge class			18.

Detailed specifications—Continued

Location of instruments and controls: From left to right; gear shift lever, high- and low-range lever, left propeller shaft engaging lever, reverse propeller shaft lever, right propeller shaft engaging lever, left steering lever clutch, hand brake, foot brake, foot throttle, right steering lever, hand throttle, and decompression lever.	
Escape hatches:	
Turret	One each side, size 22 in. x 18 in.
Hull	Two in belly in rear of driver and hull gunner, size 15 in. x 10.5 in.
Pistol ports:	
Turret	3 in each side and one in rear.
Hull	1 in each corner.
Vision:	
Driver	Slit, size 4 in. x 1 in.
Hull gunner	Slit, size 4 in. x 0.125 in.
Commander and turret gunner	2 slits, size 4 in. x 0.125 in.
	2 vision ports, 3.75 in. in diameter to right and left of 37-mm gun.

The slits each have a bracket for clamping splinterproof glass behind them or for sealing the tank against entry of water. The vision ports in the turret front have provision for at least 3 inches of safety glass windows.

Water seal	Rubber seals are provided around all openings up to and including the turret ring.
Pontoons:	
Bow pontoon:	
Weight	2,300 pounds.
Method of attachment	Attached to the hull by 3 clamps. One—top center, between driver and hull machine gunner. Two—on nose plate, approximately 2.5 feet in toward center from each side.
Appearance	Bow of a flat-topped barge with many odd angles at points of contact.
Construction	Welded 0.125 inch plate (not armor). Nose section reinforced slightly by additional thickness of plate.
Compartments	6.
Maximum height	47 inches.
Maximum length	127 inches.
Maximum width	110 inches.
Cubic volume	Estimated at 220 cubic feet.
Stern pontoon:	
Weight	1,513 pounds.
Method of attachment	Attached to the hull by 4 clamps located in the sloping rear walls of the panniers.
Compartments	5.
Maximum height	44 inches.
Maximum length	85 inches.
Maximum width	110 inches.
Cubic volume	Estimated at 105 cubci feet.

Detailed specifications—Continued

Provision for use on water.

An air duct in the form of a square section chimney may be fitted over the air inlet grille in the center of the rear deck (fig. 12) and a circular spray guard is fitted to the top of the turret over the hatch opening in some cases.

Performance:

Obstacles:	
Trench	6 feet 7 inches.
Step	2 feet 5 inches.
Speed:	
Maximum speed on land	23 miles per hour.
Maximum speed afloat	6 miles per hour.
Radius of action:	
Land	124 miles.
Afloat	93 miles.

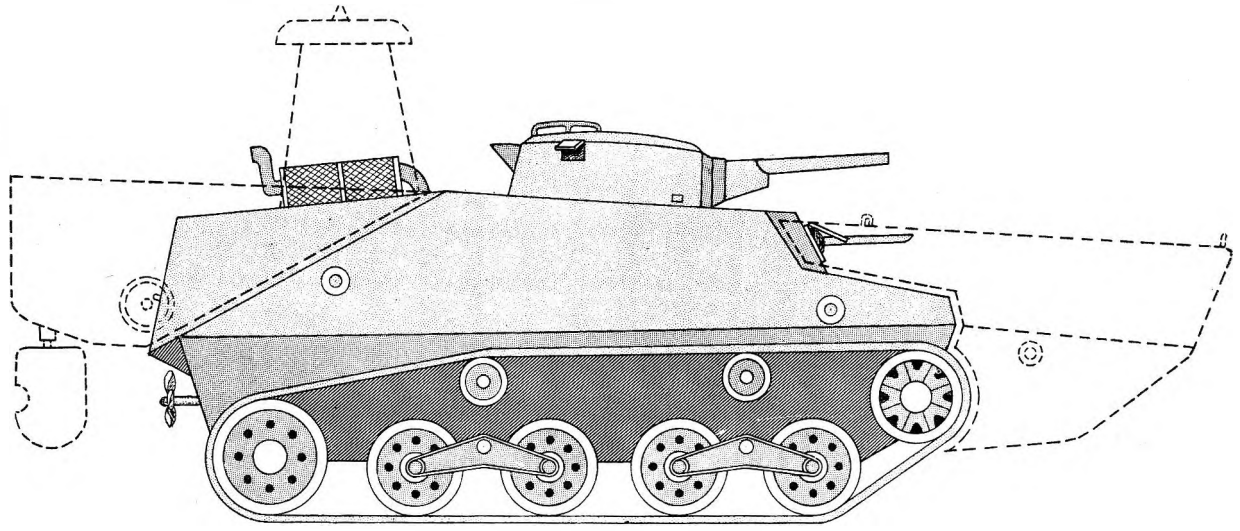


FIGURE 12.—Type 2 (1942) Amphibious Tank.

17. FLAME-THROWING TANKS

Several reports of various types of flame-throwing tanks have been made, but they generally have been conflicting in nature and it was not until the last days of the bloody Okinawa campaign that the Japanese were reported to be using them. To date, no technical report of the type used has been made. At present it would appear that Japanese flame-throwing tanks belong to engineer units rather than armored units. A captured document refers to the Type 96 (1936) SS (supersmall) bridge-laying and flame-throwing tank. It is reported that it is a 13-ton vehicle mounting five flame throwers and one light machine gun.

18. JAPANESE SELF-PROPELLED 15-CM HOWITZER

This weapon is the Type 38 (1905) 15-cm howitzer mounted on a medium tank chassis. The tank chassis has not been identified definitely as the Type 97 (1937) medium tank or the Type 97 (1937) medium tank improved, but the width of the track would indicate that it is of the improved type medium tank which mounts the Type 1 (1941) 47-mm gun.

The armor is assembled by riveting in the characteristic Japanese fashion. The armor on the chassis is the same for the tank, with a maximum armor thickness of approximately 1 inch. The gun shield has 1-inch frontal armor and ½-inch side armor. There is also an armored shield on top of the side gun shields, but this shield does not appear to extend far enough to the rear to provide protection for personnel operating the howitzer. The vehicle uses the standard tank V–12, air-cooled Diesel engine, and the Type 97 medium tank suspension. The following silhouette shows only two return rollers; however, it

is probable that the picture from which it was drawn portrayed a damaged vehicle and the third had been knocked off in combat.

Characteristics:

Length	18 feet 2 inches.
Width	7 feet 6 inches.
Chassis height	47 inches.
Height of shield	61 inches.
Over-all height	93 inches.
Diameter drive sprocket	28 inches.
Width of track	13 inches.
Ground contact	Approximately 160 inches.

Characteristics—Continued

Diameter rear idler	28 inches.
Diameter bogie wheels	23 inches.

19. 75-MM OR 105-MM SELF-PROPELLED GUN

There is not any detailed information on this self-propelled gun, as the details on the following silhouette were taken from a captured photograph. The gun is mounted on the chassis of the Type 97 (1937) medium tank, specifications of which may be found in paragraph 13 of this section.

The weapon appears to be a 75-mm gun, but there is no assurance that this is the case as the assumption is based on interpretation of the photograph.

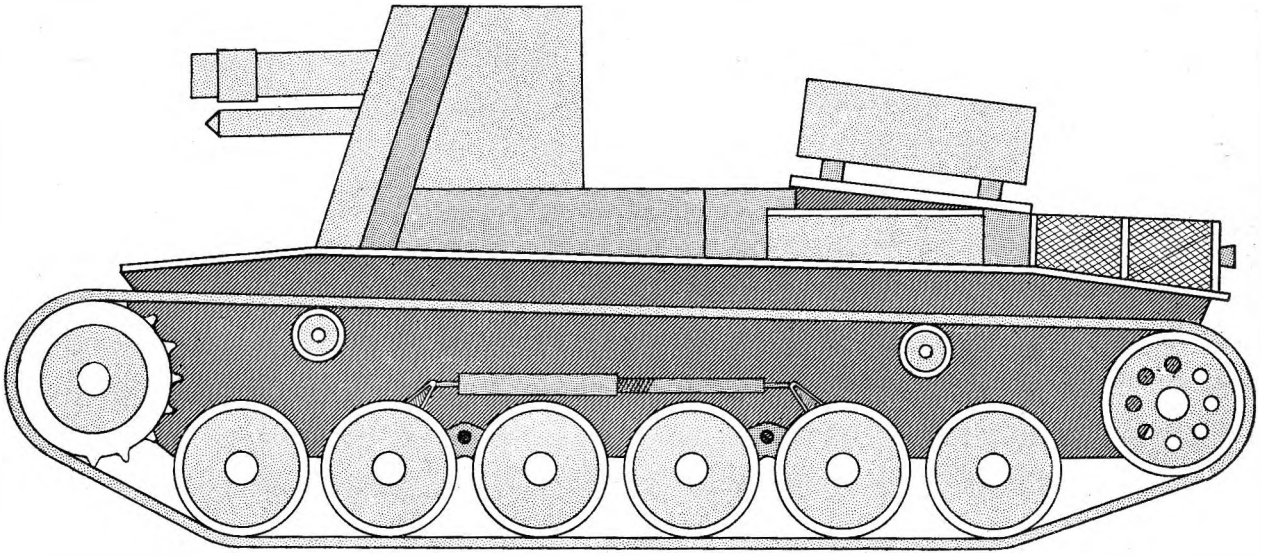


FIGURE 13.—15 cm Self-Propelled Howitzer.

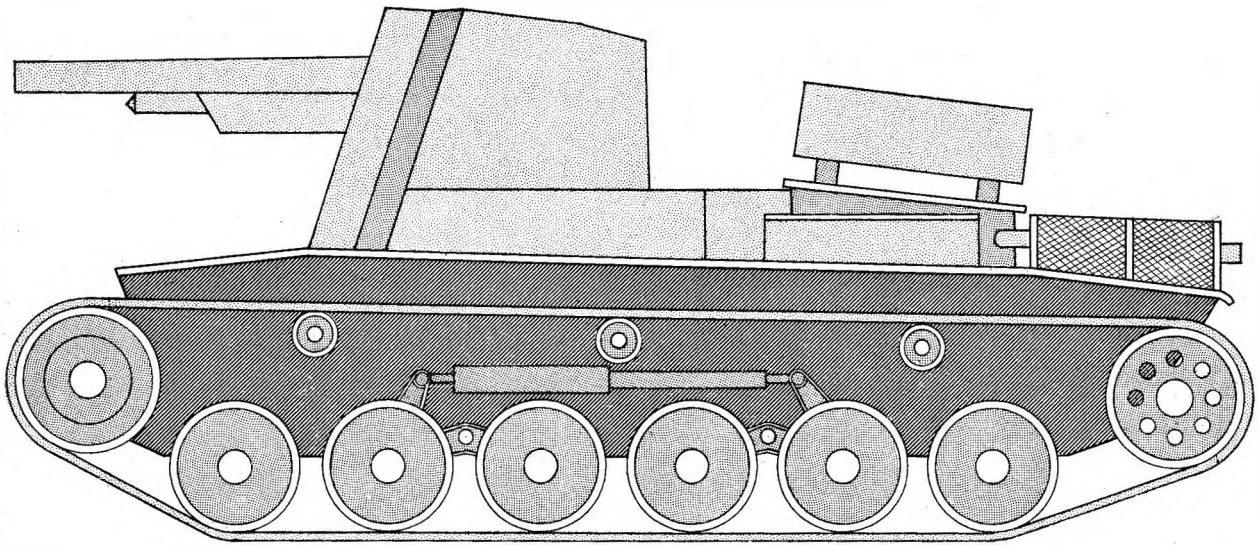


FIGURE 14.—75 mm or 105 mm Self-Propelled Gun.

20. TYPE 90 (1930) 75-MM FIELD GUN IN A SELF-PROPELLED ROLE

This weapon in its self-propelled role may be known as the Type 1 (1941) 75-mm SP gun. It has recently been recovered in the Philippine Islands, and was found to be mounted on the chassis of the Type 97 (1937) improved tank. A muzzle reinforcing band has been substituted for the muzzle brake, and the new mounting has caused a considerable loss of elevation to the gun, resulting in a reduced maximum range. Except where indicated, the following characteristics are based on the field piece.

Characteristics:

Caliber	75-mm (2.95 inches).
Length of tube (as SP)	8 feet 9 inches.
Traverse (as SP)	10° right and left } estimated.
Elevation (as SP)	25° }
Breechblock	Horizontal sliding wedge (hand-operated).
Recoil system	Hydropneumatic.
Muzzle velocity	2,230 feet per second.
Maximum range	16,400 yards.

Ammunition:

Projectile	*Weight*
Type 90 HE pointed	14 pounds.
Type 94 HE	13.24 pounds.
Type 95 APHE	13.6 pounds.
Type 1 AP	14.6 pounds.

In addition the gun fires shrapnel, incendiary, illuminating and chemical projectiles.

21. 105-MM SELF-PROPELLED WEAPONS

It may be expected that several of the field pieces of this caliber will be modified for use in a self-propelled role. The current trend in this line will find the Type 97 (1937) improved medium tank chassis used as the gun carriage for the weapons. If these self-propelled weapons of this caliber are constructed in the manner in which the others have been made, the effectiveness of the weapon may be cut down by the limiting factors of little traverse and elevation.

22. TYPE 92 (1932) NAVAL TYPE ARMORED CAR

This vehicle is easily distinguished as a naval type armored car by the flag painted on the outside.

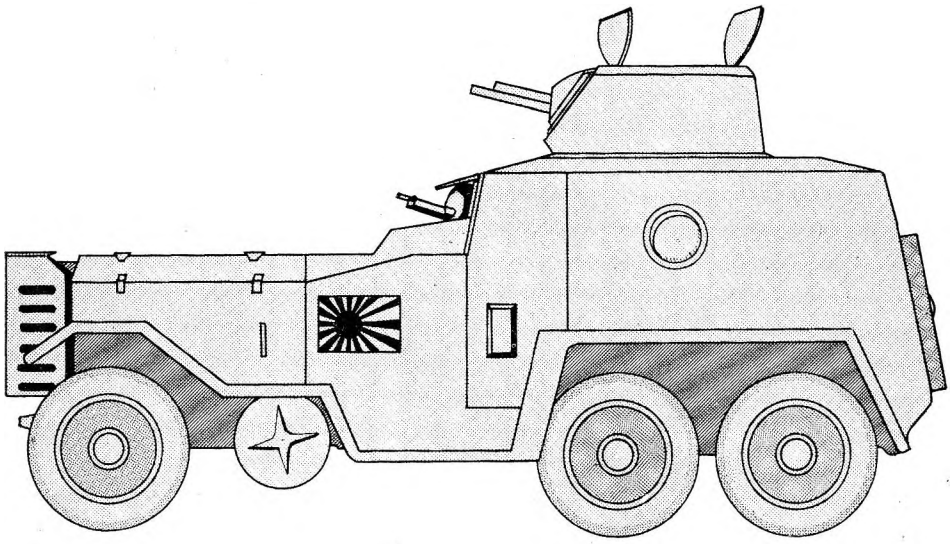


FIGURE 15.—Type 92 (1932) Naval Type Armored Car.

All vehicles used by naval and marine forces are usually marked in this manner. There are six disk wheels with pneumatic tires. The vehicle has semielliptic springs. There are auxiliary wheels to prevent bellying when the vehicle is crossing rough terrain.

Approximate specifications:

Weight	7 tons.
Length	15 feet 9 inches.
Width	5 feet 11 inches.
Height	7 feet 6 inches.
Ground clearance	16 inches.
Crew	4 men.
Armament	4 to 5 light machine guns.
Armor	8- to 11-mm (0.32 to 0.43 inch).
Engine	6-cylinder, 85-horsepower, water-cooled, gasoline engine.
Speed	50 miles per hour.

23. TYPE 93 (1933) "SUMIDA" ARMORED CAR

This vehicle may be used as an armored railway car or on the roads. It is equipped with flanged tires for use on railroad tracks and rubber-tired wheels for ordinary highway use. To change it from a rail to a road vehicle there are four built-in jacks, two in front and two in the rear of the vehicle. When traveling, the set of tires not in use is attached to the side of the vehicle. The engine is in the front, and there is a round cupola on the van-shaped hull. The road speed is estimated at about 25 miles per hour, but when on rails it is believed that the vehicle can attain speeds approximating 40 to 45 miles per hour.

Approximate specifications:

Weight	7.5 tons.
Length	21 feet 6 inches.
Width	6 feet 3 inches.
Height	9 feet 8 inches.
Ground clearance	16 inches.
Crew	6 men.
Armament	1 machine gun mounted in turret. Slits for rifles or light machine guns.

24. JAPANESE TANK RADIO

An examination of approximately 50 medium tanks, 12 light tanks, and miscellaneous other vehicles yielded the following information:

1. All medium tanks, Type 97 and Type 97 improved, were equipped with radio.
2. At least some of the light tanks are radio equipped.
3. The majority of the Type 97 and Type 97 improved medium tanks are equipped with 96 Mark 4E radio sets. Some of the Type 97 medium tanks were equipped with Type 147 radio sets.
4. Some of the light tanks were equipped with the Type 96 Mark 4E radio set, others with Type 306 radio set.

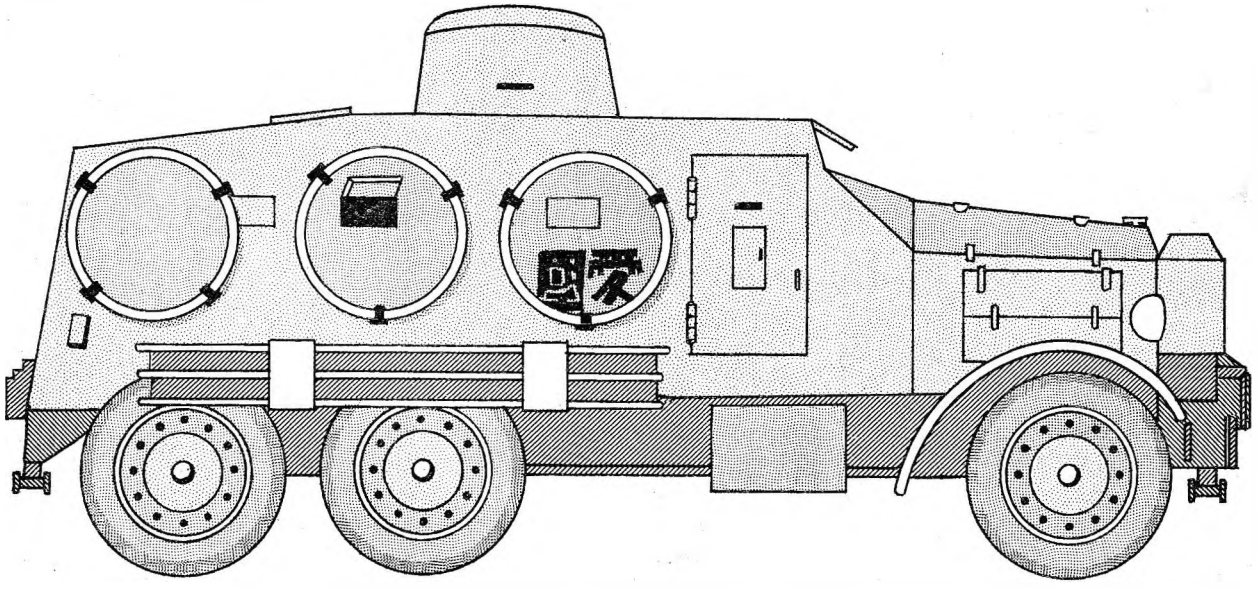


FIGURE 16.—Type 93 (1933) "Sumida" Armored Car.

5. One Type 147 radio set was found in a civilian passenger car.
6. One Type 97 medium tank which had been equipped with a Type 306 radio set had a makeshift antenna installed on the turret. This antenna would indicate operation of moderately high frequency (for example, in the vicinity of 30 megacycles) which would be consistent with the frequency range of the Type 306 radio set (20 to 30 megacycles), as determined from the calibration chart taken from the tank.

Examination of 12 other Type 97 improved medium tanks and one light tank disclosed the following information:

1. Five different types of radio sets were found in these tanks. The types were: Type 142, Type 147, Type 96 Mark 4E, Type 305, and Type 306 radio sets.
2. The Type 142, Type 147, and Type 96 Mark 4E are medium frequency sets, for example, below 10 megacycles, whereas the Type 305 and Type 306 are in the frequency range of 20 to 30 megacycles. The two latter types may be frequency modulated, but this could not be definitely ascertained in the field since none of the sets were in operating condition.

25. TYPE 91 (1931) 6.5-MM TANK MACHINE GUN

This gas-operated, air-cooled, hopper-fed weapon is the old Type 11 (1922) 6.5-mm machine gun modified to be tank-mounted by the removal of the bipod. It is equipped with a blade front sight and a V-notched rear leaf sight sliding on a ramp. There is no windage or drift adjustment. The safety lever is turned down to a vertical position to make the weapon safe.

Characteristics:

Caliber	6.5-mm (0.256 inch).
Weight	23.1 pounds.
Length over-all	43.5 inches.
Length of barrel	19.15 inches.
Maximum (cyclic) rate of fire.	500 to 600 rounds per minute.
Cooling	Air.
Sights	Open V rear sight graduated from 300 to 1,500 mils. Blade front sight.
Feed	Clip fed hopper on left holding 6 clips of 5 rounds each.
Provision for single-shot fire.	None.
System of operation	Gas.
Ammunition	6.5-mm semirimmed S. A. A.
Muzzle velocity	2,440 feet per second.

26. TYPE 97 (1937) 7.7-MM TANK MACHINE GUN

The Type 97 (1937) 7.7-mm tank machine gun is the standard weapon of the machine-gun class in all recent Japanese tanks. A shoulder-controlled weapon, it is fitted with a pistol grip and adjustable stock. It is gas-operated and air-cooled. No provision is made for semiautomatic fire. In addition to the iron sights, a telescopic sight of 1.5 power and 30° field of view is usually fitted. To prevent injury to the gunner, a heavy rubber eye pad is attached to the rear of the telescopic sight. By the addition of a bipod, this weapon may be converted to ground purposes.

Characteristics:

Caliber	7.7-mm (0.303 inch).
Weight	25.2 pounds w/o accessories.
Length w/stock fully extended.	47 inches.
Barrel length	28 inches.
Feed	30-round vertical box magazine.
Sights	Blade front sight and aperture back sight
Muzzle velocity	2,375 feet per second.
Cyclic rate of fire	500 rounds per minute.
Ammunition	Rimless: Ball, AP, Tracer (same as is fired by the Type 99 (1939) 7.7-mm rifle and light machine gun).

27. TYPE 92 (1932) 13.2-MM MACHINE GUN

The Japanese refer to this gas-operated, air-cooled, magazine-fed weapon as the "13.2-mm Vehicular Machine Gun." Documents state that it is designed for use as the primary armament of armored cars. Although no reliable information is available concerning this weapon, it is believed to be of Hotchkiss design and, therefore, probably closely resembles the Type 93 (1933) 13.2-mm machine gun in both performance and general characteristics.

28. TYPE 94 (1934) 37-MM TANK GUN

Although bearing the same type number as the antitank gun of similar caliber, these two weapons must in no way be confused as each was designed for a specific purpose. In addition, ammunition is *not* interchangeable, as the cartridge case of the tank gun is but 5.27 inches long. This gun is the primary armament of some Japanese light tanks, particularly the Type 95 (1935). There is some evidence that it may be mounted also in a tankette.

The gun is mounted in the tank turret at approximately its center of gravity. A form of gimbal mounting is used having vertical trunnions, which provide for a limited degree of independent free traverse, in addition to the usual horizontal trunnions for elevation and depression. The main traverse is, of course, obtained by rotating the turret. Traverse and elevation are both controlled by means of an adjustable shoulder rest attached to the left side of the cradle. The pistol grip, the trigger, and a telescopic sight are arranged on the left of the gun.

Characteristics:

Caliber	37-mm (1.46 inches).
Weight of gun and cradle.	305 pounds.
Over-all length of gun and mount	62.5 inches.
Over-all length of gun	53.9 inches.
Length of tube	49.5 inches.
Breechblock	Semiautomatic vertical sliding.
Recoil system	Hydrospring.
Ammunition	AP and HE.
Muzzle velocity	1,900 feet per second.
Armor penetration	1.4 inches at 300 yards normal impact.

29. TYPE 98 (1938) 37-MM TANK GUN

This weapon has recently been recovered, but a complete report has not yet been made. The gun was first found mounted in a "Nick" fighter plane. The first time it was reported as being tank-mounted was on Saipan. Documentary evidence shows this weapon to be superior to the standard Type 94 (1934) 37-mm tank gun. It has the same chamber dimensions as the Type 94 (1934) 37-mm antitank gun, using a cartridge case 6.53 inches long. The Type 98 tank gun has a muzzle velocity of approximately 2,200 feet per second. This weapon has the same gun and barrel length as the Type 94, indicating that it is the same weapon rechambered to take the longer cartridge case.

Characteristics:

Caliber	37-mm (1.46 inches).
Over-all length	53.9 inches.
Barrel length	49.5 inches.
Ammunition	AP and HE.

30. TYPE 1 (1941) 37-MM TANK GUN

This weapon is known to be the primary armament of the Type 2 (1942) amphibious tank. The weapon recovered was not in condition to be test fired, nor have any ammunition data been reported. Measurements of the chamber show conclusively that this weapon uses a cartridge case larger than that used with any other known Japanese 37-mm gun. A higher muzzle velocity than that of the Type 98 (1938) 37-mm tank gun is therefore indicated.

Characteristics:

Caliber	37-mm (1.46 inches).
Length over-all	67 inches.
Length of rifling	5.289 inches.
Length of chamber	10.0 inches.
Depth of breech recess	4.17 inches.

31. TYPE 1 (1941) 47-MM TANK GUN

This appears to be a modified version of the Type 1 (1941) 47-mm Japanese antitank gun. The sliding wedge breechblock, however, has been changed from the horizontal to a vertical position. It is a high-velocity gun, equipped with a hydrospring recoil mechanism and a semiautomatic breechblock. As the gun is mounted at the point of balance, no equilibrators are used.

Tests have shown that the gun will penetrate at least 3.25 inches of armor plate at 500 yards, at normal angle of impact.

Characteristics:

Caliber	47-mm (1.85 inches).
Length over-all	88.75 inches.
Length of tube	84.75 inches.
Weight complete	906.25 pounds.
Weight of tube	361.62 pounds.
Weight of breechblock	34.62 pounds.
Weight of cradle assembly	366 pounds.
Ammunition	AP and HE.
Muzzle velocity	2,700 feet per second.

This gun is equipped with an excellent 4° x 14° panoramic telescopic sight, resembling the M6 sight used with the United States 37-mm antitank gun M3. The sight is equipped with a night-lighting device, located at the front end, directly over the reticle lens.

32. TYPE 90 (1930) 57-MM TANK GUN

The type 90 (1930) 57-mm tank gun appears to have been the forerunner of the Type 97 (1937) 57-mm tank gun. The Type 90 is a short-barreled weapon with a low-muzzle velocity. The Japanese report that it is the primary armament of the Types 89 A and B (1929) medium tanks. The tube of this weapon is of monobloc construction.

Documentary characteristics:

Caliber	57-mm (2.24 inches).
Barrel length	41.2 inches.
Muzzle velocity	1,150 feet per second.
Range	5,900 yards at 30°.
Recoil mechanism	Hydrospring.
Weight of barrel w/-breech	135.5 pounds.*
Weight of cradle	103.6 pounds.*
Weight of mount	46. 3 pounds.*
Ammunition	AP, HE, and HE/AT.

33. TYPE 97 (1937) 57-MM TANK GUN

Although several specimens of this gun have been captured, the condition of the guns has prevented a detailed examination. Sufficient information is available, however, to indicate that this gun is a short-barreled, low-velocity weapon which is probably used in conjunction with a straight telescopic sight.

Characteristics:

Caliber	57-mm (2.24 inches).
Weight of tube	283 pounds.
Length of tube	3 feet 1.6 inches.
Length of chamber	5.1 inches.
Number of lands and grooves	20.
Recoil system	Hydrospring.
Maximum length of recoil	11 inches.
Type of breechblock	Vertical sliding wedge.
Ammunition	AP, HE, and HE/AT.
Armor penetration	0.79 inch with HE/AT.
Muzzle velocity	1,260 feet per second (estimated).

*Questionable figures due to source, a notebook giving neither the owner's name nor the issuing authority for the data.

The breech ring is box-shaped and the breechblock is of the sliding, semiautomatic type. Firing is effected with a trigger on the left side of the gun and is protected by a trigger guard and pistol grip. The cocking lever is actuated by the breech and the weapon is automatically cocked when the breech is opened.

34. TYPE 94 (1934) 70-MM TANK GUN

This weapon is reported in documents, but as yet has not been recovered. The same cartridge case as that of the 70-mm Type 92 Infantry Gun is used.

Characteristics:

Caliber	70-mm (2.76 inches).
Weight	716 pounds.
Range	5,000 yards at 20° elevation.
Tube length	50.6 inches.
Recoil system	Hydrospring.
Maximum recoil	11.8 inches.
Muzzle velocity:	
W/AP	980 feet per second.
W/HE	1,142 feet per second.
Ammunition	AP, HE, and HE/AT.
Armor penetration	3.15 inches with HE/AT.
	0.98 inch with AP at 1,094 yards.

35. TYPE 99 (1939) 75-MM TANK GUN (EXPERIMENTAL)

Little is known of this weapon. However, it is referred to in documents as the new 75-mm gun which will be mounted as the primary armament in new Japanese medium tanks. It is probable that this weapon will have a performance considerably in excess of any Japanese 75-mm gun encountered to date.

36. TYPE 38 (1905) 15-CM HOWITZER

This howitzer was found mounted on the chassis of the Type 97 (1937) medium tank, improved version. The Type 38 (1905) 15-cm howitzer is a very short weapon and its advent in this role changed its aspect from that of an obsolete field piece to that of a self-propelled howitzer. It has an interrupted-screw breechblock, opening to the right, and using a percussion primer. According to documents the rifling is 58 inches long and has

an increasing right-hand twist. The maximum range is given as approximately 6,500 yards for the field piece. However, as the self-propelled howitzer cannot be elevated above 30°, it is probable that its range in this role is appreciably less than 6,500 yards.

Characteristics:

Caliber	149.1-mm (5.9 inches).
Elevation	30°.

Characteristics—Continued

Depression	5°.
Traverse	10°.
Breechblock	Interrupted screw.
Firing mechanism	Percussion.
Rifling	RH w/increasing twist.
Lands	36.
Recoil system	Hydropneumatic.
Weight of projectile	79 pounds for the HE round.

SECTION II

ARMORED TACTICS

1. INTRODUCTION

It was not until after the disastrous experience with Russian armored units on the Manchurian border in 1939 that the Japanese gave any real attention to mechanized warfare. Prior to 1939, Japanese armored forces consisted of independent tank regiments and of tank groups consisting of three or four tank regiments, a signal unit, and an engineer unit. After 1939, the Japanese apparently planned the creation of an armored army under an independent command. In pursuance of this new policy, two armored divisions were activated in 1942. An additional armored division was also activated in 1942 but not as a part of the armored army command.

It is believed that in 1943 the Japanese realized their inability to create the armored army as originally planned. This may have been primarily due to shipping difficulties and the higher manufacturing priorities of other items such as airplanes. At any rate, the armored army was deactivated in November 1943 and its organic divisions were placed under new commands.

Another armored division was activated in 1944 subsequent to the deactivation of the armored army.

Available information indicates that the original armored divisions were organized as square divisions. However, these divisions were triangularized in early 1944, and the new division was activated as a triangular division. Estimated T/O strength of a triangular armored division is 12,950 officers and men, 175 medium tanks, and 141 light tanks (see Incl. 1 and 2, pages 65 and 66).

Armored divisions, like all Japanese units, deviate from the established T/O. Thus far, two divisions have been encountered in combat without either their AA Defense Units or their Reconnaissance Units.

In addition to the armored units included in the armored divisions discussed above, the Japanese have several types of independent units. There were originally nearly 20 independent tank regiments. Of these, one was rendered ineffective in the Marianas in July 1944, and was absorbed by Independent Mixed Regiments on Marcus and Wake. The remaining regiments operate independently. The T/O strength of the regiment is approximately 950 officers and men, 31 light tanks, and 50 medium tanks.

The Japanese also have Independent Tank Companies having a T/O strength of approximately 150 officers and men, 10 medium tanks, and 2 light tanks. Originally 11 of these tank companies were known to exist; however, 2 of them were rendered ineffective on Saipan.

Four Independent Tankette Companies are known to be in existence at present. These companies have a T/O strength of 130 officers and men, and 17 tankettes.

In 1942, several infantry divisions had tank units (T/O strength 750) and/or Infantry Group Tankette Companies (T/O strength 100). Most of these units were demobilized by early 1944. At the present time only four infantry divisions are known to have tank units. A recent trend has been to have 2 armored car or light tank companies in the division reconnaissance regiments. Such a disposition would make 8 to 12 light tanks available to the infantry division.

2. JAPANESE ARMORED TACTICAL PRINCIPLES

The Japanese battle principles and concepts presented are based upon present doctrine, teaching, and the very limited use of armor encountered up to the present time. It cannot be emphasized too strongly that Japanese tank operations to date have consisted of piecemeal tank counterattacks and defensive siting of tanks as pillboxes in direct contradiction to promulgated doctrine.

Japanese field service regulations very definitely stress the fact that all arms must be used to enable the infantry to close with the enemy and annihilate them. This indicates that the basic mission

of tanks is direct cooperation with infantry.

Present teachings describe the principle function of the tank to be "to pave the way for a victory for the entire army by bringing into full play their great mobility and striking force; by containing and destroying the enemy fighting power in detail upon initiating penetrations into the hostile lines; and by expediting prompt exploitation by the coordinated efforts of the participating units."

Similarly, the mission of tanks is prescribed as follows: "They will closely support infantry (cavalry) combat. Depending on the situation, they will infiltrate into the hostile area in order to seize the initiative or to seal the enemy's fate. In the mechanized unit, of which the tank is the main element, they become the very core of a tremendous striking force."

3. FORMATIONS

According to the Japanese field service regulations, the following formations are used:

For a deployed formation, the platoon is normally in a diamond formation and the company in a diamond of diamonds. (See fig. 17.)

The normal combat formation is a T. (See fig. 18.) The company is disposed with three platoons abreast and one platoon trailing. Each platoon is in a diamond formation. (See fig. 19.)

Although no large formations of Japanese tanks have been encountered, the Japanese Army Tank School gives precise instructions for the employment of such formations. For an attack on a lightly held enemy position, Japanese

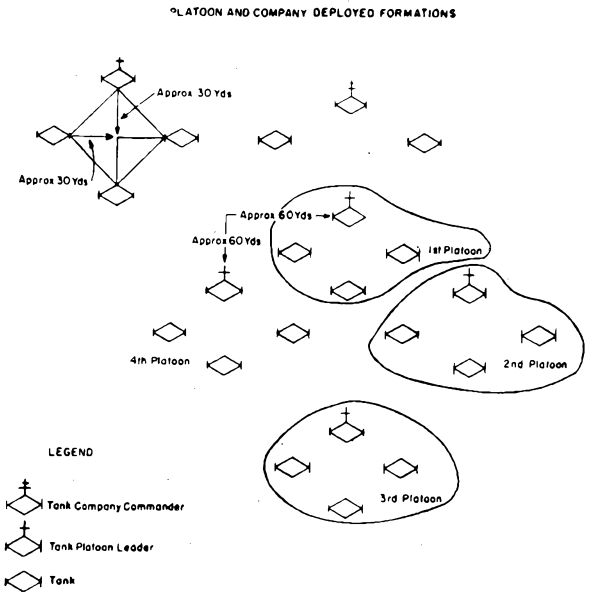


FIGURE 17.

doctrine specifies a minimum of 30 to 40 tanks. If the enemy is in a strongly defended position, at least 60 tanks are required. If hostile artillery shelling and aerial bombing are unusually heavy, 100 tanks are necessary.

Japanese tactical doctrine stresses the use of tanks in what is called a "mobile mass." When committed in this manner, the tanks constitute the main fire element in what is essentially an attempt to attain a decisive victory by one stroke. Such tactics are to be resorted to only

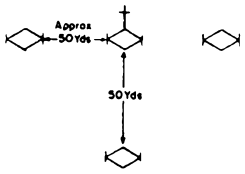


FIGURE 18.

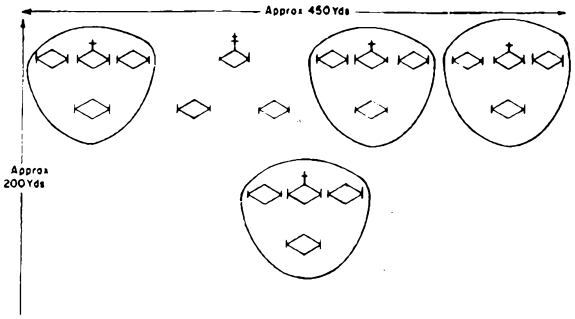


FIGURE 19.

in suitable terrain, and the nature of the terrain is considered to be the chief limitation on the employment of large tank formations. At any rate, tanks are committed as a "mobile mass" only at "a momentous time and place, when a decision of the entire army is in balance."

In utilizing a "mobile mass," "the allocation of tanks into two echelons is only to comply with combat methods set forth for the company and regiment whose dispositions are made by the company and regimental commanders respectively." Field service regulations further prescribe that "the regiment will usually deploy its entire strength along the front line, but, as the situation demands, tanks are allocated into two lines."

"The missions of the 2d line (combat unit) are:

(1) It will liquidate the enemy surviving the front line's (combat unit) assault, or

(2) It will liquidate the antitank weapons.

(3) If the situation warrants, it will execute an enveloping attack against the enemy, or

(4) It will execute a "passage of lines" through the front line (combat unit) to carry on the attack.

(5) At times, the first and second lines (combat units) will launch simultaneous attacks to neutralize the enemy line in depth completely.

"Ordinarily the company is set up into two lines (combat units) of tank platoons. The missions of the rear platoons are:

(1) To attack the enemy weapons surviving the forward platoons' assault.

(2) According to the situation, to attack the hostile antitank weapons.

"When a large tank unit (a tank group or larger) is directed against the enemy positions in depth, the attacking tanks may be formed into two echelons.

Ordinarily in a large unit the reserve echelon is held to meet any emergency, or it may be set up expediently to exploit success that may be won by the forward echelons."

According to Japanese doctrine, tanks employed in "mobile mass" should be directed against the weak spots in the enemy's lines. Antitank weapons are considered intrinsically defensive weapons, hence the Japanese believe that tanks are the only ground weapons capable of effectively opposing tanks. The Japanese also state that there are many opportunities for plane-tank cooperation and dwell considerably on the prospect of gaining crushing victories with large tank forces operating under a tremendous air cover.

4. TANKS IN INFANTRY SUPPORT

As previously pointed out, no large Japanese tank forces have been employed. The infantry support role has been used consistently. In general there are two methods of cooperation. One requires the tank commander to designate the infantry forces with which the tanks are to cooperate in response to those requests for support received from the infantry commanders. The other method is predicated upon advance specification of the objectives for the tanks' attacks. If the former plan is followed—tanks allotted directly to infantry units—the tank regimental commander gives the general outline of the plan of action, leaving the details of execution to the tank company commanders. For example, if it is necessary for the tanks to execute a reversal of movement to facilitate the forward advance of the infantry, the movement is made on order of the tank company commanders, often in response to a direct request from the infantry for the maneuver.

On the other hand, if tanks are assigned specific objectives, the tank regimental commander retains direct control throughout the entire course of the action, and the tanks are committed as a unit. This method of tank-infantry cooperation is favored when time is short and it is difficult to foresee changes that may develop in the situation during the action. It should be noted that in this method of cooperation the tanks may be committed by platoons. When tanks are assigned to infantry units however, nothing less than a tank company is committed.

In exploitation operations the Japanese tanks are deployed and committed to seize tactically important areas, confuse hostile attack deployments, and strike at enemy artillery or other vital rear installations. If tanks are to give impetus and momentum to the infantry assault, they advance in close coordination with the infantry. It is always possible, according to Japanese doctrine, to employ both methods simultaneously, especially if an ample number of tanks is available. Some can be used in direct support missions, while the remainder can be held in reserve to exploit the successes achieved by the assault.

If more tanks are available than the estimated requirements for close infantry support, some may be committed as leading tanks usually under division control.

5. PRINCIPLES OF INFANTRY SUPPORT

The following fundamental principles are emphasized in Japanese infantry-tank attack doctrine.

Close liaison is maintained at all times. Methods of liaison include radio, tank runners, joint command posts, liaison officers, and visual signaling. Until recently, available information indicated that there was only one radio in a platoon, and that was in the commander's tank. However, in the 2d Armored Division on Luzon, it was found that all medium tanks and practically all light tanks encountered were equipped with well built, two-way radios. When tanks are used as runners, two tanks are used for each assignment. If necessary, tanks are rallied frequently to insure maximum coordination of offensive action. If the infantry assault fails to progress as planned, the tanks concentrate on those enemy obstacles or strongpoints constituting the most effective impediments to the infantry advance. Prompt and vigorous action is taken against enemy positions delivering flanking fire on the Japanese infantry.

If Japanese tanks encounter an antitank installation within the enemy position, Japanese doctrine prescribes that an immediate decision must be made whether to bypass the installation or to liquidate it by frontal assault. Incipient enemy counterattacks are frustrated by striking at the counterattack base, the infantry deployed for the counterattack, or the hostile tanks which may be spear-heading the maneuver, depending upon the situation.

Areas are designated for rallying after the accomplishment of their mission and to prepare for the next phase. Tanks also assemble at rally points when the assault is suspended at night or because of the tenacity of enemy resistance. Restoration of combat strength is the principle object of rallying. With this in mind, the Japanese choose sites to afford the maximum efficiency in regroupment, replacement, and repair. Special care is taken to collect all damaged vehicles and to initiate repair when feasible.

Tank attacks or infantry attacks supported by tanks are facilitated sometimes by the assignment of engineer parties to cooperate with the tanks. Personnel of these parties are especially trained in the techniques of demolishing tank traps and other obstacles which might impede the advance of tanks or a tank supported infantry attack.

In one observed instance the engineer party consisted of a leader and five men equipped with 122 pounds of explosive, a smoke discharger, picks, shovels, and other tools. Both personnel and equipment were carried on the outside of two tanks. The tanks stopped about 10 yards from an obstacle to permit the men to dismount and unload. The tanks then withdrew to a position about 50 yards in rear and covered the demolition operations by tank-gun and machine gun fire. The Japanese anticipate the prompt demolition of obstacles by this method.

6. ORDERS

The Japanese stress the issuance of precise orders that clearly specify objectives in actions involving infantry-tank cooperation. When tanks are attached to an infantry battalion, they are under the control of the infantry commander. Company commanders are expected, however, to maintain liaison with the tank commander to facilitate cooperation and expedite prompt exploitation of tank successes by the infantry.

The infantry battalion commander's orders to the tank unit commander include a statement of the general plan. Tank objectives are clearly specified and the obstacles to be removed are designated. Assembly areas, line of departure, H-hour, and the methods to be used by the tanks in crossing the line of their infantry are prescribed. It should be noted that Japanese doctrine does not provide for the assignment of phase lines, bomb lines, or boundaries between units below divisions, although a few instances have been noted in which regimental boundaries were prescribed.

Infantry company commanders are expected to keep the battalion commander informed of the nature and location of primary tank objectives in their sectors to enable the battalion commander to assign precise objectives.

In the event that there are no primary tank objectives requiring immediate action, or their location cannot be ascertained, the tanks may be employed against the enemy's flanks. When employed in flank attacks, the battalion commander theoretically sends infantry with the tanks for a coordinated assault. The infantry is also given the mission of mopping up pockets of resistance that survive the initial assault. Infantry units assigned these missions are usually taken from front line companies opposite the flank or flanks subject to the attack.

Japanese tactical doctrine for a flank attack directs the infantry battalion commander to concentrate his firepower against the enemy antitank weapons. If necessary, details are sent forward to clear lanes for the passage of tanks through areas containing antitank weapons or where antitank weapons can be expected. Japanese doctrine also emphasizes the necessity for infantry to cover and protect the tanks from antitank fire. Despite the promulgation of this doctrine, Japanese tanks were sent against United States antitank weapons on Guadalcanal and were completely annihilated.

7. REGIMENTAL TACTICS

During an advance, the regimental frontage will be 500 to 550 yards. The advance is preceded by a patrol of tankettes for reconnaissance followed by "direct guard" (advance guard), consisting of a light tank platoon to develop enemy positions prior to the assault. Regimental headquarters follows the "direct guard" and is in turn followed by a forward platoon of light or medium tanks to deal with enemy antitank weapons that open fire. The main body follows and consists of the remainder of the company furnishing the

direct guard and forward platoons, flanked on either side by a tank company. The fourth company, in a four-company regiment, brings up the rear. A medium tank company on the march, according to logistical data, will form a column 915 yards long; a light company, one of 525 yards.

If the estimated depth of the enemy position is about 1,500 yards, the Japanese assume it will be defended by at least 2 or 3 antitank guns, 6 heavy machine guns, 5 mortars, and 9 to 12 light machine guns. The frontage of a Japanese regiment in an attack on such a position will be 550 to 875 yards and a tank company will be assigned to the support of each infantry battalion. The attack is made in three echelons. The first, under the direct control of the tank regimental commander, has as its objective the establishment of a passage for the infantry. The tanks of this echelon neutralize the enemy antitank guns and strongpoints not destroyed by the artillery preparation. Those positions not liquidated by the initial attack are subsequently mopped up by the infantry. This procedure differs from a small scale employment of tanks in support of infantry, in which case Japanese doctrine assigns the liquidation of enemy antitank weapons to the infantry instead of the first tank echelon.

The second tank echelon, under the direct control of the infantry battalion commander in charge of the infantry assault wave, leads and supports the infantry by pinning down or liquidating enemy automatic weapons personnel.

The third tank echelon, under regimental control, is held in reserve to exploit successes of the first two echelons. If a breakthrough is made by the first echelons, the reserve is committed to a strike, as deep as possible, in the enemy's rear areas.

8. DIVISION TACTICS

Japanese doctrine states that the front of a division in an attack will be about 2,735 yards. When an armored division is attached to an infantry division, the tanks are committed in three echelons. Two infantry regiments are in the front line, each preceded from 400 to 500 yards by a tank company. The primary mission of the first tank echelon is to neutralize enemy antitank weapons and strongpoints not destroyed by artillery fire, and to clear a path for the second echelon composed of the major infantry assault units and their assigned tanks.

The second tank echelon is deployed immediately in front of the major infantry assault units (two infantry regiments) with one company in front of each of the four battalions. The mission of the tanks in this echelon is to cover and support the infantry assault with special attention to liquidating enemy automatic weapons. When warranted these tanks may leapfrog through the first echelon.

A regiment of tanks, the third echelon, is held in reserve under the direct control of the division commander. The mission of the third echelon is to exploit the success of the assault. The third echelon may also be used to reinforce any area requiring aid, perhaps by attachment to an infantry unit.

When the tank support for the infantry must be exceptionally close, some important modifications in Japanese tactics are made. The tank regiment is divided into two combat units.

The first combat unit is divided into a left and right formation, each of which is preceded by a patrol of light tanks to develop the enemy position and draw enemy antitank fire. Both of the formations consist of four platoons arranged into two columns of two platoons each. The two front platoons advance with the infantry; the two rear platoons are used to swing around the flanks of the leading platoons to engage located enemy antitank weapons. Each of the two formations is followed by a platoon of engineers.

The second combat unit consists of four platoons. One platoon is assigned the mission of neutralizing antitank guns and self-propelled artillery. The remaining three platoons are assigned the mission of liquidating automatic weapons. One of them may be used as a reserve or to exploit successes. The regimental headquarters moves with this combat unit following the first platoon.

9. AN EXAMPLE OF DIVISION TACTICS—EMPLOYMENT OF THE 2D ARMORED DIVISION ON LUZON

The 2d Armored Division on Luzon was the first such unit encountered by United States forces. It was anticipated that the commitment of this Japanese armored force would provide valuable material for a study of Japanese methods in the employment of massed armor and coordinated infantry-armor-artillery tactics. Actual operations, however, revealed that the Japanese commanders either did not understand the modern concept of armor employment or simply were unable to employ the armored division in accordance with promulgated principles of operation. In-

stead, the Japanese commanders frittered away the division in piecemeal counterattacks and immobile defenses. They never mounted an attack with more than 16 tanks at one time. The principle of mass was never employed. The inherent mobility of the tanks was not utilized but was negated by committing the tanks to fixed defensive emplacements.

The greatest concentrations of Japanese tanks were in San Manuel and Munoz. Here, the armor, committed to a death stand, was dug in so that only the turrets were exposed. Emplacements had heavy adobe revetments, were under heavy foliage, and were a nucleus for all other defensive measures. Tanks were sited to cover the highways and cross-country approaches with mutually supporting fires. Close-in security of the armored pillboxes was provided by automatic weapons and infantry dug in around each tank. Artillery, emplaced in covered positions, supplemented the tanks to complete an integrated fire plan. Last resort counterattacks were launched at night once the local defenses were doomed.

10. SPECIAL OPERATIONS

a. Dawn attack. A dawn attack is really a night maneuver for Japanese tanks. Tanks normally are directed to proceed to the line of departure under cover of darkness guided by noncommissioned officers especially trained in tank tactics. Thorough preparation is made with emphasis on the removal of natural and artificial obstacles to the advance of the tanks, or provision to bypass such obstacles. The exact procedure to be followed by the tanks in leapfrogging the infantry preparatory to spearheading the attack is prescribed well in advance.

b. Night attack. Preparations for night attacks are even more elaborate and precise than for dawn attacks. As much as a platoon of tanks may be assigned to one infantry company. Tank objectives include heavy weapons of the enemy's first line of defense, obstacles, and flank defenses. Objectives are designated preferably to permit the tanks to move to the line of departure in daylight unless enemy observation renders such movement impracticable.

c. Pursuit. The Japanese feel that pursuit affords the best opportunity for exploiting the advantages of the tanks to the maximum. It is considered necessary to plan maintenance and supply facilities to preserve the continuity of the pursuit. Clear objectives are selected and the tanks are ordered to proceed against them as directly as possible regardless of losses. Pursuit, the Japanese say, should be unremitting and audacious, even if only one tank survives to complete the mission.

d. Tank versus tank. Tank operations theoretically are not conducted with the purpose of precipitating tank-versus-tank engagements. Nevertheless such theory is not practiced since when confronted by a modern well-equipped army, Japanese tank commanders, have been directed to be in a constant state of readiness to engage enemy tanks.

In tank-versus-tank engagements the Japanese believe that the retention of the initiative is the necessary requisite for success. Alert foresight, quick commands, firm determination, and cohesive organization are the attributes described as enabling the retention of the initiative. Tank units are expected to proceed on the assumption that they enjoy superiority in situations requiring quick decisions and are directed to launch immediate attacks against the flanks and rear of enemy tank formations. Japanese armor will fight in closely integrated and controlled maneuvers, attempting to defeat the enemy tanks in detail. Japanese doctrine prescribes the concentration of fire on enemy command and leading tanks.

e. Long-range raids. Long-range raids leading to meeting engagements received considerable attention in Japanese doctrine. In such an operation, advance on a 325- to 550-yard front is prescribed. A reconnaissance unit is the advance force with the mission of obtaining all possible information on the terrain, routes of advance, enemy forces and their dispositions, and other intelligence of possible use to the commander of the advancing tank regiment. An advance guard, consisting of one tank platoon, with the mission of driving in light enemy resistance encountered or developing resistance, follows the reconnaissance unit. Regimental headquarters follows the advance guard and is in turn followed by a tank company advancing on a 55- to 110-yard front. The field artillery attached to the tank regiment and the engineer unit follow in parallel columns behind the first tank company. A tank company is abreast of and parallel to the artillery and engineer columns on each flank. These flank tank companies are used for enveloping maneuvers or to assist the leading tank company in the destruction of enemy obstacles and antitank weapons. The artillery is used in a direct support role and the engineers assist in the reduction of obstacles. Behind the artillery and engineers with their flank

tank companies is the infantry which is usually motorized. The infantry may be used for a frontal assault or for a holding attack coordinated with an enveloping maneuver. The infantry is followed by a second echelon of tanks as a reserve. The reserve, committed as the situation warrants, can be used to exploit penetrations or to reinforce other tank units.

f. Raids. In contrast to the long-range raids by at least a regiment, similar Japanese tank units are used on so-called raids. Raids are undertaken, often upon the request of infantry commanders, to capture critical terrain features, confuse the enemy, or to deliver surprise strikes on artillery, headquarters, or other important installations. Since heavy losses are expected, such raids are only undertaken when the anticipated results will justify the loss. The frontage used is from 650 to 765 yards and the depth of the formation is from 440 to 660 yards. The tanks are divided into two combat units. The first combat unit is assigned the mission of liquidating enemy antitank weapons while the second combat unit is assigned the mission of destroying or neutralizing hostile automatic weapons.

Japanese defense doctrine emphasizes the offense almost exclusively. The defense is considered to be a temporary phase of combat which the Japanese must accept because of overwhelming enemy superiority. The object of the defense is to deplete the enemy's strength until a counterattack can be initiated. The Japanese views on defensive combat, coupled with the predominantly offensive character of the tank, cause a lack of attention to tank defensive tactics. Japanese doctrine prescribes the use of tanks in counterattacks. They are expected to deliver short speedy assaults upon the objectives in close cooperation with artillery. The engagement is to be broken off upon completion of the mission. If enemy tanks are present in superior numbers, counterattacking Japanese tanks try to coordinate their action with their own antitank weapons fire. In recent operations, the Japanese dug their tanks in and used them defensively as artillery and antitank weapons.

11. INFANTRY-ARTILLERY-TANK COORDINATION

Japanese doctrine prescribes that when artillery and tanks cooperate with the infantry, support must be carefully coordinated. When the infantry attacks immediately after the artillery preparation, the tanks should have a line of departure and jump-off time that will not interfere with the consummation of the artillery plan or the full realization of its potentialities by the infantry. The danger of friendly artillery fire is to be disregarded when it is necessary for the tanks to neutralize unexpected enemy flank capabilities. In the absence of artillery preparation, the tanks ordinarily initiate their attack immediately upon completion of the infantry's preparatory phase.

12. SUMMARY

Contrasting Japanese doctrine with actual operations to date, definitely reveals a complete failure on the part of Japanese commanders to employ armored forces as prescribed by field service regulations. Massed armor has never been used in offensive action. Defensive combat has been confined to a static defense with a final uncoordinated "banzai" counterattack. A truly coordinated attack has never materialized. The use of piecemeal, uncoordinated attacks may be due to physical impossibilities, lack of the proper means, a complete lack of understanding the methods, or lack of training. In any event, one fact is paramount: to date the Japanese have not employed armor according to modern concepts.

SECTION III

ANTITANK ARTILLERY

1. GENERAL

The Japanese have only one artillery weapon which they designate specifically as an antitank gun: the Type 1 (1941) 47-mm Antitank Gun. It must not be forgotten, however, that every artillery piece they possess, irrespective of size or caliber, is a potential antitank weapon.

It has become evident that the Japanese are endeavoring to improve the armor-piercing performance of all their artillery weapons by the introduction of improved armor-piercing projectiles. The Type 1 (1941) AP Projectile is frequently mentioned in connection with various artillery weapons up to 150-mm in caliber. The projectile, generally, is shorter and contains less high-explosive than other APHE projectiles. The following penetration figures are taken from a captured Japanese document, and are for Type 1 AP:

Gun	*Range (yards)*	*Penetration Surface—Normal (inches)*
Type 91 (1931) 105-mm Howitzer	250	2. 95
	500	2. 80
Type 96 (1936) 150-mm Howitzer	250	4. 9
	500	4. 7

Another recent introduction is the Hollow Charge Projectile. It is issued to the lower-muzzle velocity weapons, and the Japanese claim that it has an armor penetration approximately equal to the caliber of the weapon from which it is fired. The following penetration figures are for Type 2 Hollow Charge Projectile:

Gun	*Penetration Surface—Normal (inches)*
Type 92 (1932) 70-mm Howitzer	3. 1
Type 41 (1908) 75-mm Mountain (Infantry) Gun	2. 95
Type 94 (1934) 75-mm Mountain Gun	3. 3

To date, antiaircraft weapons have occasionally been used against tanks with good effect. Type 88 (1928) 75-mm Antiaircraft Guns have frequently been found emplaced so as to cover beaches by direct fire. From this and the fact that an AP projectile is now being issued for this weapon, it would appear that the Japanese are considering its employment as an antitank gun.

The appearance of the Type 99 (1939) 88-mm Antiaircraft Gun may prove to have considerable bearing upon the effectiveness of Japanese antitank defense. This weapon has been captured in considerable numbers in the Burma Theater of Operations. The performance of the gun is believed to be approximately equivalent to that of the German Flak 36; but though exact details are not yet available, it appears that it is mounted in a purely static role. The existence of an AP projectile for this weapon has not been confirmed.

The most important antitank guns encountered to date are described hereafter in fair detail.

2. TYPE 94 (1934) 37-MM GUN

a. General. This weapon is widely distributed throughout the Japanese Army. It is the organic weapon of infantry units and is also issued to independent antitank and armored units. It has proved to be an effective infantry close support weapon, and is used against tanks and armored cars, loopholes of embrasures, and automatic weapons.

The tube is of monobloc construction with the slipper integral with the barrel. It has a semi-automatic, horizontal sliding breechblock, which opens on recoil and ejects the empty cartridge case. The breech is retained in the open position by the extractors. When another round is loaded, the extractors are released and the breech, powered by a spring, closes.

The piece may be found mounted on wooden artillery wheels with steel tires or on perforated steel disk wheels. In action, the left side stub axle is pivoted in its mounting, allowing the left wheel to be turned 45° outwards at the rear. This permits right traverse of the piece without

fouling the wheel. A spring loaded locking arm locks the stub axle in either its normal or pivoted position.

For transportation, the weapon may be packed on horses or drawn by a single horse.

b. Characteristics:

Caliber	1.45 inches.
Weight firing	720 pounds.
Length of tube	66.4 inches.
Traverse	60°.
Elevation	−10° to +27°.
Muzzle velocity	2,327 feet per second.

c. Ammunition. Fixed ammunition is used; a small cannelure behind the rotating band allows the cartridge case to be crimped to the projectile.

Projectile	*Fuze*	*Weight (pounds)*	*Weight of complete round (pounds)*
Type 94 AP	Type 94 Short-delay	1.54	2.9
Type 94 HE	Type 93 Instantaneous.	1.4	2.54
Type 13 HE	Type 14 Instantaneous.	1.45	2.53

d. Armor Penetration—Surface Normal.

Projectile	*Range (yards)*	*Penetration (inches)*
Type 94 AP	0	2.1
Type 94 AP	250	1.9
Type 94 AP	500	1.7

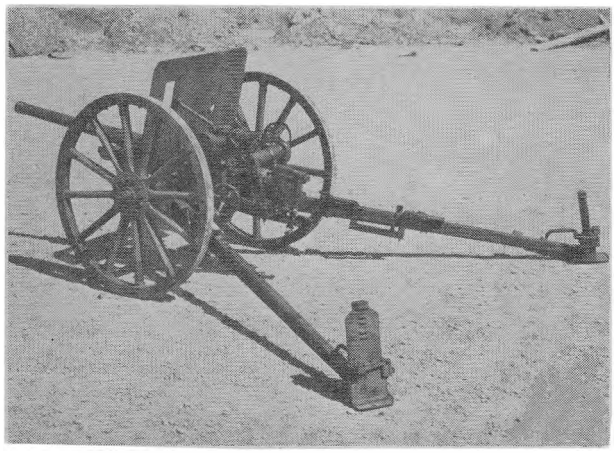


FIGURE 20.—Type 94 (1934) 37-mm Gun.

3. TYPE 1 (1941) 47-MM ANTITANK GUN

a. General. This is an antitank weapon of modern design and is mainly issued to independent antitank and armored units.

The tube is of built-up construction consisting of a tube and a jacket. The long tube has a heavy reinforced muzzle band, and employs a semi-automatic horizontal sliding breechblock. A hydrospring recoil mechanism is housed in a trough-type cradle which is trunnioned to the top carriage about the point of balance. The long trail legs are of welded steel construction and open to an angle of 60° for firing. The ends of the axle extend into a knee action shock-absorbing assembly, held in a cylindrical housing. For firing, the shock-absorbing system is locked, and disengaged when the weapon is being prepared for traveling.

Mounted on steel disk wheels fitted with sponge rubber-filled tires, the weapon is highly mobile.

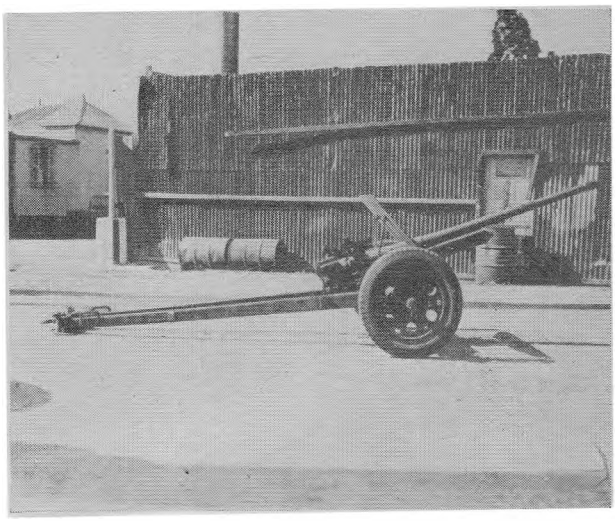


FIGURE 21.—Type 1 (1941) 47-mm Antitank Gun.

b. Characteristics:

Caliber	1.85 inches.
Weight firing	1,660 pounds.
Length of tube	99.48 inches.
Traverse	60°.
Elevation	−11° to +19°.
Muzzle velocity	2,730 feet per second with HE.
Sight	Straight telescope.

c. Ammunition. Fixed ammunition is fired.

Projectile	*Fuze*	*Weight (pounds)*	*Weight of complete round (pounds)*
HE	Type 88 Instantaneous		
	Type 88 Short-delay	3.08	5.4
APHE	Mark II Base Short-delay	3.37	6.1
Type 1 APHE			

d. Armor penetration with APHE:

Range (yards)	Penetration in (inches) at— (Normal)	(30°)
250	3.0	2.25
500	2.75	2.0
750	2.45	1.7
1,000	2.0	1.4
1,500	1.6	1.2

4. TYPE 90 (1930) 75-MM FIELD GUN

a. General. This weapon, the most up to date of its kind produced by the Japanese, is used in both field and antitank roles. It has been produced in two types, one with wooden artillery wheels for horse draft, the other with small pneumatic tired disk wheels for tractor or truck draft. The mobile version is issued to armored units and may be issued to independent field artillery units, while the horse-drawn version is issued to division artillery regiments. The comparatively high-muzzle velocity attained by this gun and its 13-pound APHE projectile makes it the most formidable antitank artillery weapon possessed by the Japanese.

The long monobloc tube has a horizontal sliding, hand-operated breechblock, and is fitted with a muzzle brake. The muzzle brake has a single baffle plate with six side ports for gas escape. The tube rides in a trough-type cradle, which is trunnioned 1 foot in front of the breech. Coil spring equilibrators are fitted. Full elliptic springs with nine leaves in each spring are fitted to the carriage of the mobile version. For firing, two small screw-type jacks fitted between an upper and lower axle are cranked down until the weight of the gun is supported on the lower axle through the jacks, and the springs are out of action.

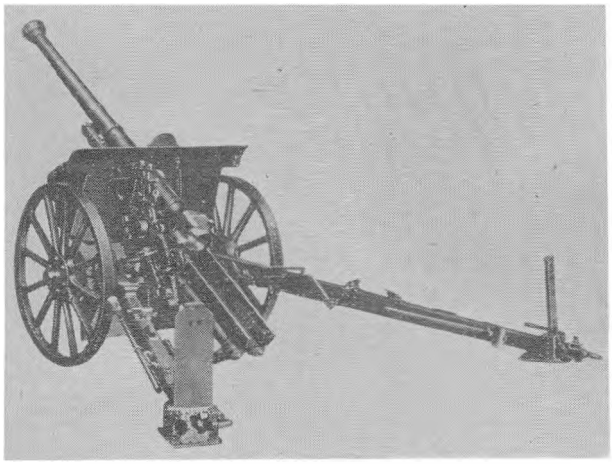


FIGURE 22.—Type 90 (1930) 75-mm Field Gun (Horse-drawn).

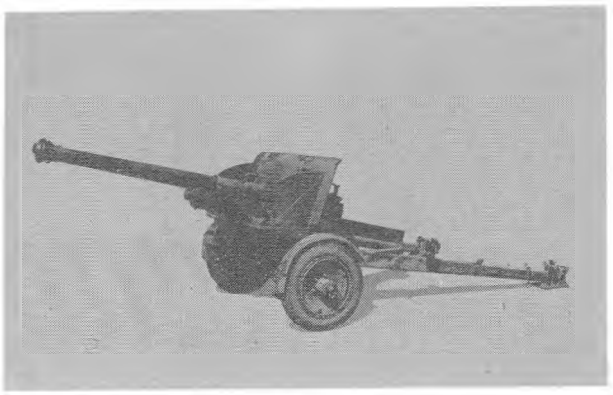


FIGURE 23.—Type 90 (1930) 75-mm Field Gun (Mobile version).

b. Characteristics.

Caliber	2.95 inches.
Weight firing	Horse-drawn: 3,080 pounds.
	Mobile version: 3,520 pounds.
Length of tube	8 feet, 9 inches.
Traverse	50°.
Elevation	−8° to +45°.
Muzzle velocity	2,230 feet per second.
Rate of fire	10 to 12 r. p. m.

c. Ammunition.

Projectile	Fuze	Weight (pounds)
Type 90 HE pointed	Type 88 Instantaneous.	14
Type 94 HE	Type 88 Short-delay.	13.24
Type 95 APHE	Type 95 Small Bore.	13.26

In addition to the above, a large assortment of all types of ammunition, including Type 1 AP, is fired.

d. Armor penetration with Type 1 AP—Surface Normal.

Range in yards	250	500	750	1,000	1,500
Penetration in inches	3.5	3.3	3.0	2.8	2.4

SECTION IV

ANTITANK MINES, IGNITERS, AND FLAME THROWERS

1. TYPE 93 MINE

a. Description. The mine consists of a cylindrical casing in two halves. Two brass strips are soldered to diametrically opposite sides of the upper half, each carrying two brass "D" rings, which are used for anchoring or carrying the mine. To the center of the bottom is soldered an internally-threaded brass disk, 0.56 in. in diameter, to which the detonator assembly is screwed. A central hole in the upper portion is reinforced with a brass collar, threaded to receive a milled brass plug. The overlap of the two halves of the cover is sealed.

The explosive filling is in two parts. A primer surrounds the detonator cavity and consists of an annular pellet of pressed picric acid. The main filling consists of a cylindrical slab of cast picric acid with a central perforation for the igniter assembly.

b. Characteristics.

Diameter of mine	6.75 inches.
Height of mine (approx.)	1.75 inches.
Weight of mine (approx.)	3 pounds.
Weight of filling (approx.)	2 pounds.

2. TYPE 93 MINE IGNITER

a. Description. The igniter assembly consists of a brass cylinder which is provided with a centrally-perforated transverse piece to act as a striker-guide. A steel plug screws into the top of this cylinder, and is drilled internally to take the steel striker and spring. A shear wire passes through a 0.093-inch diameter hole in the striker and steel plug, and is capable of taking a dead load of about 250 pounds. The upper end of the striker is drilled and threaded to take a brass safety cap, which when screwed home takes the pressure of the spring loaded striker off the shear wire. A brass cylinder fits over this safety cap forming an additional safety device; it has a big indicator with the Japanese ideograph for "safe" on it.

b. Operation. Pressure on the striker bolt shears the shear wire which causes the striker to set down on the detonator and fires the mine.

c. Neutralization. Search for and neutralize any antihandling devices. Without moving the mine or exerting any pressure on it, unscrew the brass plug. If the brass safety cap is available, screw it firmly into the top of the striker. If neither is available, remove the igniter.

3. YARDSTICK MINE

a. Description. The body of the mine is formed by two bent sheet steel rectangles, seam-welded along their length to form an oval tube. Both ends of this tube are covered by removable steel caps, one of which is provided with a threaded hole for the safety wire and a spring clip to hold the latter in place. The caps are fixed to the tube by single screws.

The explosive charge is made up of eight equal, specially shaped blocks of picric acid. The blocks are cylinders conforming to the oval cross section of the body, but flattened on one side to allow space for the pressure plate of the igniter inside the tube. Each block has a shaped semicircular recess of approximately 1 inch in diameter which allows two of the blocks, placed with these recesses adjoining to retain one igniter between them. Four such pairs form the mine charge.

b. Characteristics.

Mine body length	91-cm (36-in.).
Cross section (elliptical).	8.5 x 4.5 cm (3.35- x 1.8-in.).
Weight of body	2.1-kg. (4.5 lb.).
Weight of charge	2.7-kg. (6 lb.).
Total weight of mine	4.8-kg. (10.5 lb.).
Size of charge blocks	11- x 8- x 3-cm.
Firing pressure (provisional).	336-lb.

4. YARDSTICK MINE IGNITER

a. Description. This igniter is made of black-finished rust-resistant steel except for the copper shear wire. It is a single, compact, mechanical action igniter, cross-shaped when completely assembled with striker and primer. The igniter body consists of a short cylinder which houses the

release plunger, and has two threaded holes on opposite sides. Into one side is screwed the striker assembly, consisting of striker housing, striker and striker spring, and into the other side the primer assembly, consisting of the primer in its holder, and the percussion cap. The striker housing and primer holder are steel cylinders of the same size and outside finish, but the primer holder is marked with a daub of red paint on the base to distinguish it. Instead of a detonator, there is an initiator charge pressed direct into the yellowish white primer.

The striker release plunger is shaped as a split pin 1.5 inches long and about 0.3 inch thick, with an enlarged flat head of about 1 inch in diameter. It has a perforation to take the safety wire, and a little below this there is another hole, at 90° to the first, to accommodate the copper shear wire. The slot, which is cut lengthwise out of the lower half of the plunger, is about 0.078 inch wide at the bottom, sufficient to take the firing pin, and opens out to about 0.172 inch at its inner end, sufficient to take the striker shaft.

The striker itself is a one-piece steel piston turned down to three different diameters to form the head, shaft, and firing pin. The striker spring is a short compression coil spring of the same diameter as the striker head.

b. Operation. When sufficient force is applied to the mine body to depress the igniter pressure head, it will sever the copper shear wire and depress the striker release plunger. The enlarged portion of the slot in the plunger is moved down and allows the striker shaft to drive through the opening. The striker pin hits the percussion cap and thus detonates the initiator, primer charge, and so the main charge.

c. To neutralize. Search for and neutralize any handling devices. Remove the end cap. Carefully slide out charge until igniter becomes visible. Insert nail across the safety wire hole. Repeat for all igniters in the mine.

5. HEMISPHERICAL ANTIBOAT MINE—TYPE 98

a. Description. This mine, which has been designed by the Japanese for beach defense against landing craft, is also used on land as an antitank mine. It is of a hemispherical appearance with two protruding hornlike electrochemical igniters.

The body is of mild steel and has welded to it two carrying handles, and two internally-tapped sockets for the two igniters; centrally on top is the plunger contact assembly socket. The base plate is welded 0.81 inch above the rim and has a filling hole closed by a right-hand threaded plug. A horizontal plate divides the inside of the body into two compartments. The top compartment contains the plunger contact assembly, the two igniters, and the connecting wiring. The lower compartment contains the main explosive charge.

b. Characteristics.

Diameter at base	20.50 inches.
Height	10.62 inches.
Thickness of body	0.18 inch.
Weight of mine (less initiator).	106.50 pounds.
Weight of explosive	46.50 pounds.
Type of explosive (main charge booster)	
Trinitroanisol (T. N. A.), Picric Acid.	
Dimensions of Igniter Sockets:	
Diameter across threads.	1.69 inches.
Depth to inner shoulder.	1.13 inches.
Diameter across inner shoulder.	1.50 inches.
Dimensions of plunger assembly socket:	
Diameter across threads.	5.06 inches.
Depth to inner shoulder.	1.12 inches.
Diameter across inner shoulder.	4.12 inches.

c. Plunger contact assembly. This consists of a cylindrical body screwed to the underside of the cover plate which is screwed into the socket, and locked by a ring. The spring loaded striker is assembled with the cover plate. In the unarmed position the plunger is held upwards through the cover plate, against a spring, by a safety fork. The plunger can be retracted from the armed to the unarmed position by means of a retracting pin.

When the safety fork is withdrawn the plunger, under the influence of its spring, comes into contact with the blade on the terminals. In the base of the assembly is an electric detonator fitted into a picric acid booster.

The detonator is wired in series with the terminals and the igniters so that the activation of either cell will close the circuit.

d. To arm. The plunger contact assembly is removed, the picric booster, detonator, and wiring coupled to the terminals, and the assembly replaced. The igniters (horns) are inserted with the plunger in the unarmed position. After the mine is laid the safety fork is removed.

e. To neutralize. Screw the retracting pin into the head of the plunger, pull upwards, and insert the safety fork in the grooves on the plunger.

6. TYPE 98 ANTIBOAT MINE IGNITER

a. Description. This igniter consists of a horn of lead alloy casting, the base of which has a turned thread for screwing into the socket. The external surface of the horn is corrugated at approximately ½-inch intervals.

A glass phial is held in position by a coiled spring and contains a chemical solution. Held in the lower shoulders of the socket is an electric cell consisting of a zinc cathode (negative) and a carbon anode (positive). The cell is capable of a maximum current of 4 amps at 1.8 volts and has an internal resistance of 0.397 ohms.

b. Operation. When the lead alloy horn is distorted or crushed, the glass phial inside is broken, and the solution passes into the cell and thereby sets up an E. M. F. The current thus produced passes to the detonator, causing the mine to explode.

c. Plunger contact assembly. Similar to those of the Hemispherical Antiboat Mine, Type 98, but set together in the mechanism plate.

d. To arm. Same procedure as for the Hemispherical Antiboat Mine, Type 98.

e. To neutralize. Unscrew keep-ring and remove mechanism plate and firing mechanism. Disconnect all electric leads, remove the primer, detonator, and electric cell, and replace the mechanism plate.

b. Characteristics.

	Large type	*Small type*
Diameter	10.5 inches	8.5 inches.
Height	3.5 inches	3.5 inches.
Weight of filling	6.5 pounds (approx.)	4.5 pounds (approx.)
Types of filling	(1) Amatol 50/50.	
	(2) Amonium nitrate and dinitronaphthalene 90/90.	
	(3) Amonium perclorate, ferro silicon, sawdust, and crude oil; 75, 16, 6, and 3 percent, respectively.	

7. SINGLE-HORN ANTIBOAT MINE (TEAKETTLE MINE)

a. Description. This mine differs from the Antiboat Mine, Type 98, in shape and in having only one horn.

The case is of steel and is in the shape of a truncated cone, and has welded to it two carrying handles and a base plate. The latter has a filling hole with a screw-on cover in the center. A horizontal plate welded to the inside of the case divides the inside into two compartments. The top compartment contains the firing mechanism and the lower part the main explosive charge.

The top aperture of the mine is closed by a mechanism plate which holds the firing mechanism and is retained by a keep-ring.

b. Characteristics.

Diameter at base: 14.25 inches.
Diameter at top: 7.00 inches.
Height: 16.14 inches.
Weight of mine: 65 to 70 pounds.
Weight of explosive: 22 pounds.
Explosive (main charge): 60 percent Trinitroanisol.
40 percent Dipicrylamine.
(Primer): Picric acid.

8. TYPE 3A LAND MINE OR CERAMIC MINE

a. Description. This mine consists of an earth terra cotta case, the exterior of which has a dull glazed finish while the inner surface is highly glazed. Within the case is a light rubber bag containing the explosive filler. Inserted and sealed in the center of the mine case top is a threaded rubber igniter seat. The mine is manufactured in two sizes.

9. TYPE 3, LAND MINE IGNITER

a. Description. This igniter is a combination pull and pressure igniter. It consists of a bakelite body of two parts, the lower of which is threaded to fit the igniter pocket of the mine, and holds a metal striker, percussion cap, and detonator tube.

The upper part houses a bakelite plunger body fitting over a spring. This plunger body in turn holds a percussion hammer held in position against the pressure of a small spring by a light metal release fork. A safety pin, passing through the bakelite head, prevents downward movement of the plunger body in the unarmed position.

b. Action. When armed (safety pin removed) pressure of about 4.5 pounds compresses the main plunger spring and the plunger group moves downwards into the head of the striker, thus firing the mine.

As a secondary method of firing, a trip wire fixed to the release fork is employed. A direct pull of about 22 pounds causes the removal of the fork. The small spring of the percussion hammer forces the latter downward into the head of the striker, thus firing the mine.

c. To neutralize. Insert safety pin or small nail in safety pin hole; if trip wire is present, it should be cut before unscrewing the igniter from the mine body.

10. TYPE 3B, LAND MINE

a. Description. This mine consists of a factory-made wooden box whose sides are box jointed and nailed, and the lid is fastened with 1-inch screws. A rubber igniter socket is attached to a hole in the top into which is set the combination pull pressure Type 3, Land Mine Igniter.

The explosive charge is contained inside the box in a light rubber bag.

b. Characteristics.

Length	7.125 inches.
Width	7.125 inches.
Height	4.875 inches.
Weight	6.250 pounds.
Weight of explosive	4.50 pounds.
Type of explosive	Type 88.
Ammonium perchlorate	66 percent.
Silicon carbide	16 percent.
Wood pulp	12 percent.
Oil	6 percent.

11. TYPE 4, LAND MINE

a. Description. From documentary evidence this mine is known to exist, but few details are known.

It is said that this mine when buried in the ground can be used as a time- or remote-control mine. It cannot be detected by a mine detector because the charge is contained in a wooden box and the igniter is made of bakelite.

b. Characteristics.

Igniter	Instantaneous and delayed pressure.
Weight of charge	64 pounds.
Size	12.6-inch cube.
Weight fully equipped	83 pounds.

12. SHOULDER PACK ANTITANK MINE OR SATCHEL MINE

a. Description. This mine is a wooden box about 11 inches square and weighs between 15 and 20 pounds. It is equipped with rope shoulder straps. The mine has a pull cord of copper wire about 36 inches long with a wooden grip attached. The pull cord is attached to the safety pin of the igniter in the top of the mine.

b. Function. A soldier straps the mine on his back and conceals himself near the path of an approaching tank. When the tank arrives at a suitable distance the soldier dashes forward and throws himself between the tracks, and pulls the cord. The mine explodes in 1 to 3 seconds.

13. "LUNGE" ANTITANK MINE

a. Description. The case of this mine is of unpainted steel and is conical shaped. Three legs attached to the bottom surface give a stand-off of 6 inches. At the apex is either a standard grenade-detonator, or a primer cap, safety fuse, and detonator. Screwed to the apex is a metal tube containing a long, wooden pole with a pointed striker at the lower end. The pole and striker are held away from the detonator by a safety pin and a copper shear wire. The liner of the cone is made of aluminum or steel.

b. Characteristics.

Weight of mine body	11.8 pounds.
Weight of charge	6.40 pounds.
Length of mine body	11 inches.
Diameter at base	8 inches.
Length of handle	76 inches.
Internal height of shaped charge cone.	4.5 inches.
Bottom diameter of cone	3.7 inches.
Apex angle	40°.

c. Operation. After removing the safety pin, the attacker lunges forward toward target, with sufficient force to shear the shear wire and drive the striker into the cap.

d. Capabilities. It is reported that this mine is capable of penetrating 6 inches of armor plate with head on contact, while with contact at 60° angle, 4 inches of plate can be pierced.

14. CONCRETE MINE

a. Description. This mine consists of a 19- by 9- by 8-inch concrete block inclosing a quart size bottle filled with black powder. An iron handle is fixed on one side for carrying purposes. The mine weighs 40 pounds and is fired electrically.

15. QUILT MINE

a. Description. This improvised mine is made simply by placing TNT in a canvass bag about the size of a seat cushion. The igniter assembly is made by putting together a Type 1 fuze igniter, a Type 1 fuze, and a Type 97 detonating cap.

b. Employment. The mine is used to destroy tanks at close range. Although it is designed to be hand-thrown on top of tanks, if the time fuze is set to go off in 1 or 2 seconds, it will still be effective should it fall under the tank. For use against heavy or medium tanks, 7 to 10 kilograms of powder is used; for use against light amphibious tanks, 5 kilograms of powder is sufficient.

16. FOUR-KILOGRAM IMPROVISED-SHAPED CHARGE MINE

a. Description. This mine consists of a wooden box with inside dimensions of 8.27 by 8.27 by 3.15 inches, filled with 4 kilograms of Type 97 picric acid blocks forming a cone to give the shaped-charge effect.

b. Employment. The mine is used for destroying tracks and penetrating armor of parked or slow-moving tanks. When used as a land mine, it is placed directly on top of a Model 93 mine to increase its effectiveness. It is also used as an electrical remote-control mine.

c. Effectiveness. The blast will penetrate 2.36 inches of armor, and is effective against all parts of light and amphibious tanks, the underside, rear and upper body of medium tanks, and the tracks of heavy tanks.

17. SIX-KILOGRAM IMPROVISED-SHAPED CHARGE MINE

a. Description. This mine is constructed in the same manner as the 4-kilogram charge, except for the use of 6 kilograms of *karitto* explosive in place of picric acid, and the inside dimensions are 10 by 10 by 6.12 inches.

b. Employment and effectiveness. Same as for the 4-kilogram charge.

18. EIGHT-KILOGRAM IMPROVISED-SHAPED CHARGE MINE

a. Description. This mine is constructed in the same manner as the 4-kilogram charge, except for the use of 8 kilograms of *karitto* explosive in place of picric acid, and the inside dimensions are 11.02 by 11.02 by 6.15 inches.

b. Employment. The mine is generally fired by electrical remote control, and is always laid with the base of the cone facing up.

c. Effectiveness. The blast will penetrate 2.75 inches of armor.

19. TYPE 3 CONICAL HAND MINE

a. Description. This mine consists of a bowl-shaped wooden base 2.75 inches in diameter, connected by a truncated cone, filled with explosive, to a "Universal" type igniter assembly. The interior of the cone contains the explosive. A tail 10 inches long of hemp-palm fibers or grass is attached to the igniter at the upper end of the mine to afford greater accuracy in throwing, and to cause the mine to strike base first.

The explosive consists of TNT, cyclonite, and tetryl. It is shaped like a truncated cone and weighs 17.6 ounces. In the center of the cone is a hollow portion lined with a funnel-shaped sheet of aluminum.

b. Employment. The Japanese claim that this mine, when thrown against the side of a tank, will penetrate 2.75 inches of armor.

c. Operation. The "Universal" type igniter will function regardless of the angle at which the mine strikes the tank. When it hits with the cone base first, the firing pin, due to inertia, travels forward against the action of the firing pin spring and strikes the percussion cap, which in turn sets off the explosive charge.

20. COCONUT LAND MINE

a. Description. This mine is a field expedient and consists of two fundamental parts, the shell of a coconut and a Type 91 hand grenade.

The coconut is hollowed out and stuffed with plain black powder and the grenade is fitted in so that the top of the grenade is flush with the top of the coconut and the cap of the grenade projecting beyond.

The whole is bound with chicken wire, which serves to hold the grenade in place and also provides a carrying handle.

b. Characteristics.

Weight of mine	6 to 7 pounds.
Type of explosive	Black powder.
Weight of explosive	24 to 34 ounces.

c. Effectiveness. Antipersonnel: Much fragmentation within an estimated radius of 10 to 20 yards. Antivehicular: Less effective than the Type 93 or 99 mines, but probably capable of damaging small vehicles.

21. EXPERIMENTAL HAND-THROWN MINE

a. Description. This mine consists of the main body bursting charge, and igniter. The main body is spherical in shape and constructed of aluminum. It is fitted with a carrying strap, igniter cavity, and protecting cap. The explosive charge consists of MK2 *tanoyaku*, which is a mixture of TNT, cyclonite, and tetryl. The igniter is a "Universal," instantaneous type and consists of the body, striker, hammer, detonator chamber, spring detonator, and safety pin.

b. Characteristics.

Diameter	4.7 inches.
Height plus and protective cap	5.4 inches.
Weight	3.5 pounds.
Weight of filling	3.0 pounds.

22. MK "1" LAND MINE

a. Description. There is evidence that the Japanese antipersonnel or "bouncing baby" mine is in existence.

It consists of a projectile, a propellant container, propellant charge, and firing devices.

The projectile is a captured 15-cm mortar projectile with the fuze and fins removed. It contains about 4.5 pounds of explosive. A blasting cap and pull type friction igniter are inserted into the projectile in place of the fuze.

The propellant container consists of a cylinder resembling an artillery shell case. The propellant charge consists of 120 grams of black powder in a cotton bag.

The projectile fits snugly into the propellant container, and to the pull type igniter in the projectile is attached a light chain about 5 feet long, the other end of which is attached to the propellant container.

When the propellant charge is ignited, the projectile is thrown into the air the length of the chain. The bursting charge in the projectile will be ignited by the tension chain.

b. Employment. The mine is used in an antipersonnel role and is usually fired by remote control. However, it can be rigged with a trip wire.

23. NAVAL DEPTH CHARGE IMPROVISED MINE

Description. This Japanese depth charge, which contains 250 pounds of explosive, is 30 inches long and 18 inches in diameter, and resembles an ashcan. A well, or tube, set in one end of the charge holds a booster, a detonating cap, and a simple striker pin. There is no safety pin or retaining spring to hold the striker immobile. This mine has been found buried with an improvised pressure plate in contact with the firing mechanism. The pressure plate consisted of a board cover, to the center of which a short wooden post was attached at right angles. The post acts as a plunger against the striker.

24. POLE CHARGE

a. Description. This charge usually consists of a Type 93 antitank mine fastened to a long bamboo pole, but cases have been reported where improvised containers filled with high explosive and equipped with a pull type igniter have been used.

b. Employment. The charge is used by infiltrating Jap troops along natural tank approaches. The user hides in available cover and waits until a tank arrives opposite his position at which time he pushes the charge under the tank tracks.

25. MAGNETIC DEMOLITION CHARGE TYPE 99

a. Description. This magnetic charge consists of eight separate sections of cast TNT, assembled to form a circular disk held together by a khaki canvas cover. Press studs are used to fasten this cover up.

Four magnets are attached to the cover at right angles to each other by a strong canvas ribbon sewn to the cover. Each magnet consists of an

aluminum box containing a permanent magnet cone of compact black friable powder which is a light mixture of sintered iron, nickel, and cobalt oxides. Two soft iron plates act as pole pieces, and respective polarity is clearly indicated by the letters N and S. The magnet is capable of lifting 6.5 pounds of iron.

The igniter recess which runs diametrically through three of the sections is filled before use by a wooden plug 3.75 inches long.

b. Characteristics of charge.

Diameter (without magnets)	4.75 inches.
Thickness	1.50 inches.
Weight with igniter	2 pounds 7 ounces.
Weight (plugged)	2 pounds 7 ounces.
Type of explosive	Cast TNT.
Weight of explosive	1 pound 10 ounces.
Dimensions of magnets	1.5 x 1.25 x 0.75 inches.
Weight of each magnet	3 ounces.

c. Igniter. This consists of three distinct portions: the striker mechanism; the percussion cap and powder delay train in the middle tube, which also carries the threaded brass locking ring for screwing the igniters into the charge; and the detonator, screwed over the middle tube.

d. Characteristics of igniter.

Diameter (at head of igniter.	0.60 inch.
Weight	4 ounces.
Delay	5 to 6 seconds.

e. Operation. When the safety pin is withdrawn a sharp hit on the igniter cap will overcome the compression spring and press the igniter cap into a position where the four steel balls can escape into the ring groove, thus releasing the striker spring and firing the percussion cap which ignites the powder delay train, and so the detonator, and main charge.

f. To neutralize. Insert the safety pin or a wire into the safety pin hole. Unscrew the locking ring and withdraw the igniter.

g. Employment and effect. With the igniter screwed into place and the safety pin withdrawn, the charge must be placed by hand in direct contact with any flat steel or iron surface of the target. The delay after hitting the igniter cap should be 5 to 6 seconds, but anything from 4 to 10 seconds has been reported.

The penetration effect against steel armor plate is 0.75 inch for a single charge and about 1.25 inches for two charges placed one on top of the other.

26. FLAME THROWER, TYPE 93 (1933)

a. Description. The fuel unit comprises two fuel tanks and a pressure cylinder. Ignition of the fuel jet is effected by flash from a blank cartridge, 10 of which are loaded in the revolving cylinder located at the nozzle of the flame gun. The firing mechanism is actuated by an operating handle which controls the fuel ejection valve.

b. Characteristics.

Maximum range	25 to 30 yards.
Duration of continuous discharge.	10 to 12 seconds.
Fuel capacity	3.25 gallons.
Total weight, charged	About 55 pounds.

27. FLAME THROWER, TYPE 100 (1940)

Very similar to Type 93 flame thrower. The fuel units of the two types are identical as are range and duration of flame. The differences are found in the flame guns as follows:

	Type 93	*Type 100*
Over-all length	47⅛ inches	35½ inches.
Weight	10 pounds	8½ pounds.
Nozzle outlet tip	Fixed	Removable.

Flame-thrower accessories include Type 99 (1939) small air compressor used to recharge the pressure cylinder of Type 93 and Type 100 flame throwers. The gasoline-engine-driven compressor is packed in a wooden carrying case 18 inches square and 13.5 inches high.

SECTION V

ANTITANK METHODS

1. INTRODUCTION

Although, the Japanese have not overlooked the usual methods of antitank warfare, their antitank units appear to be handicapped both by the limited capabilities and insufficient number of their antitank weapons.

Japanese respect for Allied mechanized operations is evident in the great emphasis placed by them on antitank defense. Normal antitank weapons have been supplemented by antitank ditches and barricades as well as by mines and other types of explosives.

To compensate for the deficiencies of both type and number of antitank weapons, the Japanese have organized and trained a variety of assault teams, who, armed with available weapons and demolition charges, attack tanks at their vulnerable points. Many of the missions of these close-combat units are more hazardous than our doctrine would advocate and the majority of such attacks result in the death of the tank hunters.

While the effectiveness of these improvised antitank tactics is limited, a fairly complete system of antimechanized defenses is obtained, when they are combined with the more common antitank operations.

2. ANTITANK GUNS

a. General. Each Japanese infantry regiment has four (or less, often six) antitank guns. These are 37-mm or 47-mm guns, and are assigned as organic weapons of the regimental antitank gun company. In some Japanese infantry divisions and brigades encountered in the Central Pacific these guns have been placed down in the battalions, and are the armament of one platoon of the battalion gun company.

Some of these units already mentioned, and other infantry units, may include one or two automatic guns, generally Type 97 (1937) 20-mm, in the machine gun company or the machine gun platoons if the latter are organic within the rifle company. In the Japanese armored division, there are two antitank guns as part of the armament of the rifle company of the mobile infantry regiment, in addition to the 18 guns of the divisional antitank battalion.

Additional antitank means are obtained from independent antitank units, both battalions and companies, which may be attached to divisions and smaller units for direct support of operations against tanks. The independent battalion consists of three companies with four, sometimes six, 37- or 47-mm AT guns each. The independent company has eight 37- or 47-mm AT guns.

The most effective AT gun in the Japanese Army is the Type 1 (1941) 47-mm weapon which appears gradually to be replacing the older 37-mm type.

Each Japanese gun will normally have 60 to 100 rounds of HE and AP ammunition at the gun position. Replenishment is by the ammunition platoon which resupplies each gun squad from the company dump, which in turn draws from the battalion dump. Supply generally follows a route from larger to smaller units with the larger unit furnishing both manpower and transportation.

In action, the firing unit is the individual gun and the gun commander chooses the most suitable target and opens fire on his own initiative. Several guns may operate as a team, and coordination may be effected among gun-team tank-hunters and supporting infantry.

If the terrain permits, the antitank gunner holds his fire until the range is really favorable to him, often waiting until a tank approaches to within 50 yards or less.

b. Siting of guns and selection of positions. In normal land operations, some guns are placed as far forward as possible, with a number of weapons held in a more rearward position as reserve guns and to give the defense as much depth as terrain and situation permit. Concealment and camouflage of positions are stressed. Alternate positions are prepared so that guns can be moved frequently. Positions are sited where they best can cover logical avenues of approach, and occasionally an infantry unit may be attached for local protection of the antitank guns. Positions are selected which can take advantage of natural obstacles,

and artificial obstacles are constructed whenever and wherever possible. Flanking fire is customary.

Antitank guns may be sited in such positions as steep ridges or rocky slopes from which they can open fire on tanks while remaining relatively inaccessible to the tanks and supporting infantry. When guns are emplaced in areas affording heavy cover it is possible that small fire tunnels will be cut in the vegetation in the same manner as is done for Japanese machine guns.

Artillery pieces of larger caliber also have been used by the Japanese to counter tank attacks. The 70-mm battalion howitzer and the 75-mm regimental gun have been employed to cover road blocks, antitank obstacles, and mine fields. Antiaircraft guns frequently are sited so that they can engage tanks in addition to their normal missions, but carefully coordinated plans for such combat do not appear to have been worked out in any known instance.

In a part of the campaign in Burma, the Japanese employed nearly all of their field artillery exclusively against tanks and tank-infantry attacks. In one town in Burma, the bulk of the artillery was sited to bring direct fire on tanks whose routes of approach were confined to the city streets.

Antitank artillery may work in close cooperation with suicide tank hunters. In one instance in the Philippines, the Japanese scored a direct hit on the lead tank of three Allied tanks with a 47-mm antitank gun, forcing all of them to halt. Immediately 15 to 20 Japanese armed with satchel charges and incendiary grenades swarmed around the tanks. The two squads of supporting Allied infantry were pinned down by the fire from a Japanese machine gun during the attack in which the Japanese succeeded in setting fire to two tanks and blowing a tread off the third.

c. Large-scale antitank defense. To combat tanks on a large scale, the Japanese have devised what they call an "elastic defense" (dansei bogyo) which operates as follows:

At the approach of a tank attack in force, only some 20 percent of available heavy infantry weapons are used from front-line positions. With the exception of one squad per platoon, all units fall back 800 to 1,500 yards. The squads remaining on the front line scatter, lay a smoke screen, and attack the tanks with incendiary grenades as they come through the smoke.

While the tanks are meeting this resistance, they come under the fire of all the main Japanese antitank weapons, sited 500 to 800 yards to the rear. Meanwhile, the divisional artillery moves forward to positions which permit direct firing on the tanks, thus supporting the infantry either in defense or in counterattack.

Japanese sources state that once a tank attack is stopped by this "elastic defense" method, the hostile forces are to be pinched off. The Japanese infantry, although scattered, can still offer successful opposition to hostile infantry which might attempt to exploit the advance of tanks. However, this large-scale antitank defense seems not to have been used extensively in the field.

An official Japanese Army source states, "Tanks must be defeated at all costs." It is apparent that this attitude is reflected in the operations of all Japanese units in the field. Since antitank guns are not available in the requisite numbers, the employment of suicide tactics against tanks must increase if the Japanese are to have any chance of success in the defense against our mechanized operations. These suicide tactics may include those types of attack already familiar, together with more original methods.

3. TANK HUNTERS

The Japanese have been unable to cope successfully with Allied armor by using the conventional methods of antitank defense. As a result, they have put an unusual stress on close-quarter attacks against tanks made by individuals or small groups known as "tank hunters." These last resort measures, often suicidal in nature, have received increased emphasis in recent operations.

These antitank assault teams are organized and trained to attack tanks in battle at their vulnerable points, or to infiltrate as small raiding parties into tank parks, and destroy the vehicles there. Each infantry platoon may have one of these units armed with demolition equipment, incendiaries, armor-piercing mines, mines tied to grenades, clusters of grenades, Molotov cocktails, and pole mines. Frequently a group will operate with a combination of these weapons.

Where tanks move slowly because of terrain difficulties they can be more easily approached and attacked by these antitank assault units, particularly if supporting infantry fails to keep up with the advancing tanks.

Because it is difficult to assault a tank moving more than 10 miles an hour, the tank hunter teams are taught to select ambush points such as defiles, narrow roads, fords, or rough trails through dense vegetation. They are alert to at-

tack tanks that have outdistanced their infantry support or which have been immobilized or forced to slow down by antitank obstacles, terrain, or damage. They favor attacks at dawn, at dusk, or in rainy weather, but will attack at any opportune time.

The assault teams often concentrate on command tanks but they may attack several tanks simultaneously. Assault teams are taught to direct their attacks against the following points:

a. Treads.

b. Rear of tank, including air vents.

c. Front of tank, particularly observation ports and periscope.

d. Turret, particularly the turret ring.

e. Tank weapons and gun mantlet.

In assaulting a tank, each member of the team has a specific mission. One man tries to place an antitank mine or demolition charge under the tank tread, either by tossing it or by putting it there by hand or on the end of a pole. A second member of the team may throw a Molotov cocktail or some other incendiary to force the crew to abandon the tank. If these efforts fail, the assault team may try to mount the tank and force the ports with small-arms fire and grenades. When attacking a light tank, the Japanese may try to halt it by jamming a pole into the treads, near the driving wheels, and then maul it with picks and crowbars. Smoke grenades or candles may be used in an effort to blind the tank crew, to force them out of the tank, or to hide the tank from its infantry support. The Japanese may adopt deceptive measures to approach the tank without arousing suspicion. In one instance a Japanese dressed in an American uniform climbed onto a tank and dropped a grenade inside it. In another instance 8 to 10 Japanese holding a conversation in English strolled casually into a tank park talking about racing at the Santa Anita race track. The Japanese fled as soon as their deception was discovered, leaving behind several shell cases filled with explosives with detonators attached.

Japanese sources indicate another method in which a group of three tank hunters (designated "group leader, No. 1, and No. 2") might operate. No. 1 hurls a Molotov cocktail at a tank and if the weapon strikes the tank he yells "a hit." In that case the others do not attack the target. If the throw is unsuccessful, No. 1 will call out "miss" whereupon the group leader, using a pole charge, attempts to damage the tracks and thus stop the tank. No. 2, before the explosion of the pole mine, seeks to destroy or damage the tank's guns by placing an adhesive mine or some similar explosive under them. It is considered preferable for No. 2 to attack the tank simultaneously with the leader if No. 2 is armed with an armor-piercing mine; otherwise, he awaits the result of the leader's effort. A two-man group, according to Japanese sources, usually operates in the following manner. The leader carries a pole mine and No. 1 carries a Molotov cocktail. The tank is attacked simultaneously from both sides as it enters upon favorable terrain from the attackers' viewpoint.

According to a prisoner of war, an independent antitank company was organized on Okinawa from line of communication troops. The company had a strength of about 100 men and was considered to be a suicide unit. The troops were armed only with satchel charges and were expected to infiltrate into Allied lines or to remain in covered positions, waiting to make an unexpected attack. Certain men in each platoon of every rifle company were also designated to carry out this same duty.

According to instructions issued by the Japanese for attacking tanks with explosives, close-quarter combat units used against tanks are composed mainly of infantry and engineer troops. These combat unit teams are divided into several land mine squads (firing squads), destruction squads, a reserve squad and, where necessary, a covering squad. Each team is assigned the task of destroying one tank.

The land mine squad consists of 10 men with a noncommissioned officer as a leader. The first duties of this squad are to plant mines along the possible avenues of tank approach. One man in each squad is designated as the "igniter," presumably his responsibility is to explode controlled mines at the proper moment. After mines are planted, the land mine squad's next duty is to act as a firing squad and to create opportunities for the destruction squad by machine gun and rifle fire designed to separate the hostile covering infantry from the tanks they are supporting. To accomplish this mission the squad is equipped with two or three light machine guns.

The destruction squad is composed of several men with a noncommissioned officer as leader. It attempts to destroy the hostile tank, using mines and explosives which its members throw or place against the tank.

As soon as the hostile tanks and their covering infantry approach the mined areas, each team is assigned a tank, the emplaced land mines

are detonated by the igniter, fire is opened by the land mine (firing) squad on the infantry and any exposed tank crew men, and the destruction squad, which is waiting in the vicinity, makes close-quarter attacks on the chosen tank. Smoke may be used to isolate the tank and cover the attackers.

The reserve squad acts as a reserve for the land mine and destruction squads and performs, when necessary, the duties of those squads.

The covering squad covers by fire the activities of the land mine and destruction squads and when the tank-destroying mission has been completed, this squad covers the withdrawal of the other elements of the close-quarter combat unit.

One type of tank fighters which appear to be scheduled for much greater use by the Japanese are tank-borne infantry. Three to seven of these men ride on a light tank, and four to eight are carried by a medium tank. When advancing against hostile fire, the tank-borne infantry lie flat on the tank, and may return fire if the opportunity offers. If engaged in close combat or upon reciving fire from snipers, the Japanese also fire from the tank or attempt to use hand grenades. The infantry usually dismounts on orders from the tank commander, but exercises their own initiative in this respect if close individual combat is expected or encounter made with mine fields. After dismounting, the infantry advances with the tank or precedes it to give close support. The Japanese tank then attempts to support the movement of the infantry with both endeavoring to operate as a unit. When opposing tanks are encountered, the Japanese infantry attempts to take advantage of friendly tank fire and carry out individual combat against the enemy tanks. Attacks are also made against opposing tanks that move up from the rear or flanks. Tank-borne infantry also are charged with the duty of neutralizing and destroying antitank weapons carried by the enemy infantry, of clearing mine fields, and of taking individual

Number of men	Number	Duty	Weapons and material carried	
	1	Leader	Ax, Pick.	1 each—frangible smoke grenade, type 3 mine, stick mine.
4 Men	2		Saw (sic) shovel.	Same (plus) one smoke candle, one hydrocyanic acid frangible grenade.
	3		Same as above.	Same.
	4		Same as above.	Same (plus) 1 stick mine.
5 Men	1	Leader	Saw, Pick.	One frangible smoke grenade, one type 3 mine, one stick mine.
	2		Saw, Shovel.	Same (plus) one smoke candle, one hydrocyanic acid frangible grenade.
	3		Same as above.	Same.
	4		Same as above.	Same (plus) 1 stick mine.
	5		Same as above.	Same.
6 Men	1	Leader	Ax, Pick.	One frangible smoke grenade, one type 3 mine, one stick mine.
	2		Saw, Shovel.	Same (plus) one smoke candle, one hydrocyanic acid frangible grenade.
	3		Same as above.	Same.
	4		Ax, Pick.	Same (plus) one stick mine.
	5		Shovel.	Same.
	6		Same as above.	Same.
Remarks	The tank is equipped with the following weapons: 5 frangible smoke grenades, 10 type 3 hand-thrown mines, 10 smoke candles, 5 stick land mines, 2 hydrocyanic acid frangible grenades.			

FIGURE 24.

action against enemy tanks, coordinated with the movement of their own supporting tanks. They assist in the laying of smoke screens, short-range reconnaissance, guiding, routing, observation, and command liaison. The organization of a four- to six-man tank-borne infantry assault unit and the antitank weapons to be used are shown in figure 24.

Instructions issued by a Japanese infantry division contemplate the use of the motorized company of the division reconnaissance regiment in the antitank combat. The instructions gave thorough training in individual suicide attacks against hostile tanks. Five to ten kilograms of explosive were to be used, probably by each man. Figures 25 to 33 illustrate the tactical formations to be used by the motorized company in the attack against tanks.

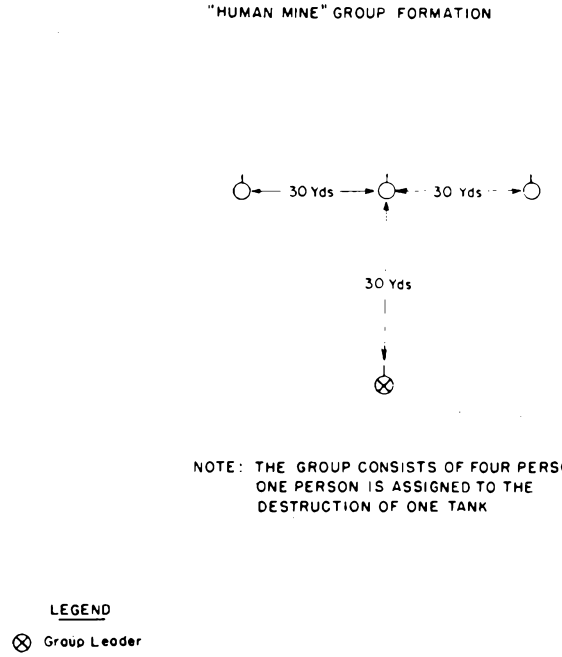


FIGURE 25.

The Japanese have made extensive use of snipers in the assault on Allied armor. The snipers are employed to break up the infantry-tank attack in the early stages by sniping tank commanders or by attempting to separate the tanks from their supporting infantry.

Instructions issued by the Japanese Army Engineer School contemplate the use of another type of assault team. In the attack, smoke is used to neutralize the tanks. The attack is preceded by the throwing of smoke candles and grenades. In addition, an artillery smoke screen is laid down.

The assault team, depending on its mission, is generally divided into three sections: neutralization, track destroying, and demolition teams, with a noncommissioned officer as leader.

The neutralization team is composed of two or three men and constitutes the leading element of

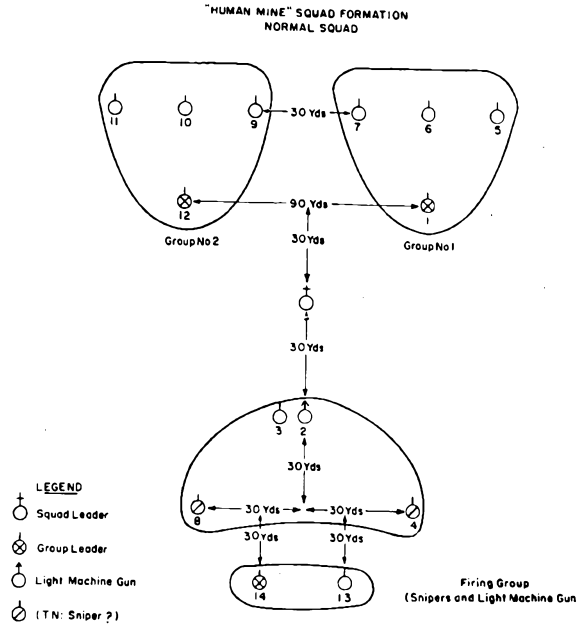


FIGURE 26.

the assault team. It makes surprise attacks on tanks and creates an opportunity for the other teams to engage in close combat.

When the tank has been neutralized, the track destroying team, also composed of two or three men, assaults the tank and attempts to destroy the tracks. Usually only one side of the tank is attacked, but depending on the situation, both tracks may be attacked.

The demolition team is generally composed of two or three men. Taking advantage of the destructive work of the track destroying teams, it attacks the armor plates of the tank and furnishes the final blow by the use of armor-piercing explosives.

The assault team will usually attack one tank at a time with particular attention paid to the lead or command tank. Several assault teams are deployed in depth in order to facilitate operations on successive tanks.

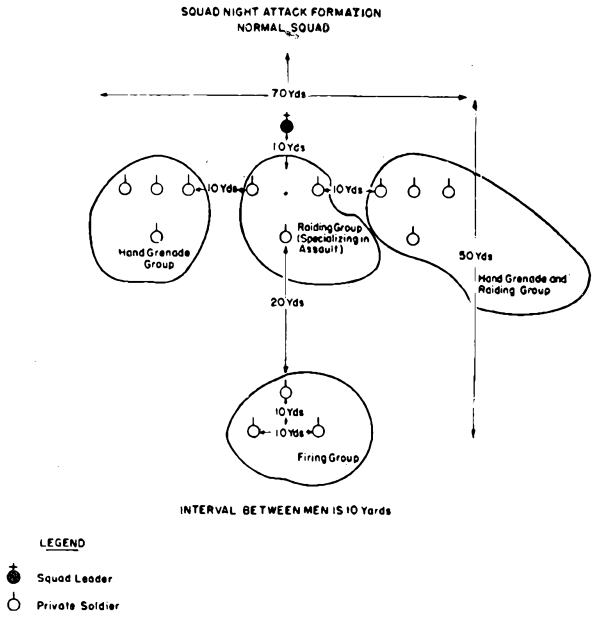


FIGURE 27.

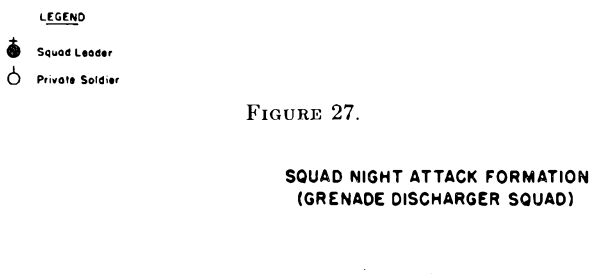


FIGURE 28.

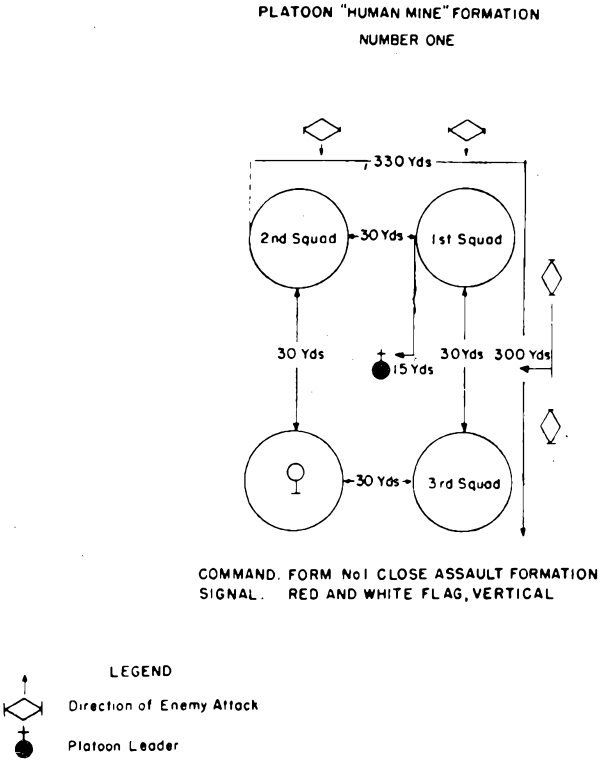


FIGURE 29.

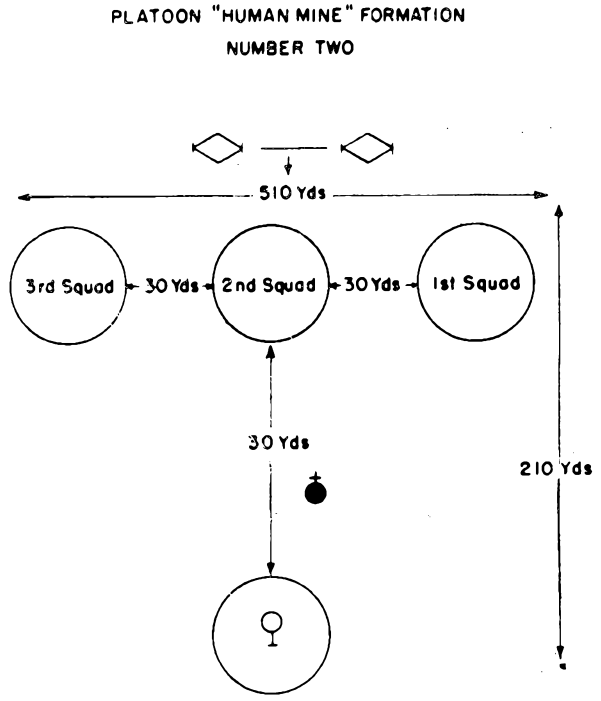
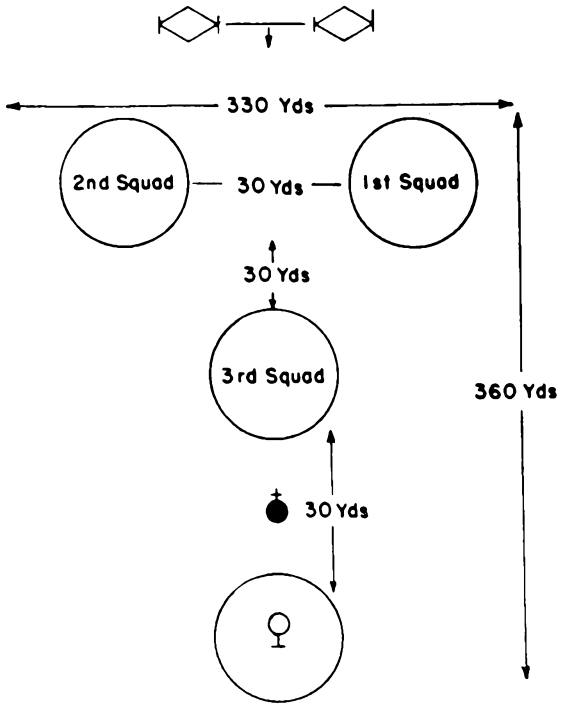


FIGURE 30.

PLATOON "HUMAN MINE" FORMATION
NUMBER THREE

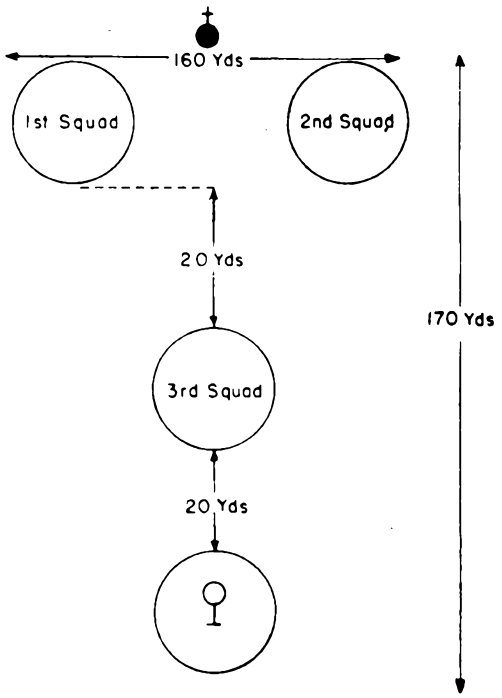


COMMAND: FORM No 3 CLOSE ASSAULT FORMATION

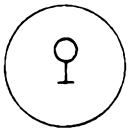
SIGNAL: RED AND WHITE, FLAG, WAVE IN A CIRCLE

FIGURE 31.

PLATOON NIGHT ATTACK FORMATION



LEGEND



Grenade Discharger Squad



Platoon Leader

FIGURE 32.

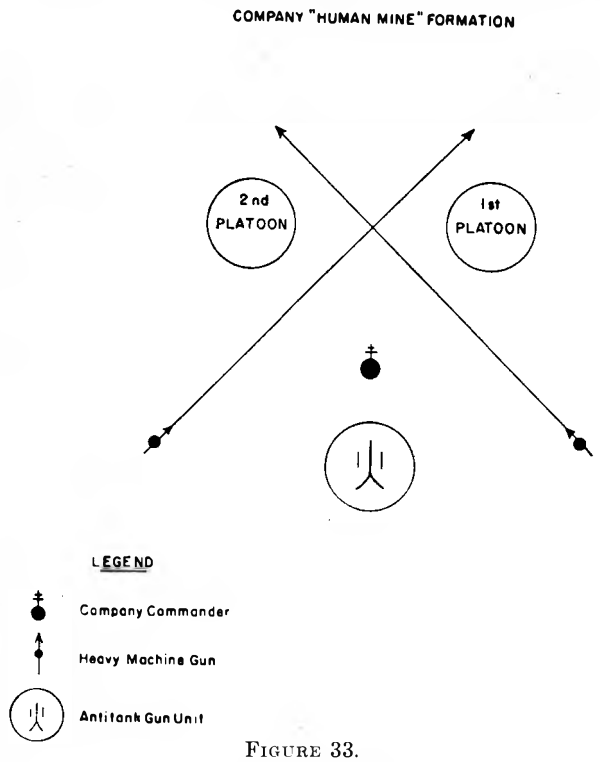


FIGURE 33.

AN EXAMPLE OF ORGANIZATION AND DISPOSITION OF AN ASSAULT TEAM

No.	Leader	1	2	3	4	5	6
Mission	Command and attack preparations	Neutralization team		Track attack team		Demolition team	
		a. Blinding smoke attack. *b.* Neutralizing the crew.		Track destroying (to completely cut off).		*a.* Piercing of armor plate. *b.* Destroying the engine. *c.* Inflicting casualties.	
Portable materials	1 Type 3 Hand Mine 2 Hand Smoke Candles	2 Hand Smoke Candles (Smoke Grenades) 1 Smoke Candle with attached cord	1 Type 3 Hand Mine 1 Hand Smoke Candle (Smoke Grenade) 1 Smoke Candle with attached cord	2 Type 93 Antitank Mines 1 Mine on Rod	(Same)	1–2 kg Cone-shaped Armor Piercing Mine (Rod attached)	1–5 kg Semispherical Armorpiercing Mine (Rod attached)
Each individual will carry: 1 Hand Grenade, 1 Type 99 Mine							

FIGURE 34.

If supporting Japanese infantry is attached to the assault team, the infantry attempts to isolate the tank under attack from its infantry support and then directs fire at the tank's observation ports.

In an attack against flame-throwing tanks, effort is made to take advantage of the flame thrower's dead spaces and of lulls in its operation.

Flame-throwing tanks are neutralized with smoke candles fired from an improvised projector which is sited about 60 yards from the approaching tank. The organization and disposition of an assault team is shown in figure 34.

4. INDIVIDUAL SUICIDE ATTACKS

Japanese antitank methods include considerable individual action by Japanese soldiers in suicidal missions. In one instance, a Japanese soldier dug a foxhole among the weeds just off the shoulder of the road, which was just barely two lanes wide. A Type 93, tape measure mine was tied to the end of a bamboo pole which was 5 feet long. Lying in the protection of the foxhole which was well camouflaged, the mission was to wait until a tank came up the road at which time the mine would be pushed under the tank tread.

Another one-man attack method uses the Lunge Mine in which the armor-piercing charge is placed on the end of a pole. The attacker waits in hiding and lunges at a tank with his mine when one approaches. The mine explodes on contact.

A demolition charge manually attached to an Allied tank and hand detonated is another suicide weapon employed by the Japanese. Filled with 10½ pounds of picric acid, a wooden box about 8 to 10 inches square is mounted on a wooden base and is slung over the back of the soldier. The outside perimeter of the box is fringed with hooks which are used by the tank raider for hanging the demolition charge on the turret or any other parts of the Allied tank. A Type 91 or 97 hand grenade is used as a detonator. Once the box is attached to the tank, the fuze head of the grenade is tapped sharply by the tank hunter, an explosion resulting immediately.

Another weapon is the shoulder pack mine. With the mine strapped to his back, the Japanese conceals himself as close as possible to the path of the approaching tank. When the tank arrives at a point about 15 feet from the concealed soldier, he dashes out at the tank and throws himself under it, between the tracks, and pulls a detonating cord when the tank is over him. The

mine explodes in 1 to 3 seconds after the cord is pulled.

In recent operations in Burma reliance was placed on one-man suicide tank hunting tactics. Types of suicide activities varied and included soldiers sitting in foxholes with aerial bombs between their knees and prepared to detonate them by hand when an Allied tank passed over, attempts to place picric acid charges with pull fuzes on the tank by hand, throwing hand grenades and Molotov cocktails from hiding places in culverts. Other Japanese were reported to have thrown lighted branches which had been dipped in oil in attempts to set the tank on fire. One Japanese officer charged a tank armed only with his sword and succeeded in inflicting considerable personal injuries on the tank crew.

A report from Okinawa indicates that Japanese soldiers hidden in camouflaged holes have been armed with explosive charges strapped to their backs. When an Allied tank passes over the hole the Japanese detonates the charge using a pull igniter.

5. ANTITANK OBSTACLES

a. General. Given time, the Japanese always construct antitank obstacles around a defensive position. These generally take the form of ditches and barricades and are usually covered by antitank or small-arms fire. As is the case with other armies, the purpose of the artificial and natural obstacles used by the Japanese is to impede or stop the movement of armored vehicles and bring them under the fire of covering weapons or else to channelize the movement of tanks into areas where they can be attacked to advantage by some antitank means.

Obstacles are often sited so that they supplement natural antitank barriers. The outstanding characteristic of Japanese obstacles is that they are constructed largely of materials available locally or are improvisations from weapons or material intended for other purposes. An example of this improvisation occurred in Burma recently in the contemplated use of an antitank obstacle called a "fire belt." The method consisted of dumping oil on the road in front of advancing tanks, and then igniting the oil as the tanks entered the oiled area.

It is common practice for the Japanese to use several different types of antitank obstacles in a single defensive position, but the general form and nature of the obstacles remains constant. The materials used for their construction, as well as their size and method of construction, vary with the nature of the terrain and with the equipment of the opposing forces. Any of the antitank obstacles can be and are used either as road blocks or as continuous barriers. They may also be used in inland defense or as beach obstacles.

b. Ditches. The antitank ditch, one of the most common Japanese antitank obstacles, has been used on nearly all of the defended Pacific Islands, both as a beach obstacle and as an inland tank barrier.

Ditches also have been used in Burma where one ditch was reported to be over 1 mile long. In some places ditches are divided into cells or sections by earth walls a foot or two wide, left at intervals along the ditches, ditches thus far encountered in the Pacific theater vary from 10 to 20 feet in width and from 5 to 10 feet in depth. The most common cross sections are triangular and trapezoidal. The spoil is usually piled on the Japanese side of the ditch, thereby increasing its effective depth. The ditch may be camouflaged with palm fronds or other material, and sometimes the spoil is removed or scattered to facilitate concealment. On occasion, tank ditches may be covered completely so as to be tank traps large enough to engulf an entire tank.

c. Log barricades. The log barricade is a commonly used antitank obstacle. It has a number of variations. One of the simplest types, consisting of horizontal logs attached to trees 3 to 4 feet above the ground, is used in woods or where heavy timber is available. A contrasting type consists of a solid wall of logs placed horizontally between vertical posts.

A more common variation consists of two or three rows of horizontal logs attached to braced vertical posts. This barricade is about 5 feet high and consists of native timber logs at least 1 foot in diameter. This type of barricade is also used as a beach and as an underwater obstacle.

d. Posts. Post obstacles consist of a field, or series of timber or concrete posts. Timber posts are most common, and the Japanese state that they should be oak and at least 12 inches in diameter. If palm logs are used they must be braced. Palm-log posts have been strengthened by fastening three posts together in a clover leaf. The posts, from 5 to 10 feet long, are placed with about an average of two-thirds of their length in the ground. Standard Japanese patterns call for one, two, or three rows of posts. Instructions for the construction and use of concrete-post obstacles have been issued by the Japanese, though there are no reports that such obstacles have been

encountered in the field. Plans prescribe a post 6 to 7 feet long and about 1 foot square, with both vertical and horizontal steel reinforcing. Such posts are emplaced with about one-third of their length embedded in concrete bases in one, two, or three rows, with 5 to 7 feet between rows, and with the posts in each row 6 to 10 feet apart. Post obstacles are prescribed for use as both land and underwater obstacles. Both timber and concrete post obstacles may be made more effective by inclining the posts toward the enemy.

e. Abatis. The abatis is a simple but less effective obstacle. It consists of large trees felled with the tops toward the enemy so that the branches become intermingled. This obstacle finds its widest use by the Japanese as a road block. Trees along a narrow road can be prepared for demolition and then blown at the last minute. They have been used in this manner in Burma. In a few cases mines or booby traps have been placed in the abatis.

f. Walls. The Japanese have constructed very few solid concrete walls. Wall obstacles have been constructed of native rock held in place with cement or mortar. The walls are at least 4 feet high and are generally back-filled. They are designed to be high enough so that a tank cannot climb over, and strong enough to resist being overturned or destroyed by gunfire. A wall type obstacle found on some Pacific Islands was constructed of palm tree stumps. The excavated stumps were piled up with roots pointed towards the avenues of approach of the Allied tanks.

g. Antitank obstacles in cities. In the defense of Manila, the Japanese used as strongpoints all types of earthquakeproof structures such as private homes, churches, schools, and government buildings, and covered approaches to these buildings with antitank weapons which were sited in the buildings.

Approaches to these strongpoints were also blocked by obstacles and mines and covered by antitank weapons which were normally protected by heavily sandbagged pillboxes. Full advantage was taken of existing stone walls around houses and buildings to add to the strength and completeness of the organization of delaying obstacles.

In one area, a drainage ditch 15 feet wide and 10 feet deep was utilized as a natural tank trap and this approach was further protected by a concrete wall 15 feet high and 2 feet thick.

Streets were blocked by a variety of obstacles. Intersections were barricaded and defended with antitank weapons sited to cover streets approaching the intersections. Steel posts, imbedded in concrete, were used for this purpose and in one instance, railroad car axles were set upright in the pavement. In other instances, heavy factory machinery was moved into the city streets and there firmly imbedded. One kind of antitank obstacle was constructed of fuel drums set upright and arranged in two or more columns. The space between these columns was then filled with earth, as were the drums themselves.

Conventional antitank ditches were used in Manila and existing shell craters were improved upon and then used for antitank purposes. Figures 35 to 40 illustrate antitank obstacles found in the city of Manila.

6. MINE FIELDS

a. General. The Japanese did not start to use mines effectively until after the Saipan campaign. Prior to that time, mine fields were generally poorly sited and camouflaged, and often appeared to have been laid merely to get them into the ground. In recent operations mine fields have been much more soundly employed. The Japanese have prescribed standard patterns and principles for the use of mines but in actual practice they seldom conform to their doctrine. In some instances mines are laid between or near other antitank obstacles, in areas that are difficult to cover with fire power, or in terrain, the nature of which makes difficult the construction of other obstacles.

Where Allied units are known to have armor, the laying of mines is considered to be the essential duty of the Japanese divisional engineer regiment. In one particular operation involving a division it is known that 12,000 mines were laid. Based on prior use by the Japanese, mines are most likely to be encountered in the following places.

b. Beaches. Mines are used on beaches in one or more of the following areas: that section of the beach lying between high-tide and low-tide levels; and in that area from 25 to 30 yards inland. Usually the mines are laid in rows, with rows from a few feet to 10 yards apart. Individual mines in a particular row may be spaced from 10 to 30 feet apart. The use of mines on beaches has not been important in recent operations.

c. Open fields. Mines are frequently found in large open fields or in the area that may be termed the approaches to the field. Their employment in most cases is the same as that inland from the

beach. They are placed in rows with no standard distance between rows.

d. Roads. Ordinarily, junctions of roads and approaches to bridges are mined. Special attention usually is given to mining the shoulders of the road in the vicinity of such areas.

e. Cities. In the battle for Manila, the Japanese made an extensive use of mines. Controlled and uncontrolled mine fields as well as combinations of both types were found on roads, street intersections, bridges, in the vicinity of barricades, and in open lots. Most mine fields were covered by fire. No regular pattern of mine-field construction was noted, and mine fields were liable to be encountered anywhere. In general, they were poorly camouflaged with many mines being only partially buried and quite easy to locate.

All types of mines and explosives were used and indiscriminately mixed. Naval beach mines were most common, and were followed in number by aerial bombs converted to land mine use. These two types were frequently found together, in the proportion of two beach mines to one aerial bomb. In addition, artillery shells, mortar shells, and depth charges often were used as mines.

As a rule, depth charges were prepared for electrical detonation, with control wires leading to concealed positions. Depth charges were also placed on end 6 to 8 inches below ground level. On the top of the depth charge was a ceramic or yardstick mine flush with the ground. In fields and on grassy road shoulders, depth charges with ceramic mine detonators and trip wires, either single or interconnected, were encountered. Fifty-five gallon drums were found to contain depth charges with ceramic mines attached. This combination was most often used in road blocks.

Ceramic mines were frequently trip-wired, and yardstick mines were scattered on road surfaces

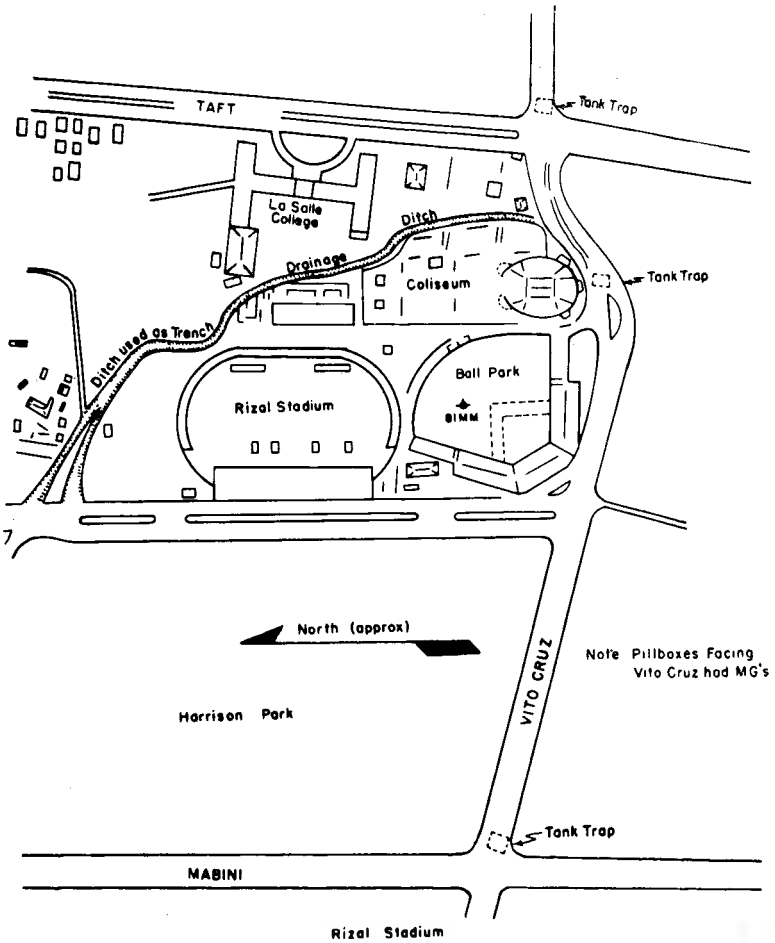


FIGURE 35.

or placed above buried 100-pound aerial bombs. In other instances, aerial bombs with a nose impact fuze set close to the surface of the ground were found; 50 pounds pressure was sufficient to cause their detonation.

f. Pillboxes. Because of the characteristics of pillboxes, their field of fire is necessarily limited. Therefore, land mines are sometimes used to cover the approaches bordering the field of fire from a pillbox.

g. Approaches to obstacles. Approaches to antitank barricades and detours around them are likely to be mined and covered with fire from neighboring positions, but this is not a consistent practice.

h. Methods of laying. The mine is either laid on top of the ground or buried so that the fuze is at ground level or ½ inch below. The Type 93 mine, which is normally used, does not always damage the track of a medium tank sufficiently to disable it. The Japanese, therefore, generally lay one mine on top of another or place booster charges under a mine.

In most fighting areas there has been a total lack of uniformity as to pattern, even in mine fields laid by troops in the same command. In fact, many fields had no pattern, and apparently had been placed by troops ignorant of the tactics of mine fields.

i. Dummy mine fields. The Japanese have made an occasional use of dummy mine fields. Some have been constructed of branches or bricks and then covered with earth. Aerial bombs have been placed uncovered and unfused along roadways. These dummy mine fields were prepared to be obvious and designed to slow down tank attacks and minesweeping efforts. Another use of these dummy mine fields is to force tanks off the road and over foxholes occupied by suicide parties.

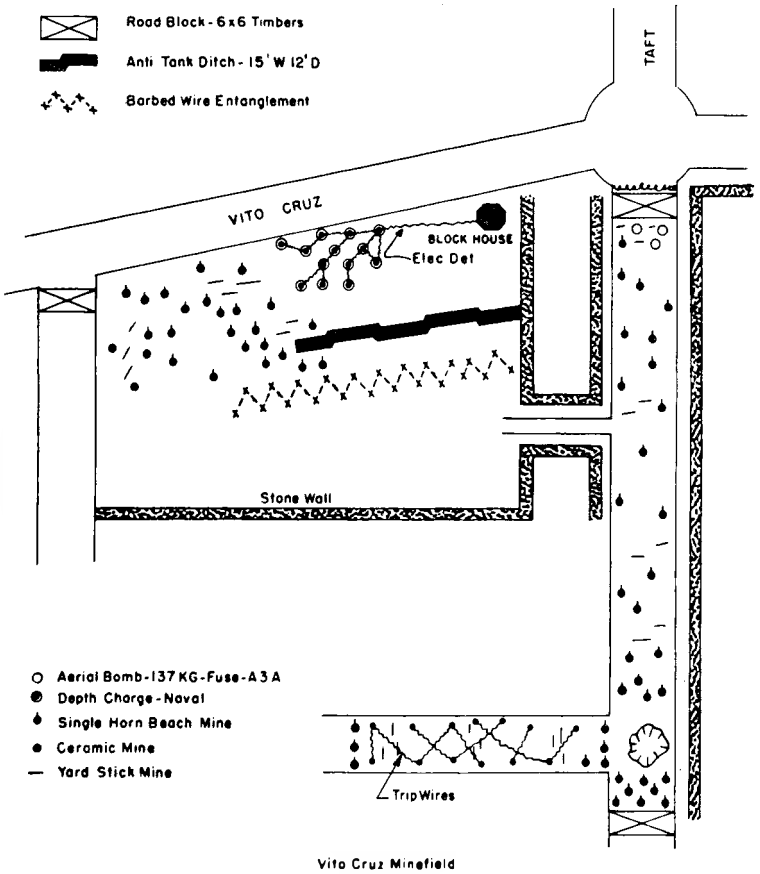


FIGURE 36.

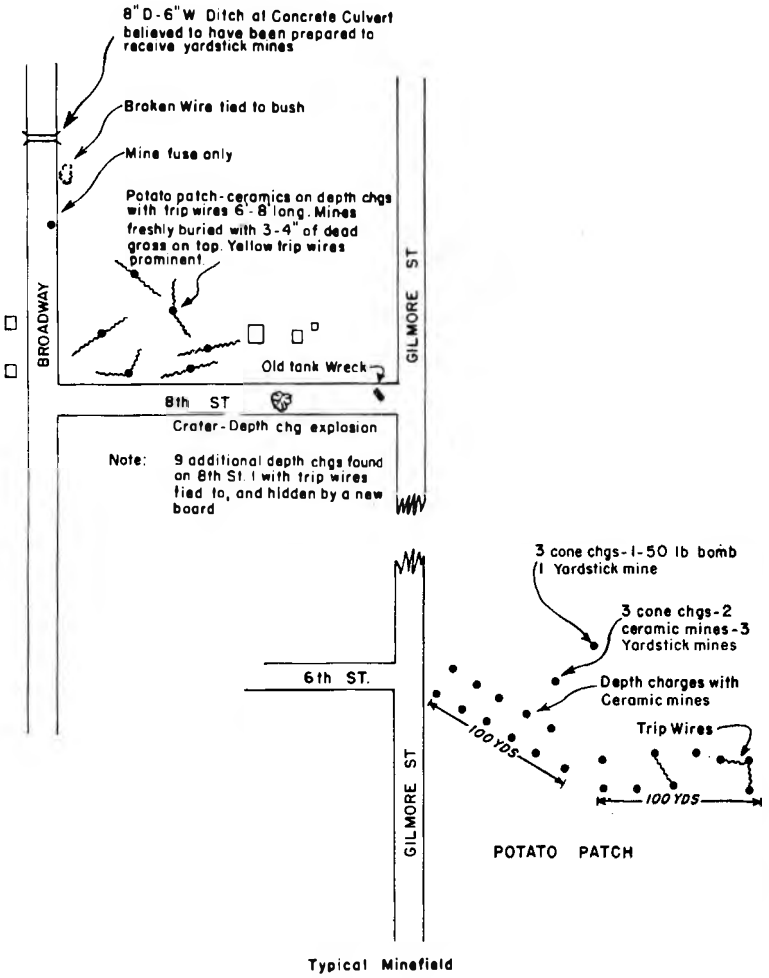
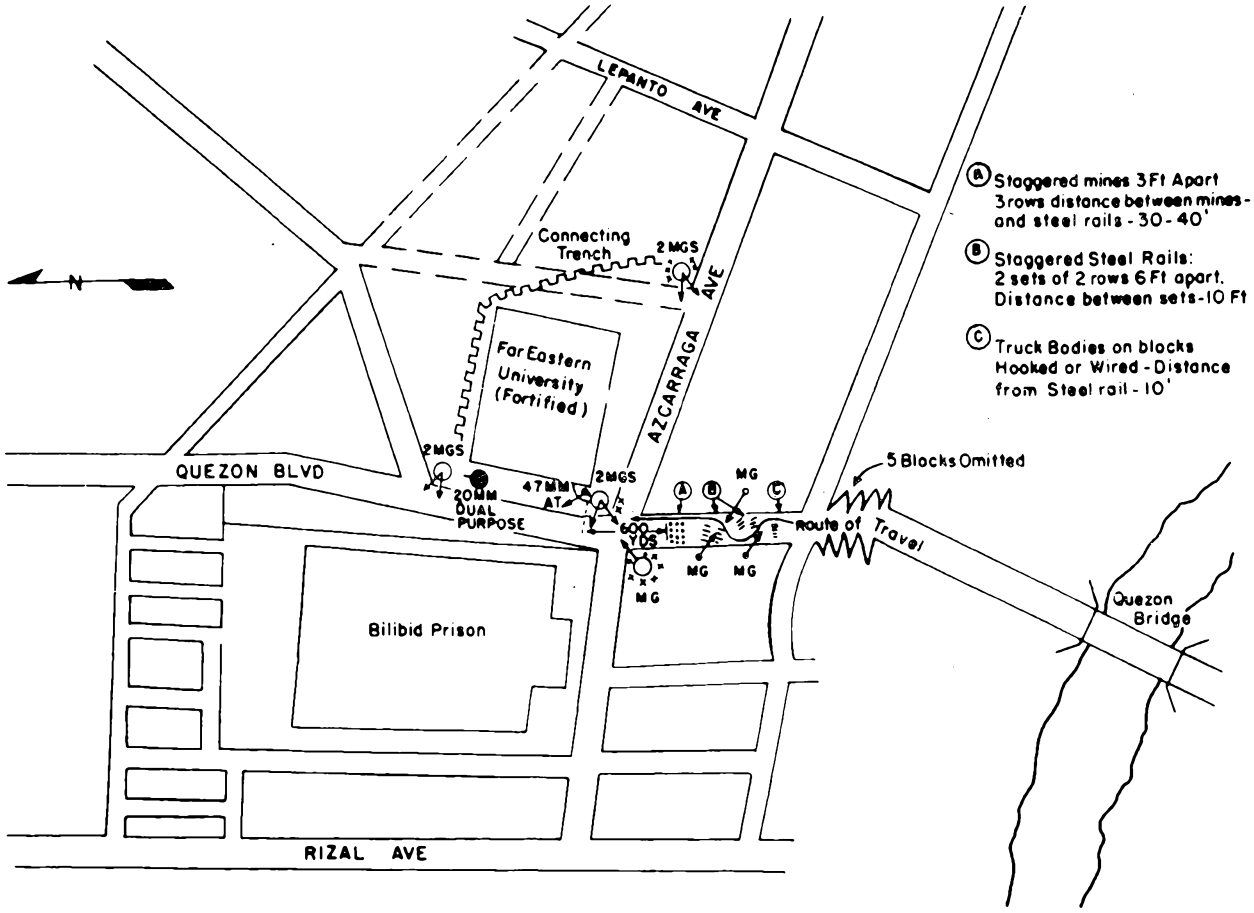
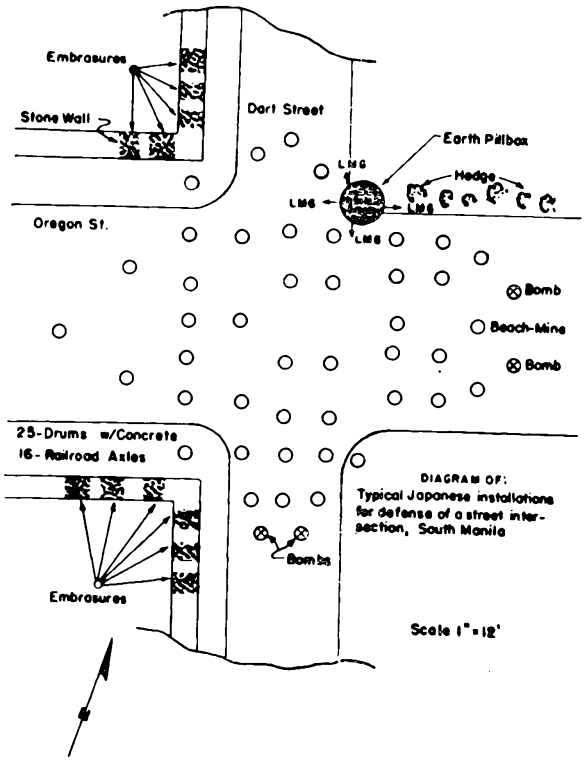

8" D-6" W Ditch at Concrete Culvert believed to have been prepared to receive yardstick mines
Broken Wire tied to bush
Mine fuse only
Potato patch-ceramics on depth chgs with trip wires 6-8" long. Mines freshly buried with 3-4" of dead grass on top. Yellow trip wires prominent
BROADWAY
GILMORE ST
Old tank Wreck
8th ST
Crater-Depth chg explosion
Note: 9 additional depth chgs found on 8th St. 1 with trip wires tied to, and hidden by a new board
3 cone chgs-1-50 lb bomb 1 Yardstick mine
3 cone chgs-2 ceramic mines-3 Yardstick mines
Depth charges with Ceramic mines
Trip Wires
100 YDS
100 YDS
6th ST.
GILMORE ST
POTATO PATCH
Typical Minefield

FIGURE 37.



Far Eastern University

FIGURE 38.



Typical Street Intersection

FIGURE 39.

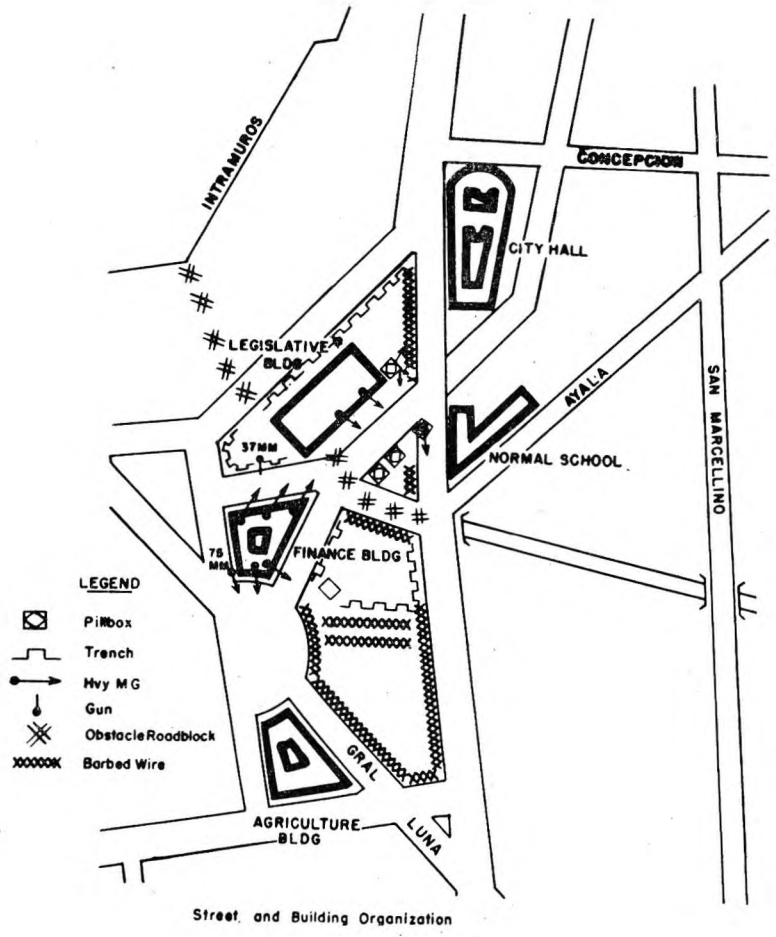

INTRAMUROS
CONCEPCION
CITY HALL
LEGISLATIVE BLDG
AYALA
SAN MARCELLINO
37MM
NORMAL SCHOOL
75 MM
FINANCE BLDG
LEGEND
Pillbox
Trench
Hvy MG
Gun
Obstacle Roadblock
Barbed Wire
GRAL
AGRICULTURE BLDG
LUNA
Street and Building Organization

FIGURE 40.

7. ANTITANK METHODS ON OKINAWA

Combat instructions issued by the Japanese prior to the Allied invasion of Okinawa reveal that the defensive organization of their positions was based on the proposition that "Allied combat strength lies in their tanks." Plans for defense against these tanks included complete preparations for blocking vital routes by the fire of all types of weapons, by the use of mines, and by the construction of some antitank obstacles. Japanese appreciation of terrain was excellent and much thought was given to limiting and channelizing the maneuverability of American armor through the coordinated use of all antitank means and methods. Gunfire from commanding terrain by antitank weapons, field artillery, antiaircraft artillery employed in a ground role, and mortars were relied upon to a greater extent than antitank obstacles. Unimportant roads were demolished and, where they were used, antitank ditches were well camouflaged and the tendency was to prepare them as pitfall traps rather than as conventional ditches. Bridges were blown consistently and trees were felled across roads as hasty delaying obstacles.

To extend and supplement these more conventional methods, suicide and assault team tank-hunters were organized. The Japanese paid every attention to coordinating these operations with supporting fire of all arms. Foot troops or tank-borne infantry, in support of Allied armor, particularly were the targets of such Japanese fire from automatic weapons, mortars, grenade dischargers and battalion guns. Combat instructions called for close-in assault of tanks within 15 seconds after the fire of these weapons ceased and in some instances this close coordination was achieved.

In some close quarter attacks, Japanese, armed with satchel charges, bangalore torpedoes, pole charges, and antitank mines, ran up alongside of Allied tanks and endeavored to stay with the tank until both the tank and the individual were destroyed. It should be emphasized, however, that the death of the individual was accepted as the necessary price for the destruction of the tank, in accordance with the Japanese doctrine of, "one soldier; one tank." Close-quarter tank attacks are not designed by the Japanese for the purpose of committing suicide alone; the attack is expected to achieve definite military results. Tanks which were halted during the fighting in towns and cities by natural or artificial obstacles, and by gunfire, were subject to these tank-hunter operations.

In one Japanese infantry division, small picked raiding parties, called mortar and tank destruction units, were ordered to infiltrate Allied lines and to cause as much destruction as possible to Allied armor, and to mortars as well.

The use of Type 91, 97, and 99 hand grenades was augmented on Okinawa, by the use of the Type 3 conical hand-thrown mine. This mine appears to have been an item of general issue to small units. Many of these mines were found without the stabilizing hemp or straw tail which insures that the mine will hit the tank in the correct position for the maximum explosive effect. This is a possible indication that the Japanese were instructed to place the charge directly against the tank rather than risk failure of the thrown mine to make proper contact. Large quantities of stick type fragmentation and stick type incendiary grenades were also employed.

The use of land mines on Okinawa was far better than in previous campaigns. Roads, particularly in the vicinity of bridges, were mined. All logical terrain approaches to defensive installations and areas adjacent to, and in the vicinity of caves, also were effectively mined. Reports indicate that at least one electrically-controlled mine field was installed on the island. Definite mine-field patterns were used in the vicinity of airfields but irregular scattering of mines seemed to be the most common method of employment. Mines often were camouflaged by utilizing vegetation indigenous to the area. One field was laid in a cabbage patch, with heads of cabbage used as camouflage. The presence of the mines, however, was soon revealed by the wilting of the cut cabbage.

One mine field was found to be composed entirely of single-horn antiboat mines, while in another locality, 500-pound aerial bombs were used as makeshift land mines.

All types of light and heavy artillery and mortars were used with effect on Okinawa against Allied light and medium tanks. Fire from antitank weapons often was delivered at ranges as close as 50 yards but the majority of such fire came from much greater distances. Antitank guns were sited in caves and acted as covering weapons to approaches to these caves. Guns were sited so as to be in mutual support of each other. Antitank artillery often was sited to deliver flanking and, in some instances, rear fire on approaching tanks. Japanese tanks were en-

countered well dug in and sited as additional anti-tank defense.

Some use of wire was reported on Okinawa with inverted double apron obstacles being the most commonly encountered. Roll wire obstacles, probably of the concertina type, also were used, as well as single- and double-strand wire.

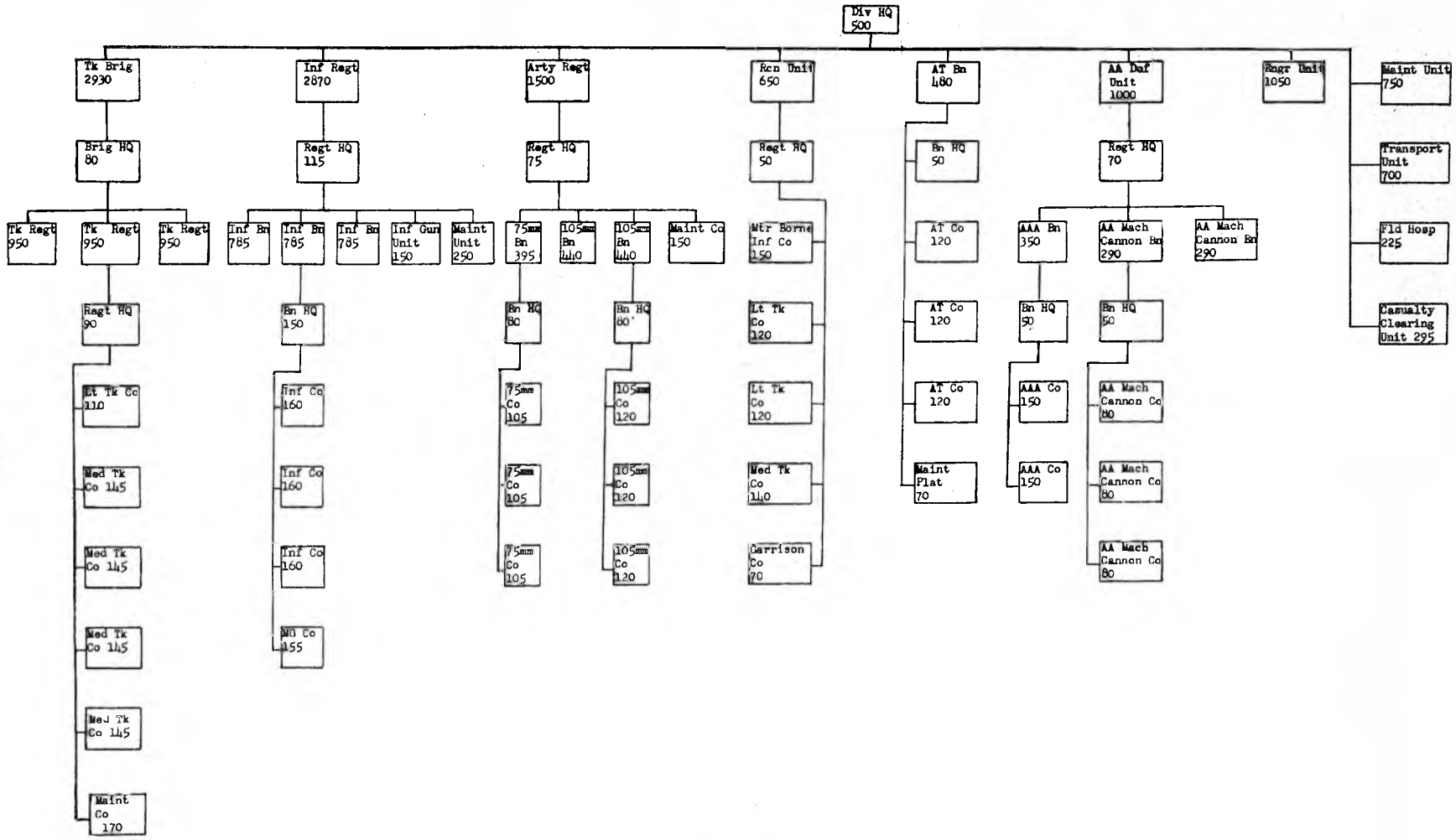
For the most part, Japanese armor was used as dug-in pillboxes. One coordinated infantry-tank attack was reported to have been made at dawn. From the standpoint of the defender, the terrain and existing weather conditions limited the employment of tanks in their conventional role.

		Tank Brigade								Infantry Regiment								Artillery Regiment			
			Tank Regiment								Infantry Battalion								75-mm Battalion		
	Div Hq	Brig Hq	Regtl Hq	Lt Tk Co	Med Tk Co	Maint Co	Regt total: 1 Lt Tk Co 1 Med Tk Co 1 Maint Co	Brig total: 3 Tk Regts	Regtl Hq	Bn Hq	Co	MG Co	Bn total: 3 Co 1 MG Co	Inf Gun Unit	Maint Unit	Regt total: 3 Bn 1 Inf Gun Unit 1 Maint Co	Regtl Hq	Bn Hq	Co	Bn total: 3 Co
Rifles	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )
Grenade discharger											9		27			81				
Light machine gun											9		27			81				
Heavy machine gun						3	3	9				12	12		3	39				
20-mm AA machine cannon																				
37-mm AT gun																			1	3
47-mm AT gun											2		6			18				
75-mm AA gun																				
75-mm gun														6		6			4	12
105-mm howitzer																				
Light tank	2	2	3	12	4		31	95		3			3			9				
Medium tank	7	5	4		11	2	50	155												
4-ton prime mover											2		6			18			9	27
Truck	43	8	6	4	5	34	64	200	12	12	11	11	56	12	35	227	4	5	6	23
Other motor vehicles	17	4	4	1	1	3	12	40	4	8	2	2	16	2	20	74	7	6	3	15

	Artillery Regiment—Continued						At Battalion				AA Defense Unit								
	105-mm Battalion																		
	Bn Hq	Co	Bn total: 3 Co	Maint Co	Regtl total: 1 75-mm Bn 1 105-mm Bn 1 Maint Co	Ren Unit	Bn Hq	Co	Maint Plat	Bn total: 3 Co 1 Maint Plat	AAA Gun Bn 2 Cos	AA Mach Cannon Bn 3 Co	Unit total: 1 AAA Gun Bn 2 AA Mach Cannon Bn	Engr Unit	Maint Unit	T Unit	Fld. Hosp.	Casualty Clearing Unit	Division Total
Rifles	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	*7,000
Grenade discharger						9								12					102
Light machine gun						9													90
Heavy machine gun								1	1	4				6		8	1	3	70
20-mm AA machine cannon												12	24						24
37-mm AT gun		1	3		9	3								6		4			22
47-mm AT gun								6		18									36
75-mm AA gun											8		8						8
75-mm gun					12														18
105-mm howitzer		4	12		24														24
Light tank						32									3				141
Medium tank						10									3				175
4-ton prime mover		5	15		57			6		18	10		10						103
Truck	5	10	35	37	134	41	3	4	18	33			75	116	50	228	25	40	1,212
Other motor vehicles	6	3	15	12	64	11	5	2	5	16			40	37	25	41	2	3	370

*Total number of rifles is known, but number of rifles of the subordinate units is not known.

Inclosure No. 1. T/E of Triangular Armored Division as of May 1945



Total strength of division--12,950

Inclosure No. 2. T/O of Triangular Armored Division as of May 1945.