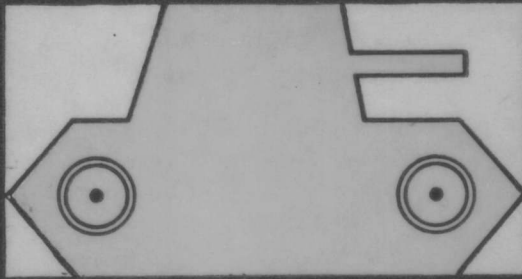


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JAPANESE TANKS AND TANK TACTICS



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JAPANESE TANKS
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TANK TACTICS



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For explanation of symbols, see FM 21-6.



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Introduction

The Japanese have made only limited use of tanks up to the present time. In their operations in China, however, they have had an opportunity to utilize tanks much more extensively than elsewhere because of the character of the terrain and the large areas over which the fighting has occurred. As a matter of fact, China has been the great proving ground for Japanese armored vehicles of all types. The Japanese also used light and medium tanks to some extent in the Malayan campaign and in the siege of Singapore, as well as in the Philippines, Burma, Guadalcanal, and Papua. More recently, on Guam and Tinian, comparatively large numbers of Japanese tanks have been in action; on Saipan more than 80 were destroyed, many by aerial and naval bombardment before they could be moved from assembly areas.

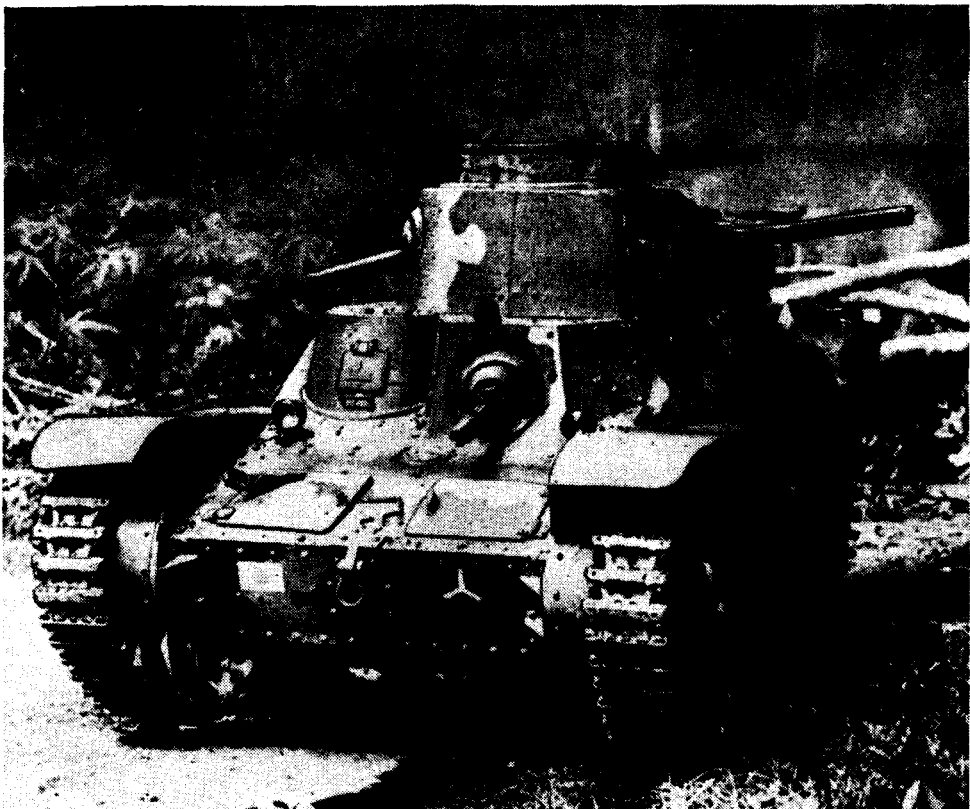


Figure 1.—Japanese Model 95 (1935) light tank ambushed by British troops on a Malayan road in 1941. Note full turret armament: rear 7.7-mm machine gun (left) and 37-mm gun (right), exposed by training the turret sideways.

In suitable terrain the tank is an ideal weapon for the favorite envelopment tactics of the Japanese. Although it is likely that their armored units will continue to be considered primarily as infantry support weapons, the potentialities of tanks in wide encircling movements to cut enemy lines of communications and to disorganize his rear areas hardly will be overlooked. Equipment probably will remain inferior in comparison with armored vehicles used by the other modern armies, but the study of German and United Nations designs is likely to bring about important modification in the construction of Japanese armored vehicles. Japanese industry will be able to provide a volume of production, which, although small in comparison with United Nations standards, will make possible the commitment of tank units on a larger scale than hitherto has been encountered.

All information in JAPANESE TANKS AND TANK TACTICS is believed accurate as of 1 November 1944.

CHAPTER I. Organization

Thus far tanks usually have been employed by the Japanese in independent units which are attached to infantry commands as operational expediency dictates. This practice can be expected to continue, in view of the preponderant emphasis of Japanese tactical doctrine upon the decisive role of infantry both in offense and defense. Yet large tank units exist in the Japanese Army, and there is evidence of an increasing disposition to allocate them to higher echelon control.

Armored Divisions

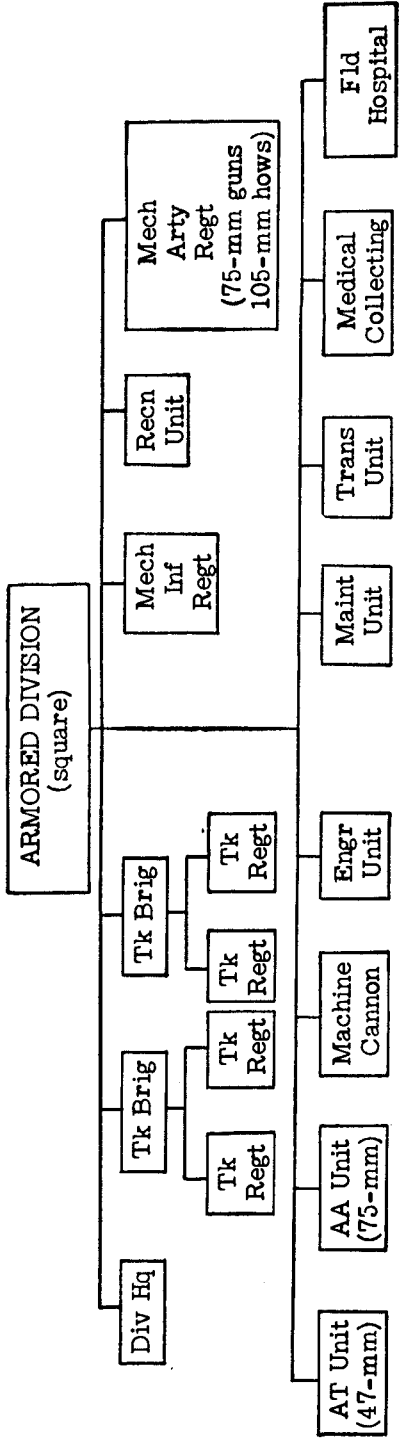
Evidence indicates that the Japanese may have both the "square" and the "triangular" types of armored divisions. The square-type division has a total estimated strength of 12,550 officers and enlisted men and is equipped with a total of about 2,000 vehicles, including 230 medium tanks and 170 light tanks.

Division headquarters has a total personnel of 500. The division is organized in two brigades, each having two tank regiments. The strength of a tank regiment is about 920. The division also includes a mechanized infantry regiment with a strength of 2,900. Also included is a motorized artillery regiment of 1,200 officers and enlisted men. The regiment is armed with 75-mm field guns and with 105-mm howitzers; 150-mm howitzers may also be included.

The square division also has a number of units under direct division control. There is a reconnaissance unit and an engineer unit, as well as an antitank unit armed with 47-mm antitank guns and an antiaircraft unit equipped with 75-mm antiaircraft guns. A machine cannon unit, armed with 20-mm machine cannons, also is included in the division organization. Transport of supplies, ammunition, fuel, and other necessities is integrated under a transportation unit. The division also has a maintenance unit.

There is evidence that a heavier type of square division may also be in existence. Strength of such a division would be in the vicinity of 14,000 officers and enlisted men. It would probably have a total of 450 tanks, including heavy tanks.

The chief difference between the square and the triangular types of armored divisions is the fact that the latter is not organized into brigades but has a tank group comprising three tank regiments. The strength of



STRENGTH

EQUIPMENT

Division Headquarters	500	Medium Tanks	230
Brigade Headquarters	80	Light Tanks	170
Tank Regiment	920	Motor Vehicles	1,600
Mechanized Infantry Regiment	2,900	20-mm Machine Cannons	16
Mechanized Artillery Regiment	1,200	47-mm Antitank Guns	34
Antitank Unit	450	75-mm Antiaircraft Guns	4
Antiaircraft Unit	175	75-mm Field Guns	12
Machine Cannon Unit	300	75-mm Mountain Guns	6
Engineer Unit	1,000	105-mm Howitzers	16
Maintenance Unit	620	57-mm Antitank Guns (mounted on Medium Tanks)	230
Division Reconnaissance Unit	530	37-mm Antitank Guns (mounted on Light Tanks)	170
Transportation Unit	680	Heavy Machine Guns (mounted on Tanks or Vehicles)	790
Division Medical Unit	280		
Field Hospital	220		

Figure 2.—The armored division (square).

the triangular division would be from 10,500 to 11,250. A triangular armored division recently identified was organized as follows:

The three tank regiments—the chief components of the triangular armored division—are organized into a tank group which has a total personnel of about 2,950 officers and men and is assigned 500 vehicles, including about 250 tanks. In addition to the tank group, there is a mechanized infantry unit with 2,800 officers and enlisted men. The mechanized artillery unit of the triangular armored division has a strength of 1,200 with about 220 vehicles. There also are included in the division organization a reconnaissance unit with a strength of 530; an antitank unit armed with 47-mm antitank guns; an anti-aircraft unit equipped with 75-mm guns; a machine-cannon unit armed with 20-mm machine cannon; an engineer regiment with a strength of 1,030; a transport unit with 1,500; a medical unit with 285; a field hospital with 220; and a maintenance unit with a strength of 600.

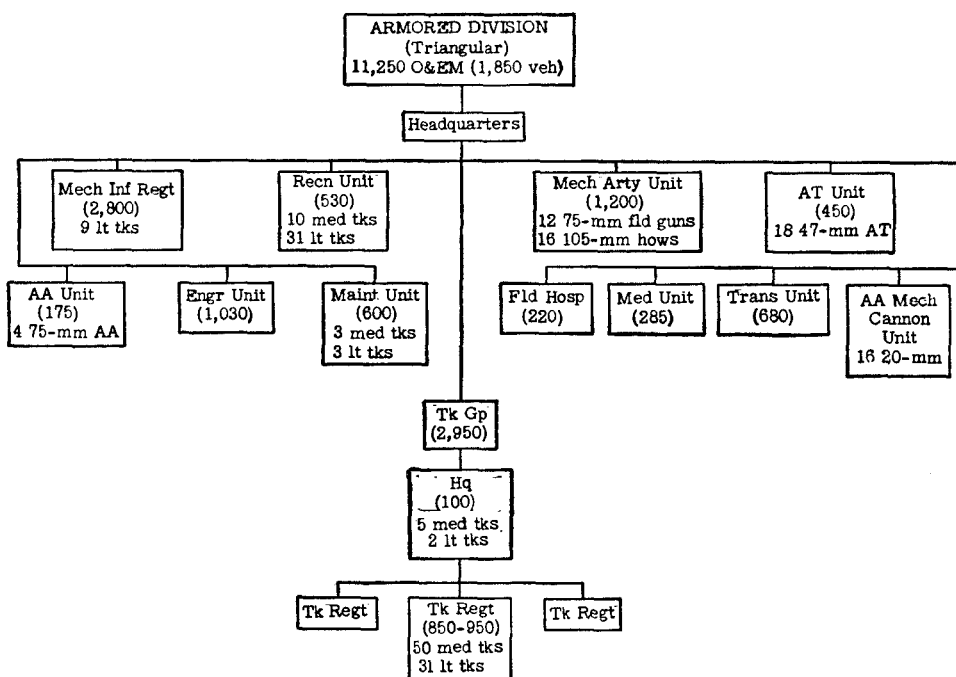


Figure 3.—The armored division (triangular).

Organization and strength of tank regiments in the square and triangular armored divisions are virtually the same. There also are a number of independent tank regiments in the Japanese Army. Before the war tank regiments had three companies; at Guadalcanal, however, a four-company regiment was identified, and since that time a number of similar identifications have been reported. There are five-company regiments too: it seems that the trend is to have five-company regiments as components of armored

divisions, while the independent tank regiments have three- or four-company structure.

In a five-company regiment, about which full information has been secured, headquarters personnel aggregated 89. The light tank company of the regiment had a total strength of 104, while each of the four medium tank companies had 143. There was a maintenance unit, or company, of 175. The light tank company had 12 such vehicles, while each medium company had 11 medium tanks and four light tanks.

JAPANESE FIVE-COMPANY TANK REGIMENT

	O	WO	NCO	EM	Total	Tanks		Troop Carriers		Trucks	Light Re-pair Cars	AT Guns		Hv MG Mtzd on Veh	#92 Hv MG
						M	L	L	S			57-mm	37-mm		
Regt Hq.....	11	2	31	45	89	4	3	1	2	4	-----	4	3	14	----
No. 1 Co.....	4	2	35	63	104	-----	12	-----	1	4	-----	-----	12	24	----
No. 2 Co.....	4	2	43	94	143	11	4	-----	1	5	-----	11	4	30	----
No. 3 Co.....	4	2	39	98	143	11	4	-----	1	5	-----	11	4	30	----
No. 4 Co.....	4	2	43	94	143	11	4	-----	1	5	-----	11	4	30	----
No. 5 Co.....	4	2	32	105	143	11	4	-----	1	5	-----	11	4	30	----
Maint Unit (co?)..	5	3	20	147	175	2	-----	-----	3	34	6	2	-----	4	3
Total.....	36	15	243	646	940	50	31	1	10	62	6	50	31	162	3

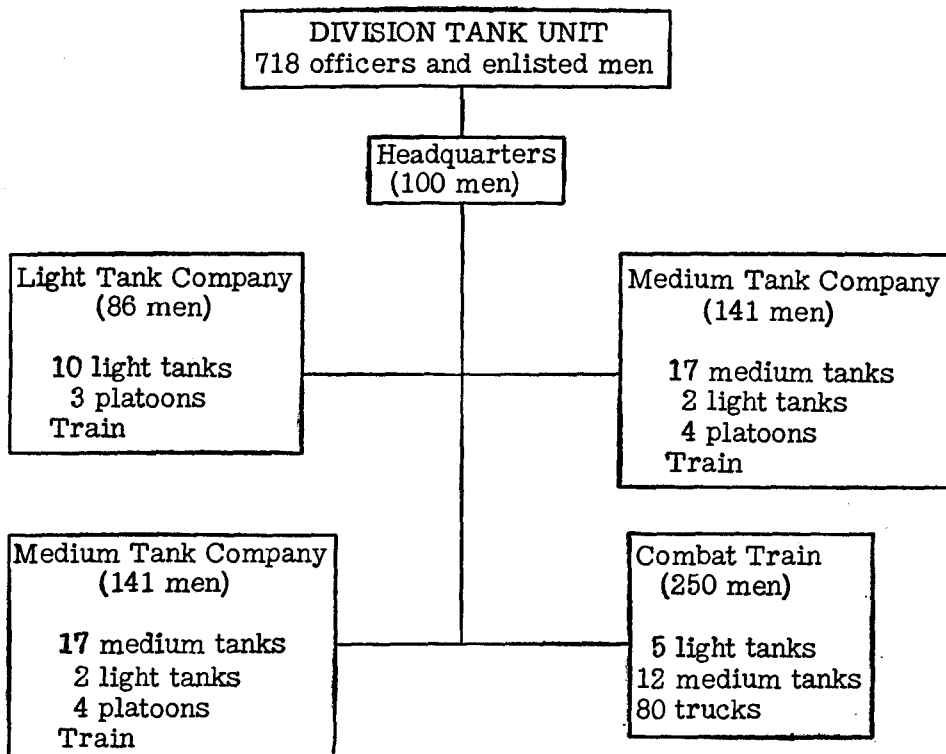


Figure 4.—The division tank unit.

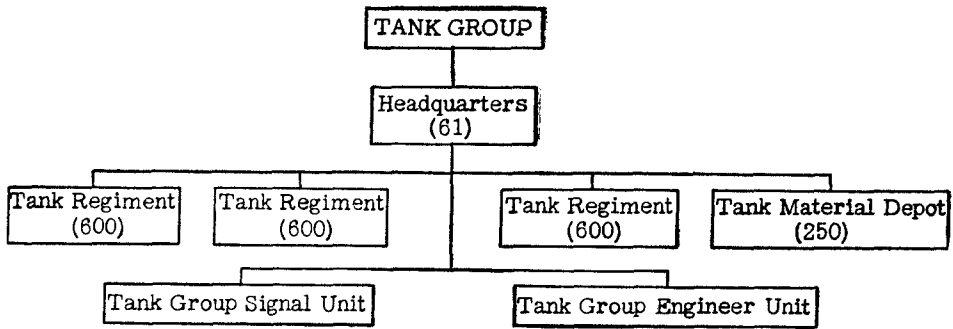


Figure 5.—The tank group.

In some of the stronger types of triangular infantry divisions, in addition to a reconnaissance unit, a tank unit of about 700 men is included. In other types of triangular divisions, namely those composed of combat teams, a smaller division tank unit has replaced the reconnaissance unit. A number of the latter type of tank units have been identified; however, few details are available.

Non-Division Units

Several cavalry brigade tank units are known to exist. The total strength of a unit of this type is approximately 350, and estimated armament includes 33 (or 27) light tanks, 250 rifles and carbines, and 15 pistols. Each unit has a headquarters with a total personnel of 30; two light tank companies each with a personnel of 130; and a train with an aggregate personnel of 60 officers and enlisted men, apportioned to ammunition and chemical warfare matériel sections with a reserve of six light tanks. Each constituent

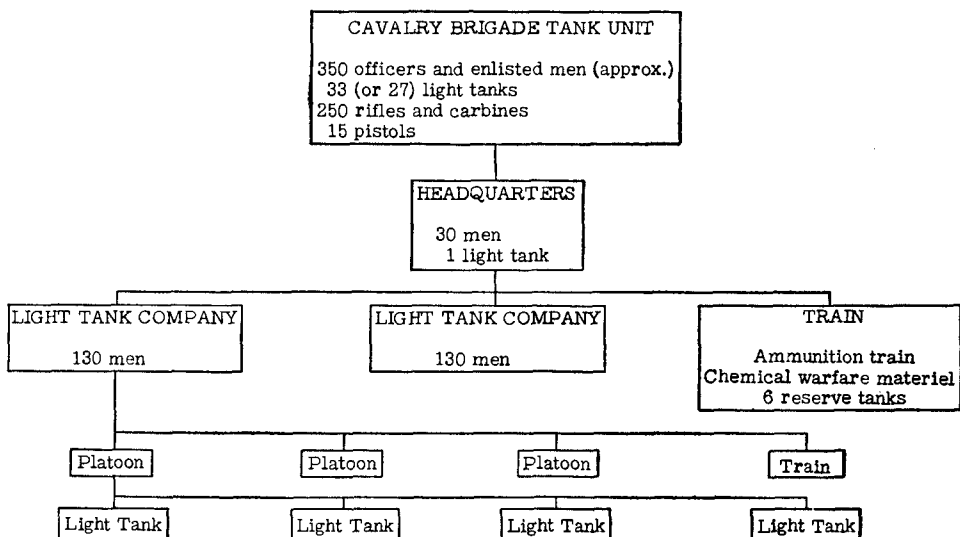


Figure 6.—The cavalry brigade tank unit.

company of the cavalry brigade tank unit has three light tank platoons and a train.

Independent Tank Units

The Japanese also have independent tank groups. A tank group has a total strength of approximately 2,500 officers and enlisted men and is commanded by a major general. Each tank group consists of a headquarters, three regiments, and a train. Headquarters has a total personnel of 61, while each of the three constituent regiments has 600. In addition to these units there are a tank signal unit, a tank group engineer unit, and a maintenance matériel depot. The tank group is equipped with 70 light tanks and 135 of the medium type. Although no conclusive information is available, artillery units presumably would be included or attached to the group. It is possible that some of these tank groups were used as a nucleus around which triangular divisions were organized.

Strength of independent tank regiments has been reported from 500 to 800. One recently studied was divided into three companies and a combat train. Each company had three medium tank platoons, equipped with five tanks each, and a light tank platoon which had four light tanks. Total company tank strength aggregated six light and 16 medium tanks. The whole regiment had 21 light tanks, 49 medium tanks, and a reserve of 6 light and 15 medium tanks.

Sometimes the light tanks are assembled into one company, making a fourth or light tank company.

A variant has been reported with 700 officers and enlisted men, and a total of 60 tanks. The light tank company had ten tanks, while each

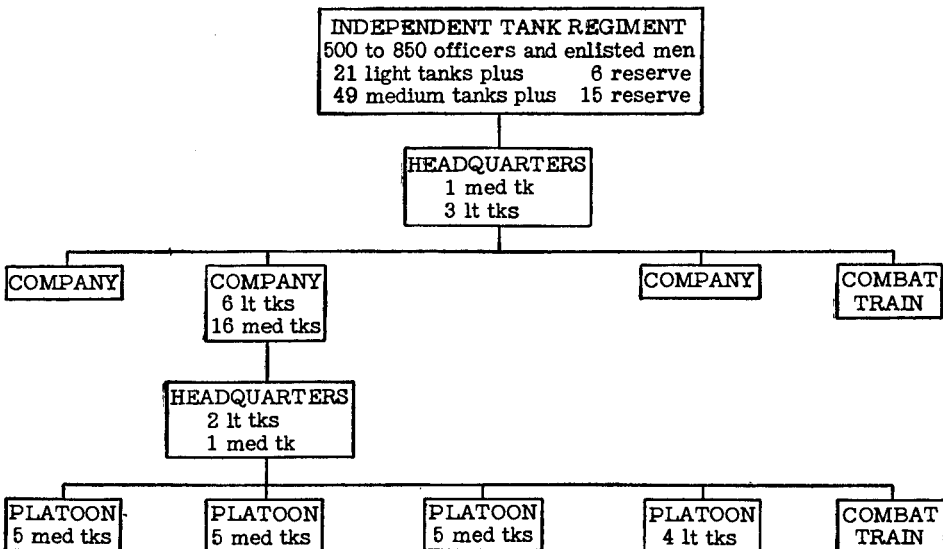


Figure 7.—The independent tank regiment.

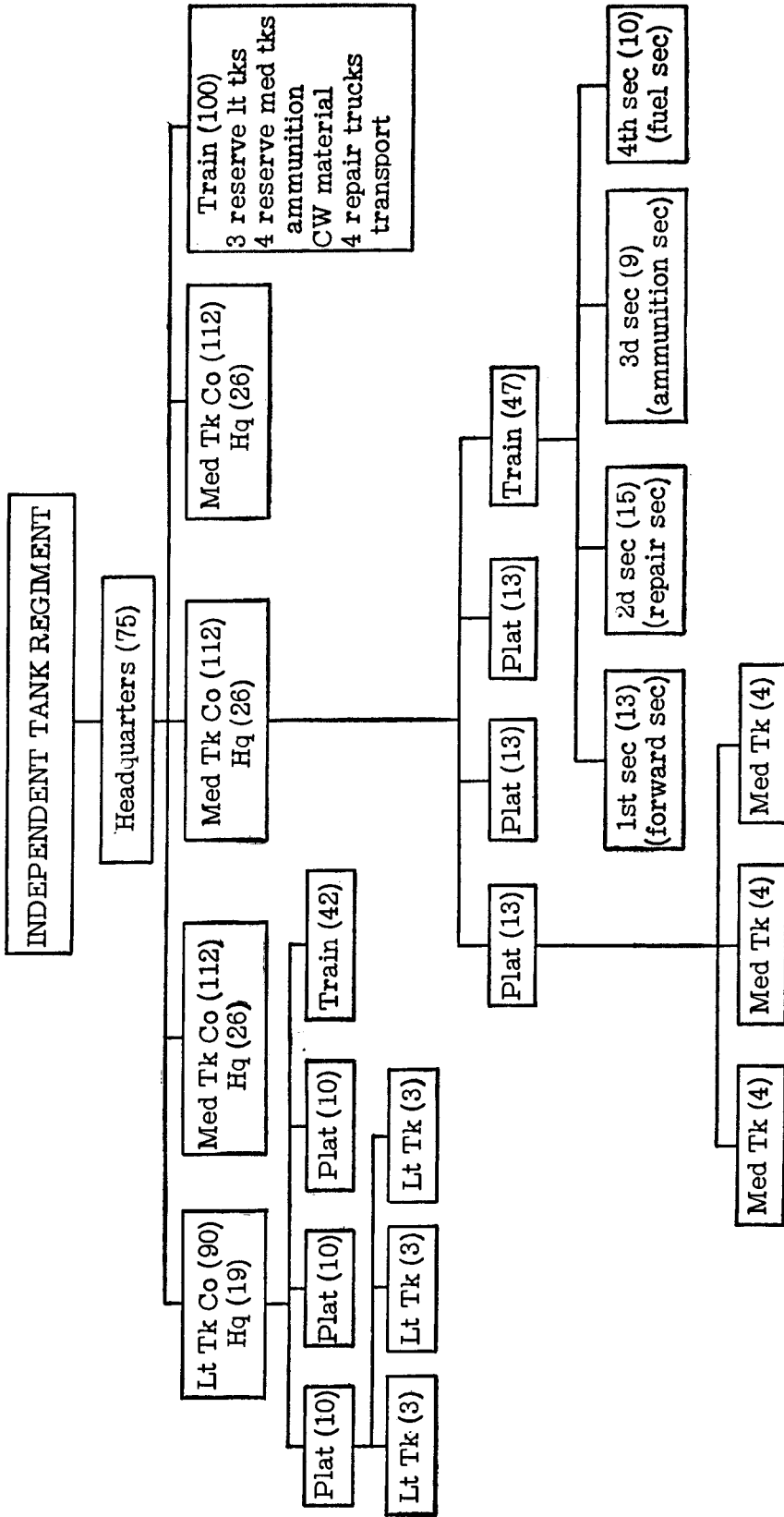


Figure 8.—The independent tank regiment.

medium tank company was equipped with ten medium and two light tanks. The remaining tanks were assigned to headquarters units and the reserve.

A four-company independent regiment, about which information is available, had a total strength of 601, with 75 authorized for headquarters, 90 to the light tank company, and 112 to each of the three medium tank companies. The regimental train had a total personnel of 100. The primary armament of the regiment comprised 23 light and 45 medium tanks.

Company Organization

Each company, in addition to headquarters, had three platoons and a company train. The platoon, in addition to the lieutenant in command, had three sections; the train had two repair sections, an ammunition section, and a fuel section.

The company was commanded by a captain and each of the three platoons was under a lieutenant. There were also a warrant officer and 29 non-commissioned officers. The strength of the medium tank company was 112; in the light tank company it was only 90. The medium tank company was equipped with two light tanks and ten medium tanks. There were four radio sets, one for the company commander and one for each platoon leader's tank. It also had 15 trucks, two passenger cars, and one motorcycle.

Armament totals were:

Model 97 (1937) 57-mm tank guns.....	10
Model 94 (1934) 37-mm tank guns.....	2
Model 97 (1937) 7.7-mm tank machine guns.....	28
Model 38 (1905) 6.5-mm carbines.....	84
Pistols	4
Bayonets	107

A company in the four-company regiment carries in its train enough tank fuel for seven days. A 15-day lubricating oil supply is carried, while a four-day supply of gasoline and lubricating oil for transport vehicles likewise normally is included. Ordinary rations sufficient for five days are carried, as well as a five-day supply of emergency rations.

Tankette Companies

Tankettes are widely used by the Japanese Army for reconnaissance as well as for other purposes. There are two types of independent tankette companies, according to Japanese designation, termed "armored vehicle companies" and "light armored vehicle companies". So far as known, the only distinction between the two types is in the model of tankette with which they are equipped.

The organization of the two types is the same. Each company has a headquarters with a total personnel of 30, and is organized into four platoons each with a strength of nine. Each platoon comprises four sections, each of



Figure 9.—Model 92 (1932) tankettes in an assembly area behind a hill in China.

which is equipped with one tankette and a light armored trailer. Total strength of the company is 121, of which 55 are allotted to the company train. If the company is equipped with a Type 98 (1938) tankette, or a later model, the strength of the company apparently is increased to 138. A total of 17 tankettes is allotted to the company.

It is interesting to note the inclusion of the tracked trailers which may indicate that the units are used for tactical supply purposes as well as for combat and reconnaissance. Each platoon has an enlisted man specially trained in chemical warfare, while the personnel of the company train includes a noncommissioned officer and two enlisted men with such training.

In addition to independent tankette companies there are infantry group tankette companies, of which at least nine are known to be operative. Companies of this type have a headquarters with a total personnel of 20. There are three platoons, each with a total strength of 10, and a train with an authorized personnel of 30. Each platoon is organized into three sections.

The total strength of the company is estimated at 80. Ten tankettes are allotted, and supplementary armament includes 50 rifles and carbines and 20 pistols.

CHAPTER II. Tactics

General Doctrine

Although the Allied armies have had relatively little experience with Japanese tank units in the current war, there is considerable evidence that the Japanese will use large armored units when the terrain permits their effective operation. It may be expected, also, that lessons learned from the European and North African war theaters will exercise an influence on their armored tactics.



Figure 10.—Model 97 (1937) tankettes during a halt in Northern Burma in 1942. Tanks and tankettes were used for infantry support during this campaign.

In combat with Allied forces the Japanese have utilized light and medium tanks, as well as tankettes, in support of infantry in direct frontal attacks. After the infantry reached their objective the tanks were withdrawn without attempting to exploit the limited gains. In Malaya tanks were brought up wherever the infantry was unable to advance. The tanks normally attempted to force a passage for the infantry by a frontal assault. If this failed, the tanks were sent against the hostile flanks. On occasion, however, Japanese tanks have attacked by moving directly down roads

with the infantry following in trucks. Unless effective road blocks were prepared by Allied forces, the tanks struck at artillery and other installations as much as 8 to 10 miles in the rear of the main Allied positions. When a road block was encountered, fire from the tanks was used to get around the flanks by infiltration tactics. Only a very few operations have involved Allied tanks directly against Japanese armored vehicles.

Large Armored Formations

No large commitments of Japanese tanks have occurred thus far outside the Chinese theater. Tactical studies in a Japanese army tank school, however, give precise instructions for the employment of large armored formations. For an attack on a lightly held enemy position, Japanese doctrine maintains that a minimum of 30 to 40 tanks are required. If the enemy is in a strongly defended position, it is stated that at least 60 will be needed, and this number will be increased to 100 in the event hostile artillery shelling and aerial bombing are unusually heavy. The number of tanks assigned to regiments in some cases, at least, has been increased,



Figure 11.—Model 94 (1934) medium tanks deployed in China.

with 15 being allocated to a platoon instead of ten as formerly was the practice. Yet tanks would seem to be an ideal weapon for the Japanese in the envelopment maneuvers that are so favored in their tactical doctrine and practice. Where the terrain is favorable it can be anticipated that they will utilize tanks in wide encircling movements to cut hostile lines of communications and strike at vital rear areas.

Japanese tactical doctrine stresses the utilization of tanks in what is termed a "mobile mass." In operations in which they are committed in

such a fashion tanks constitute the main fire element in what is essentially an attempt to attain a decisive victory in one stroke. The Japanese believe that such tank tactics can be resorted to only in suitable terrain and that the nature of the terrain really is the chief limitation upon the employment of large tank formations. In any event, tanks are committed as a "mobile mass" only at "a momentous time and place when a decision of the entire army is in balance." If these conditions prevail, Japanese doctrine maintains that the loss of even the entire combat power of the tanks will be justified in view of the magnitude of the results achieved.

Inherent weaknesses and disadvantages of tanks are recognized by the Japanese. Yet the great advantages of tanks—high mobility, great offensive and fire power, as well as the power to crush and penetrate—cannot be found to a comparable degree in other weapons, and the Japanese recognize that the tank will be used to an increasing extent by modern armies.

It follows, according to Japanese reasoning, that when the objective is to secure a decision by armored operations alone tanks should not be committed in a piecemeal fashion and should never be used in a struggle of attrition. At best, tanks require extensive maintenance facilities; damage and loss in combat normally will be severe, and replacement both of equipment and personnel is difficult.

Ideally, tanks employed in "mobile mass" should be directed against weak spots in the enemy's lines, according to Japanese doctrine. With the constantly increasing efficiency of antitank guns, which threatens to overbalance compensating improvements in tank armor, the element of surprise becomes progressively more important. A Japanese tactical treatise says that "the essence of tank warfare is to take the enemy by surprise and assault him suddenly with concentrated power." Antitank weapons, however, are considered intrinsically defensive; the Japanese believe tanks are the only ground weapon truly capable of effectively opposing tanks. The airplane is becoming the tank's greatest enemy, according to the Japanese, necessitating important changes in the design of armored vehicles. Opportunities for plane-tank cooperation, however, are most promising, and Japanese tactical writings speak almost ecstatically of the prospect of gaining crushing victories with huge tank forces operating under the coverage of swarms of planes.

Tanks in Infantry Support

Despite Japanese appreciation of the potentialities of mass employment of tanks, the infantry support role doubtless will continue to be emphasized, affecting not only tank tactics but also the design of tank matériel. Although Japanese tanks do not compare unfavorably with armored vehicles used by the Allies in their speed-weight ratios, they lose speed more appreciably on cross-country runs. Japanese tanks are bulkier in proportion to

their weight than comparable Allied vehicles because of their smaller armor basis. This feature is a direct resultant of the fact that, tactically, the Japanese relied primarily upon their infantry to neutralize hostile antitank weapons. Now, however, when Japanese tanks are attached to infantry, one of their missions is the elimination of antitank weapons not neutralized by artillery fire.

Another connection between equipment and tactics can be seen in the allocation of radio sets. Only one set is issued to each tank platoon, and this factor inevitably entails constriction of the area of maneuver of tank units. If a platoon leader's tank is knocked out in combat, the entire platoon is deprived of all except visual communication with higher echelon command.

Japanese reliance upon infantry explains the existence of a large number of independent tank units in the Japanese army which readily can be attached to infantry commands. This factor also explains the failure to coordinate the artillery with tank units more effectively, for artillery, too, frequently is put under infantry control.

Two Methods of Cooperation

Japanese tactical doctrine distinguishes between two methods of tank cooperation with infantry. One method requires the tank commander to designate the infantry forces with which the tanks are to cooperate in response to such requests for support as are received from the infantry commanders concerned. The other method is predicated upon advance specification of the objectives which the tanks will attack. If the former plan is utilized—that is, if the tanks are directly allotted to infantry units—the tank regiment commander gives the general outline of the plan and leaves the details of its execution to the tank company commanders. If, for example, it is necessary for the tanks to execute a reversal of movement to facilitate the forward advance of the infantry, the movement is made upon the order of the tank company commanders, often in response to a direct request from the infantry for such a maneuver.

On the other hand, if the tanks are assigned particular objectives, the tank regiment 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 if time is short and it is difficult to foresee changes in the tactical situation that may develop during the engagement. It also should be noted that in this form of tank-infantry coordination the tanks may be committed by platoons; if they are assigned to infantry units, however, nothing less than a tank company will be committed.

It also must be decided whether the tanks will be used in coordination with infantry primarily for purposes of exploitation, or for the utilization of their momentum to facilitate infantry penetration of the enemy line. In exploitation operations the Japanese tanks will be so deployed and

committed that they can seize tactically important areas, confuse hostile deployments for attack, and strike at enemy artillery or other vital rear installations. If the tanks are utilized to give impetus and momentum to the infantry assault, they will advance in close coordination with the infantry. It is always possible, according to Japanese doctrine, to employ both methods simultaneously, particularly if tanks are available in ample numbers. While some can be used for direct support missions, the remainder can be held in reserve for exploitation of such successes as may be achieved by the assault.

Leading tanks also occasionally are used in offensive operations. If more tanks are available than it is estimated are necessary for close infantry support, some may be committed as leading tanks, usually under division control.

Principles of Infantry Support

A number of fundamental principles are emphasized in Japanese infantry-tank attacks. Close liaison is maintained at all times, with frequent rallying of the tanks if necessary to ensure maximum coordination of offensive effort. If the infantry assault does not progress as planned, the tanks will concentrate on the enemy obstacles or strongpoints which constitute the most effective impediments to the forward movement of the infantry. Especially prompt and vigorous action is taken against enemy positions from which flanking fire is being delivered against the Japanese infantry.

If Japanese tanks encounter an antitank installation within the enemy positions, an immediate decision must be made whether to detour around it or make a frontal thrust to liquidate it. Incipient enemy counterattacks, according to Japanese doctrine, are frustrated by striking at the counterattack base, the infantry deployed for the counterattack, or the hostile tanks which may be spearheading the maneuver, depending upon the immediate circumstances.

Rallying points are designated for assembly of the tanks after their mission is accomplished and preparation for the next attack phase is necessary. The tanks also assemble at rallying points when the assault is suspended at night or because of the tenacity of enemy resistance. Restoration of combat strength is the main objective of rallying; sites are chosen to afford maximum efficiency in the regrouping, replacement, and repair of the combat vehicles. Special care is taken to collect all damaged vehicles and to initiate repair where feasible.

Coordination Stressed

When artillery and tanks cooperate with the infantry, both support weapons must be carefully coordinated, state Japanese tactical instructions.

When the infantry attacks immediately after artillery preparatory fire, the tanks should have a line of departure and a 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 will be disregarded, however, if it becomes necessary for Japanese tanks to overwhelm defense capabilities on the enemy's flanks which unexpectedly may be revealed. Where there is no artillery preparation, the tanks ordinarily initiate their attack immediately upon the completion of the preparatory phase of the infantry attack.

Tank attacks, or infantry attacks supported by tanks, sometimes are facilitated by the assignment of special engineer parties to cooperate with armored vehicles. Personnel of these engineer parties are especially trained in the techniques of demolishing tank traps and other obstacles which could hinder the advance either of the tanks or of tank-supported infantry.

In one observed instance an engineer party consisted of a leader and five men, equipped with 122 pounds of explosives, a smoke discharger, picks, shovels, and other tools. Both personnel and equipment were carried on the outside of two tanks. These tanks stopped about 10 yards from an obstacle to permit the men to dismount and unload their equipment. As soon as this was accomplished, the tanks retired to a position about 50 yards to the rear, and with tank-gun and machine-gun fire covered the engineer party which in the meantime had begun its demolitions. By this technique the Japanese expect obstacles to be destroyed promptly.

Orders and Objectives

The Japanese Army lays stress upon precise orders and clearly specified objectives in actions involving tank-infantry cooperation. If tanks are attached to an infantry battalion, they will be under the battalion commander's control. Company commanders, nevertheless, are expected to maintain liaison with the tank commander to facilitate effective cooperation and to expedite prompt exploitation by the infantry of such successes as the tanks may achieve.

The infantry battalion commander's orders to the tank unit under his control include a statement of his plan as a whole. Tank objectives are specified clearly, and the obstacles which they are expected to remove likewise are designated. Assembly areas, line of departure, and H-hour are stipulated, and the methods the tanks will use in crossing the line of their infantry also are prescribed.

To enable the battalion commander to assign objectives as precisely as possible, company commanders are expected to inform him about the nature and location of primary tank objectives in front of their sectors, such as antitank guns, natural and artificial obstacles, enemy heavy weapons, etc.

If there are no primary tank objectives that demand immediate attention, or their location cannot be ascertained, the tanks may be sent against the

enemy flanks. When Japanese tanks are used in an **attack on hostile flanks**, the battalion commander sends infantry with them in a coordinated assault. The infantry also are assigned the task of mopping up pockets of enemy resistance that survive the initial attack. These infantry units assigned to cooperate with the tanks ordinarily are drawn from the forward companies opposite the flank or flanks against which the assault is made.

In attacks on hostile flanks, Japanese doctrine directs the infantry battalion commander to concentrate the firepower under his command against enemy antitank weapons. If necessary, details are sent forward to clear a passage for the tanks through areas where the enemy has antitank weapons emplaced or can be expected to have them. Japanese doctrine emphasizes the principle that infantry should cover the tanks and protect them against antitank fire. Yet their orders on Guadalcanal directed just the opposite procedure. There the tanks were sent against hostile antitank weapons, and every vehicle was destroyed.

Regimental Tactics

Details of Japanese tank tactics are available in several tactical treatises. The tank regiment when advancing, according to Japanese doctrine, will have a frontage of 500 to 550 yards. A patrol of tankettes is sent ahead for reconnaissance purposes, followed by "a direct guard", consisting of a light tank platoon utilized to develop enemy positions preparatory to the assault. Regimental headquarters follows the "direct guard" (advance guard), and after it comes a forward platoon of light or medium tanks to deal with enemy antitank weapons that may open fire. The main body then follows with the remainder of the company which furnishes the direct guard and forward platoons, flanked on each side by a tank company. The fourth company of a four-company regiment brings up the rear.

A medium tank company on the march will form a column 915 yards long; a light tank company, one of 525 yards. The platoons are drawn up in diamond formation, and the company forms a diamond of diamonds. In deploying for battle three platoons ordinarily will draw up abreast, with the fourth just to the rear of the center of the line. In special cases, however, all platoons may be deployed abreast.

If the depth of the enemy position is estimated to be approximately 1,425 yards, the Japanese assume that the position 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 front 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 by the tanks in three echelons. The first echelon is under the direct control of the tank regiment commander. Its objective is to establish a passage for the advancing infantry. The tanks of this echelon deal with enemy antitank guns and strong fire points that have not been

destroyed by preparatory artillery fire. Those that are not liquidated by the initial attack subsequently are mopped-up by the infantry. It should be noted that this procedure is somewhat different than would be the case if a smaller number of tanks were involved. In a small-scale employment of tanks to support infantry, Japanese doctrine assigns the liquidation of enemy antitank weapons to the infantry, rather than to the first tank echelon as is the practice in an attack by a regiment or more of tanks.

The second tank echelon is under the control of the battalion commander in charge of the infantry assault wave. Tanks in this group lead and support the attacking infantry, pinning down or liquidating the enemy's automatic-weapon personnel. The third tank echelon remains in reserve under regimental control. The reserves are held to exploit successes that may be won by the first two echelons. If a break-through is made by the advance tanks and the infantry, the reserve tanks will proceed through it to strike as deeply as possible into the enemy's rear areas.

Division-Strength Attack

In an attack of division strength, Japanese doctrine states that the front will be about 2,735 yards. Three tank regiments with a total of 135 tanks are employed, with 45 to a regiment, 15 to a company, and 5 to a platoon. As in the case of an attack on a smaller scale, the armored vehicles are committed in three echelons. Two infantry regiments are deployed in the front line, and one tank company is placed considerably in advance of each of them. The primary mission of this first tank echelon is to neutralize enemy antitank weapons and strongpoints not previously destroyed by artillery fire and to clear a path for the second echelon, which comprises the major infantry assault units in addition to the tanks assigned to this echelon.

The second tank echelon is deployed immediately in front of the infantry, with one company in front of each of the four battalions. It moves 400 to 500 yards behind the first echelon, and its mission is to cover and support the infantry assault with especial attention to the liquidation of enemy automatic weapons. If the situation warrants, the second echelon may "leap-frog" through the first. A regiment of tanks is held in reserve as the third echelon under direct control of the division commander, primarily for exploitation of such success that the assault may achieve. It also may be used to reinforce any area requiring such aid, perhaps by attachment to an infantry unit.

When the support of the infantry by the tanks must be exceptionally close there are some important modifications in Japanese armored tactics. The tanks are allocated to two combat units. The first combat unit is divided into left and right formations, each of which is preceded by a patrol of light tanks utilized to develop the enemy position and draw the fire of his antitank weapons.

Both the right and left formations of the first combat unit consist of four platoons, drawn up in two columns, each of two platoons. The two front platoons advance with the infantry; the two rear platoons are used to swing around the flanks of the two leading platoons to engage enemy antitank weapons, as soon as the location of them is ascertained. A platoon of engineers follows the first combat unit. The second combat unit consists of two tank platoons, assigned the mission of liquidating the enemy's automatic weapons which survive the first echelon assault, and a reserve. The reserve may be used to provide necessary reinforcements or to exploit success.

Special Tactical Situations

A dawn attack is really a night maneuver for Japanese tanks, which normally will proceed to their line of departure under cover of darkness guided by noncommissioned officers especially trained in tank tactics. Thorough preparation is made, with major emphasis upon the removal of natural or artificial obstacles to the advance of the tanks, or the provision



Figure 12.—Model 95 (1935) light tank after engaging U. S. M4 medium tanks on the Agana-Piti Road, Guam Island.



Figure 13.—Rear view of two Japanese Model 95 (1935) light tanks knocked out by U. S. M4 medium tanks on Tinian. Note the wooden ammunition boxes and the wooden carrier built on the rear end.

of facilities for their evasion. Arrangements are completed well in advance for the exact procedure to be followed when the Japanese tanks “leap-frog” the infantry line preparatory to spearheading the attack.

Preparation for a night attack, according to Japanese principles, is even more elaborate and inclusive than it is for dawn attacks. As many as a platoon of tanks may be assigned to one infantry company for night attacks. Tank objectives will include the heavy weapons of the enemy’s first line of defense, obstacles, and flank defenses. The objectives preferably are designated so as to permit the tanks to move to their departure line by daylight, unless enemy observation facilities make this inexpedient.

The Japanese feel that pursuit affords the best opportunity to exploit the advantages of tanks to the full. It is considered necessary to arrange maintenance and supply facilities carefully so that continuity of pursuit may be facilitated. Clear objectives should be selected, and Japanese tank units are directed to proceed against these as directly as possible regardless of losses. Pursuit should be unremitting and audacious, even if only one tank survives to complete the mission.

Tank operations, according to Japanese tactical principles, are not conducted with the purpose of precipitating tank-versus-tank engagements.

Nevertheless, in operations against a modern, well-equipped army such battles are regarded as inevitable, for, according to the Japanese view, the tank in the last analysis is the only ground weapon capable of successfully opposing tanks. Consequently, Japanese tank commanders are directed to be in constant readiness to engage in battle with enemy armored vehicles.

Strive for Initiative

The most important necessity for success in tank-versus-tank engagements is the constant retention of the initiative, the Japanese believe. Alert foresight, quick commands, firm determination, and cohesive organization are the factors that allegedly will enable the Japanese tank commander to retain the initiative and thus gain a decisive victory. Japanese tank units are expected to proceed on the assumption that they enjoy superiority in a situation where quick decisions are necessary and are directed to launch immediate attacks against the flanks and rear of the enemy's tank formation. Japanese armored units will fight in closely integrated and controlled maneuvers, attempting to destroy enemy vehicles in detail. The fire of the Japanese tanks, according to prevailing doctrine, will be concentrated upon enemy command and leading tanks.

“Long-Range Raids”

Considerable attention also is given in Japanese tank doctrines to what are termed “long-range raids” which may lead to meeting engagements. On a “long-range raid” the advance of the tank regiment is conducted on a front from 325 to 550 yards wide. A reconnaissance unit constitutes an advance force and is assigned the mission of securing all available information in regard to terrain, routes of advance, enemy forces and their disposi-



Figure 14.—Front view of two Model 95 (1935) light tanks. They appear to have been hit from the right flank.

tions, and all other intelligence that may be of use to the commander of the advancing tank regiment. A "direct guard" (advance guard) consisting of one tank platoon follows the reconnaissance unit. This unit drives in light enemy units that may be encountered or develops resistance which subsequently can be dealt with by the main body.

Regimental headquarters follows the "direct guard", and behind this group a tank company advances on a front of from 55 to 110 yards. The field artillery attached to the tank regiment and the engineers unit follow in parallel columns behind the first tank company. A tank company is on each flank, abreast of the artillery and engineers columns. These companies, in the event of a meeting engagement, can sweep out against the enemy flanks in an envelopment maneuver, or they may aid the leading tank company in the speedy destruction of enemy obstacles and antitank weapons. The artillery provides direct fire support, while the engineers move ahead to aid in the elimination of obstacles.

Behind the line formed by the tank companies, the artillery, and the engineers come the infantry, usually motorized units that can deploy quickly for either frontal assault or a holding frontal action and an envelopment maneuver.

A second echelon of tanks follows the infantry. It is used as a reserve, committed as the tactical situation warrants after the battle is begun. As in other types of attacks, the reserve tanks can be used for exploitation of penetrations of the enemy lines or to reinforce tank units that may require aid in the accomplishment of their missions.

In contrast to the "long-range raids" involving at least a tank regiment, similar Japanese tank units are employed on what are termed "raids". These are undertaken, often upon the request of infantry commanders, to capture terrain features of tactical importance, to confuse the enemy, or to deliver surprise attacks on enemy artillery, headquarters, and other important installations. Heavy losses of tanks are anticipated on raids of this nature which therefore should only be undertaken when the potential results can justify the losses that may be incurred.

The front of the advance on such operations is from 650 to 765 yards, and the depth of the formation ordinarily will be from 440 to 660 yards. The tanks are allocated to two "combat units". The first combat unit, according to Japanese tank-training literature, is assigned the mission of liquidating enemy antitank weapons, whereas the primary objective of the second combat unit is the destruction or neutralization of hostile automatic weapons.

Emphasis on Offense

Japanese tactical doctrine emphasizes the offensive almost exclusively. The defense is considered to be merely a passing phase in combat during which the Japanese must assume the ignominious role of defense because of



Figure 15.—Model 95 (1935) light tank dug in to face a beach on Eniwetok. The revetment is open to the rear so that the tank may back out.

the overwhelming superiority of the enemy. The object of defense is believed to be the depletion of the enemy's strength until such time as the Japanese can initiate a counterattack.

Since the tank is predominantly an offensive weapon, this factor, taken in conjunction with the general Japanese views on defensive tactics, means that practically no attention is paid to defensive tank tactics. In a defensive situation the tanks are to be employed for counterattack purposes. They are expected to deliver short, speedy assaults upon the designated objectives in close cooperation with artillery. As soon as their mission is accomplished, according to Japanese doctrine, they will break off the engagement. If enemy tanks are present in superior numbers, counterattacking Japanese tanks try to coordinate their action with their antitank-weapons fire. In recent action the Japanese have dug in their tanks and used them defensively as artillery or even as antitank weapons.

CHAPTER III. Equipment

Introduction

The first tanks used by the Japanese army were of European manufacture. British and French designs were adopted and vehicles produced by Vickers, Carden-Lloyd, and Renault were used on a small scale by the Japanese armed forces until domestic manufacture of armored vehicles was begun in 1929. Since the conclusion of the Tripartite Pact (27 September 1940), German tank designs apparently have been made available to the Japanese; and since the Nomonhan incident of 1939 on the Mongolia-Manchuria border, Soviet equipment likewise has been available for study by Japanese designers. Combat with the forces of the United Nations has afforded another source for ideas relative to the design of Japanese tanks. There is no evidence, however, that foreign principles of tank construction have exercised a direct influence on Japanese design.

Japanese tanks encountered thus far have been inferior to those utilized by Axis and Allied armies in Europe and North Africa. Their armor was too thin, although of good quality, and insufficient attention had been given to the utilization of deflection angles. In many cases reentrant angles had been formed, and no effort apparently had been made to protect turret rings or mantlets against jamming or splash.

No tanks encountered, with the exception of a negligible number of heavy vehicles, have been armed with weapons heavier than 57-mm guns. Light tanks have 37-mm guns, and one variation of the Model 95 (1935) light tank was armed with a 47-mm gun. Machine guns are mounted both in front and rear, but it is doubtful if the rear weapon can be fought at the same time as the other armament. All guns, with the exception of the 47-mm gun and the new Model 1 (1941) 37-mm tank gun, are low-velocity weapons. It should be borne in mind, on the other hand, that the development of hollow-charge ammunition to some degree will compensate for this disadvantage.

Crew space is cramped in models captured to date, and no escape doors or hatches have been provided. Visibility has been poor. Radio equipment has been installed on an extremely meager basis judged by the standards of the armored forces of other armies.

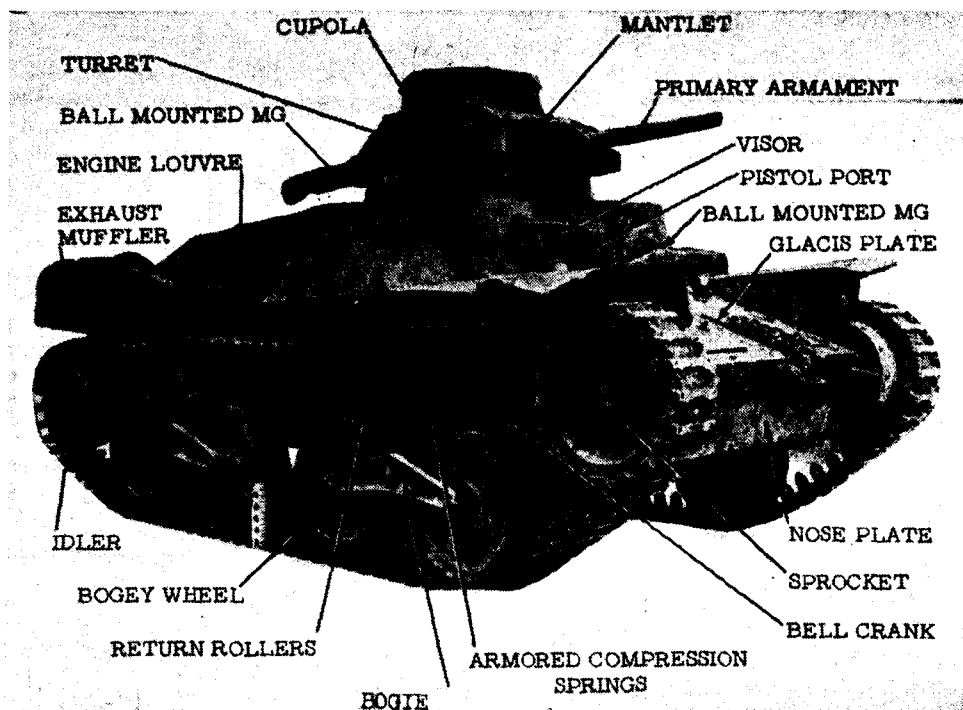


Figure 16.—Tank nomenclature.

Improved Models Expected

Despite these deficiencies of earlier models, the design of efficient modern tanks, even heavy types, is not beyond the capabilities of the Japanese. They are familiar with the details of modern German models and have had an opportunity to observe American and British equipment. Limitations on the productive capacity of Japanese industry impose the necessity of freezing tank models in order to attain a reasonably large volume of production. Nevertheless, it would be unwise to assume that the Japanese do not or will not have more effective armored vehicles than those encountered to date.

Much heavier armor, or the addition of spaced armor to the present armor, can be expected in newer models. To compare with European and American standards, the armor of light tanks should be as much as 40-mm thick; that of medium tanks, 75-mm. Heavy tanks would be expected to have armor up to 100-mm in thickness. Heavier armor in each case would be compensated for normally by the installation of wider tracks to reduce ground pressure.

Equipment of medium tanks with a modern, high-velocity gun of at least 75-mm caliber would be imperative in any program of improving Japanese tank design, and the installation of coaxially mounted machine guns likewise can be anticipated. Hulls may be improved by a better employment



Figure 17-a.—Rear of light tank found on Tinian Island, showing hit by and effect of HE projectile.

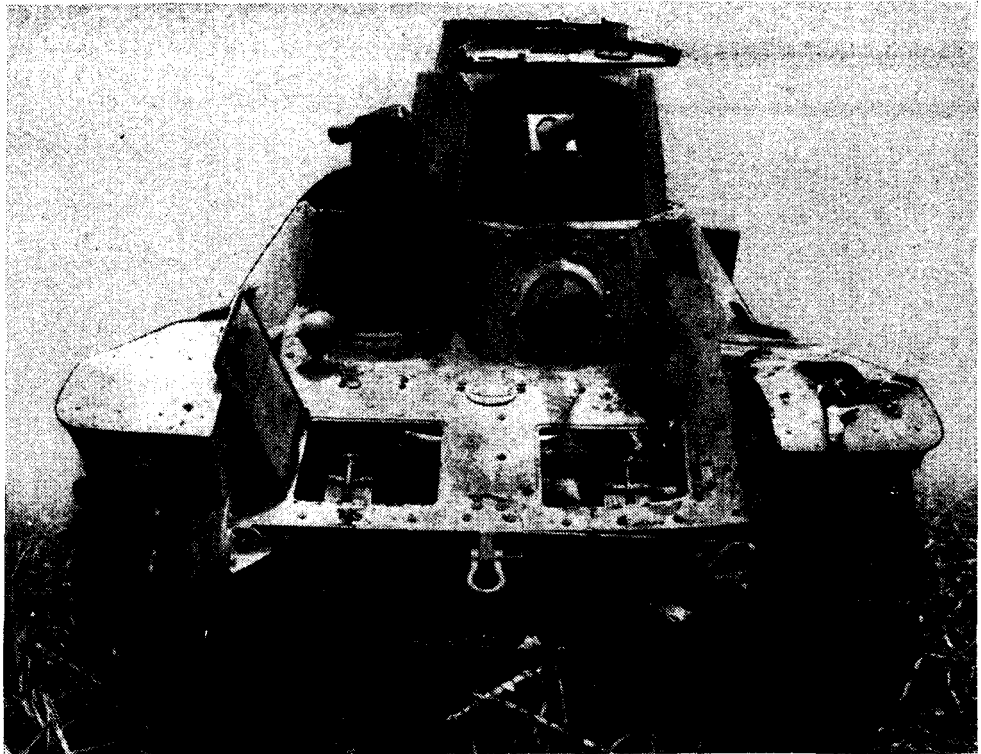


Figure 17-b.—Front of light tank, showing effect on front of hit by HE projectile.



Figure 18.—Model 95 (1935) light tank knocked out on Peleliu Island. An anti-aircraft machine gun is mounted on the turret. The crew was burned by a flame thrower while attempting to escape.

of deflection angles, and accessory equipment will be augmented, particularly by the installation of two-way radios, perhaps in every tank. Greater attention will be paid to crew comfort. Escape doors, periscopes, improved vision, gas-fume extraction equipment, better anti-aircraft armament, and similar accessories probably will be incorporated in modernized models. Continuance of high power-weight ratios may be expected, making possible high speed and good cross-country mobility.

Japanese tanks are classified into four types according to their weight. These are tankettes which weigh less than $5\frac{1}{2}$ tons; light tanks weighing from $5\frac{1}{2}$ to 11 tons; medium tanks with a weight range from 11 to 22 tons; and heavy tanks over 22 tons.

Tankettes

The development of tankette models has been progressive. In China, Japanese tankettes were used in reconnaissance and cavalry roles and, when equipped with tracked trailers, also were employed to carry supplies and ammunition.

The Model 92 (1932) tankette represents probably the earliest tankette model still commonly used. This vehicle has the turret mounted to the

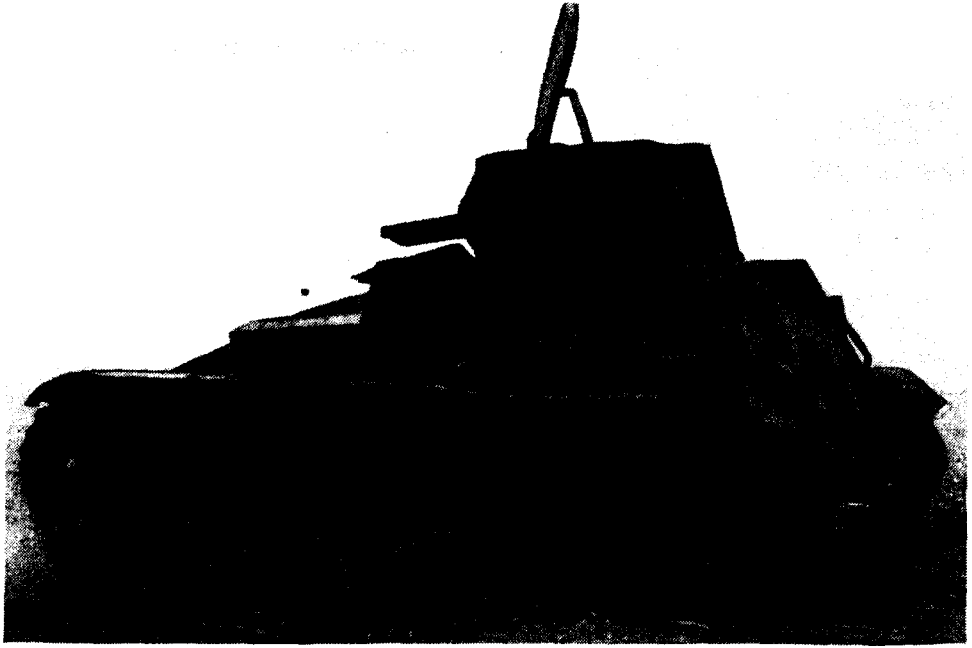


Figure 19.—Model 92 (1932) tankette.

rear of the chassis, giving it a boot-like 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

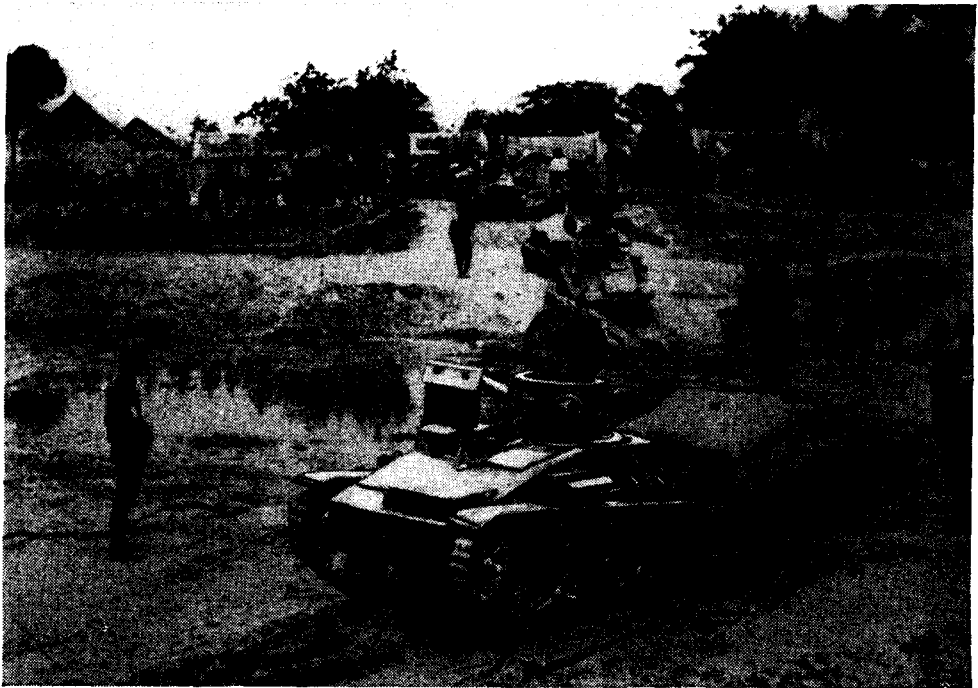


Figure 20.—Model 92 (1932) tankette with tracked trailer.

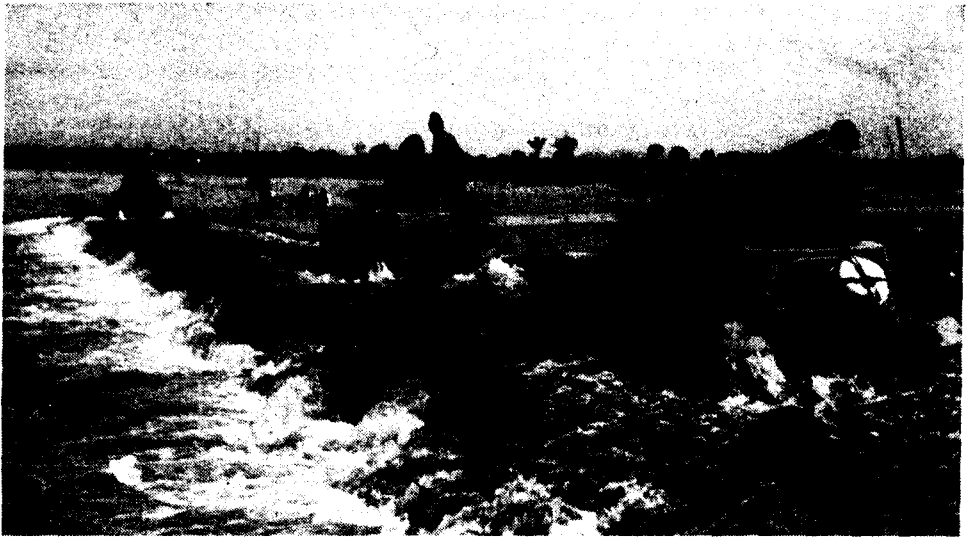


Figure 21.—Model 92 (1932) tankettes crossing Sinkiang River.

MODEL 92 (1932) TANKETTE

Approximate specifications

1. Weight 3 tons.
2. Length 10 feet 3 inches.
3. Width 5 feet 3 inches.
4. Height 5 feet 4 inches.
5. Clearance 13½ inches.
6. Crew 2 men.
7. Armor 6 to 14-mm (0.24 to 0.55 inch).
8. Armament 17.7 MG ball mounted.
9. Ammunition 1,980 rounds.
10. Engine, 4 cylinder 32 horsepower, gasoline.
11. Transmission 4 forward, 1 reverse.
12. Ground contact 6 feet.
13. Width of track 5 inches.
14. Track pitch 3 inches.
15. Diam. sprocket 21 inches.
16. Diam. bogie wheel 15 inches.
17. Diam. rear idler 15 inches.
18. Height to center of sprocket 25 inches.

Approximate maximum performance

1. Speed 25 miles per hour.
2. Range of action 100 miles.
3. Gradient 27°.
4. Obstacles:
 - Trench 4 feet 6 inches wide.
 - Step 2 feet 1 inch high.
 - Ford 2 feet deep.

on each side. There are four rubber-tired bogie wheels in pairs and two return rollers on each side. A front sprocket drive is used. 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.

Tankette Model 94 (1934) is basically the same as the parent Model 92. The rear idler, however, has been replaced by a trailing idler and the front drive sprocket has been lowered to compensate for this. Bell-crank suspension with armored compression springs is employed, as in the Model 92,

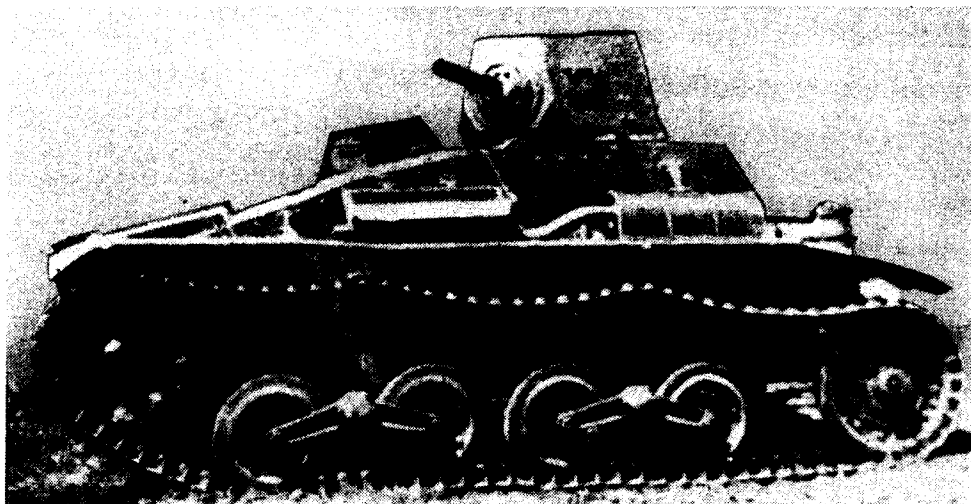


Figure 22.—Model 94 (1934) tankette.

and the number of rubber-tired bogie wheels and return rollers is the same as in the earlier model. It is reported, however, that a Ford 4-cylinder tractor engine is used in the Model 94.

Specifications of the Model 97 (1937) tankette vary considerably in reports from several combat theaters. As compared with the Model 94, the suspension remains unchanged. The hull, however, has been completely redesigned. More room has been provided in the turret to accommodate the 37-mm gun, although a machine gun sometimes is mounted instead of the tank gun. The design of the front plate is simpler than in earlier models and deflection angles have been improved. Significant armor is .47 in. thick.

There is a large hatch on the turret top and a hatch over the driver's compartment which cannot be opened when the turret is at the 12-o'clock position. There also is a hatch over the engine-compartment grille and a small hatch in the rear sloping plate of the engine compartment. There is a driver's visor, and a vision slit in the turret equipped with a protectoscope at about a 10-o'clock position. There is a small pistol port in the

rear of the turret. No facilities for intercommunication of crew members are provided.

The vehicle is powered by a 4-cylinder in-line, air-cooled Diesel engine of 48 horsepower. Engine specifications, however, indicate that this engine might develop 105 horsepower at 2,000 revolutions per minute.



Figure 23.—Model 97 (1937) tankette.

MODEL 94 (1934) TANKETTE

Approximate specifications

1. Weight 3.4 tons.
2. Length 11 feet.
3. Width 5 feet 3 inches.
4. Height 5 feet 4 inches.
5. Clearance 12 inches.
6. Crew 2 men.
7. Armor 4 to 12-mm (0.16 to 0.47 inch).
8. Armament 17.7 MG.
9. Traverse 360°.
10. Ammunition 1,980 rounds.
11. Fuel capacity 23.3 gallons.

Approximate maximum performance

1. Speed 26 miles per hour.
2. Range of action 100 miles (estimated).
3. Gradient 27° (also reported as 30°).
4. Obstacles:
 - Trench 4 feet 6 inches wide.
 - Step No details.
 - Ford 2 feet deep.

MODEL 97 (1937) TANKETTE

Approximate specifications

1. Weight 4.5 tons.
2. Length 12 feet.
3. Width 6 feet.
4. Height 6 feet.
5. Clearance 14 inches.
6. Crew 2 men.
7. Armor 4 to 12-mm (0.16 to 0.47 inch).
8. Armament 137-mm gun.
9. Ammunition 96 rounds.
10. Transmission 4 forward 1 reverse.
11. Steering Drive shaft brake.
12. Fuel capacity 20 gallons (also reported 24 gallons).

Approximate maximum performance

1. Speed 28 miles per hour.
2. Gradient 30° (also reported as 34°).
3. Obstacles:
 - Trench 5 feet 3 inches wide.
 - Step No details.
 - Ford 2 feet 6 inches deep.

The tentatively identified Model 98 (1938) tankette sometimes is confused with the Model 97. It has a squat, rounded appearance, and the turret is set centrally. A three-man crew is carried, with a turret gunner and front gunner in addition to the driver.

Suspension is bell crank, spring resisted, with four bogies in pairs on each side and a large rear idler which also acts as a bogie. There are two return rollers on each side; the drive is of the front-sprocket type.

The vehicle mounts a 13.7-mm machine gun in the turret and a light machine gun, probably 7.7-mm, in the hull. Also reported is a model that had a 37-mm gun as its only armament.

Additional specifications are:

Length	-----	10 feet 3 inches.
Width	-----	5 feet 9 inches.
Height	-----	5 feet 4 inches.
Weight	-----	3 to 4 tons.
Speed	-----	33 mph (max.).
Armor	-----	Same as Model 92.
Ford	-----	2 feet 6 inches.
Trench	-----	4 feet 6 inches.
Belly clearance	-----	1 foot 1 inch.

Light Tanks

The Model 93 (1933) is an early example of the 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, the gunner on the right.

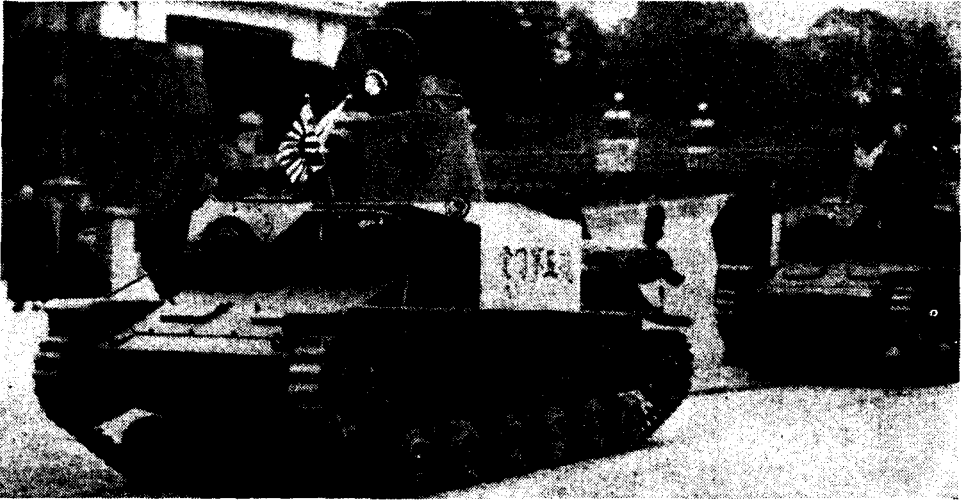


Figure 24.—Model 93 (1933) light tank.

Suspension is by six small rubber-tired bogie wheels mounted on three semielliptical springs on each side. There are three return rollers on each side, and drive is of the front-sprocket type. The track is center guide.

The turret mounts one machine gun to the front, and some pictures show a similar weapon mounted in the rear. Traverse of these weapons is 360 degrees. The turret is small, high, and rounded, with sloping sides.

MODEL 93 (1933) LIGHT TANK

Approximate specifications

1. Weight..... 7.8 tons.
2. Length..... 14 feet 8 inches.
3. Width..... 5 feet 11 inches.
4. Height..... 6 feet.
5. Clearance..... 15 inches.
6. Crew..... 3 men.
7. Armor..... Up to 22-mm (0.87 inch) (reported).
8. Armament..... 1 MG light (hull) 1 MG light (turret).
9. Steering..... Clutch brake.
10. Ground contact..... 10 feet.

- 11. Engine 6-cylinder 85-horsepower Mitsubishi.
- 12. Cooling Air.
- 13. Width of track 7½ inches.
- 14. Pitch of track 3½ inches.
- 15. Diam. of sprocket 1 foot 6 inches.
- 16. Diam. of rear idler 1 foot 3 inches.
- 17. Height of sprocket center 1 foot 8 inches.

Approximate maximum performance

- 1. Speed 28 miles per hour.
- 2. Obstacles:
 - Trench 5 feet 8 inches wide.
 - Step 1 foot 6 inches high.
 - Ford 2 feet 8 inches deep.

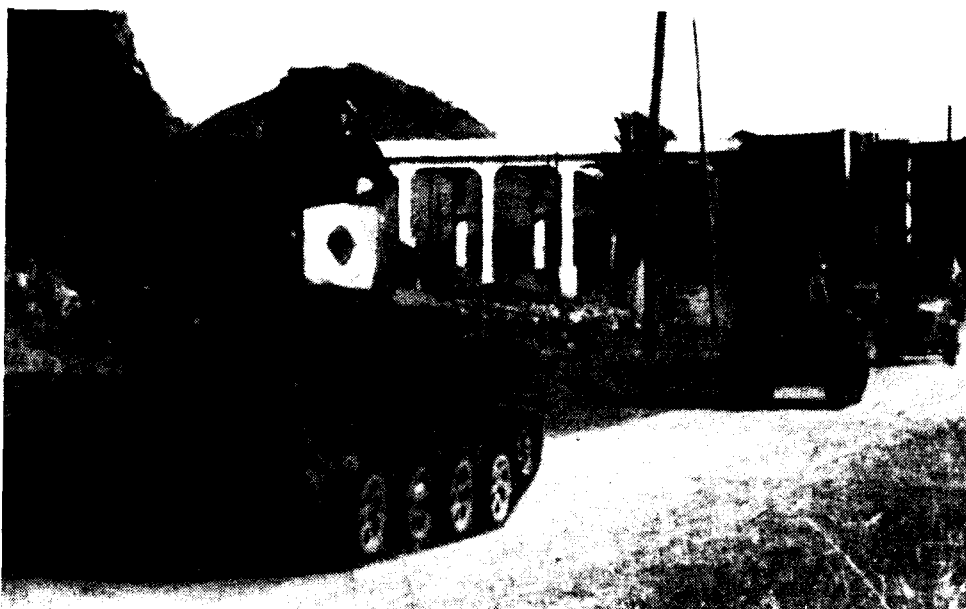


Figure 25.—Model 93 (1933) light tank (improved).

MODEL 93 (1933) IMPROVED LIGHT TANK

Approximate specifications

- 1. Weight 7.8 tons.
- 2. Length 14 feet 8 inches.
- 3. Width 5 feet 11 inches.
- 4. Height 6 feet.
- 5. Clearance 15 inches.
- 6. Crew 3 men.
- 7. Armor up to 22-mm (0.87 inch) (reported).
- 8. Armament 1 37-mm tank gun, 1 turret MG.
- 9. Engine 6-cylinder, 85-horsepower air-cooled Mitsubishi.
- 10. Ground contact 9 feet 6 inches.

- 11. Width of track 7½ inches.
- 12. Track pitch 3½ inches.
- 13. Diam. bogie wheel 15 inches.
- 14. Steering Clutch brake.
- 15. Fuel Gasoline.

Approximate maximum performance

- 1. Speed 25 miles per hour.
- 2. Range of action 120 miles.
- 3. Obstacles:
 - Trench 5 feet 8 inches wide.
 - Step 1 foot 6 inches high.
 - Ford 2 feet 10 inches deep.

Model 94 (1934)

The Model 94 (1934) two-man light tank shows some pronounced variations from earlier designs. The hull is constructed of armor plate which reaches entirely around the vehicle and protects the interior from enemy fire. Both the turret and the suspension are mounted on the hull. Mudguards, suspension spring covers, the final drive covers, return rollers, and idler wheels are attached to the side plates of the hull.

Armor thickness has not been accurately ascertained. There are vision slits to the right and left of the driving compartment; in front of the lever-operated flap door of the driving compartment there is another vision aperture fitted with bullet-proof glass. There also is a sighting and firing aperture for a small-arms weapon. In front of the hull is an access plate which can be lifted for servicing the differential and the engine. The back plate also has an entrance hatch door and a special fitting for stowage. Apertures in the floor plate for lubrication of the engine and transmission are watertight. On the left of the top plate there are air-cooling and exhaust openings which, of necessity, must be exposed.

Suspension of the vehicle is somewhat unusual. Pairs of bogie rollers are carried at the ends of levers pivoted on the ends of bell cranks which, in turn, are pivoted in the hull structure. The vertical arms of the bell cranks are connected by rods to horizontal springs. The disc road wheels are of two-piece, built-up construction, with rubber tires; the return rollers also are fitted with rubber tires.

The gun turret, which has a tapered cross-section, is mounted on a ball and race for quick and easy rotation and forms a cover for the firing compartment. There is no rotation gear, however. The mantlet for the machine gun is ball-mounted and in two parts, and there is a turret traverse lock. In addition to the entrance hatch there are two vision apertures, a gun-sighting aperture, and an aerial mast opening. The interior of the turret, as well as the inner surfaces of plates surrounding the driving and fighting compartments of the hull, are lined with asbestos to protect the

crew from engine and sun heat. One light machine gun is installed on a ball mounting.

The engine is a 4-cylinder, in-line, air-cooled model. It is old fashioned in design, having among other outmoded features a splash-type lubrication system. It is believed that it can develop about 50 horsepower at 1,700 revolutions per minute. Maximum speed of the tank is estimated at about 16.5 miles per hour.

Model 95 (1935)

The Japanese light tank most frequently encountered in the combat theaters to date is the Model 95 (1935). There is reason to believe that this vehicle was in production from 1935 to 1942, and evidence indicates that the design of Japanese light tanks was frozen to permit production of large numbers of this model.

While designed primarily to operate in soft, spongy ground, the chassis and power plant of this tank are adequate for satisfactory performance in all types of terrain where tanks normally can operate. High horsepower-weight ratio, high ground clearance, and the cleat construction of the track are factors that would insure good cross-country mobility. Forging is facilitated by the installation of leather gaskets on hatch covers which are below the level of the air-intake louvres.

Workmanship and design of the vehicle on the whole are good. The lavish use of aluminum and light alloys, as well as the equally prodigal employment of self-aligning ball-bearings, are striking features. The hull shows unmistakable evidence of complete redesigning. It is constructed over an angle-iron frame, with backing plates at the corners. The armor is $\frac{1}{2}$ inch thick, except on the sloping portion from the front to the turret where it is only $\frac{1}{4}$ inch. The armor is not well distributed, however, especially in the front where there are several reentrant angles. The hull is lined with a layer of woven asbestos padding which, although not considered effective protection against heat radiation, would provide some fire-proof protection for the crew.

The suspension makes use of an improved bell-crank design, with resistance provided by armored suspension springs mounted horizontally over the bogies. The horizontal springs give better track tension than would be afforded by volute springs, although crew and equipment are more subject to jarring, and the fire platform is not very stable. There are four bogie wheels mounted in pairs on each side, and two return rollers on each side. Suspension is designed to insure constant contact of the bogie wheels with the ground, irrespective of the nature of the terrain. Track pressure for a gross weight of 9 tons is 9.9 pounds per square inch.

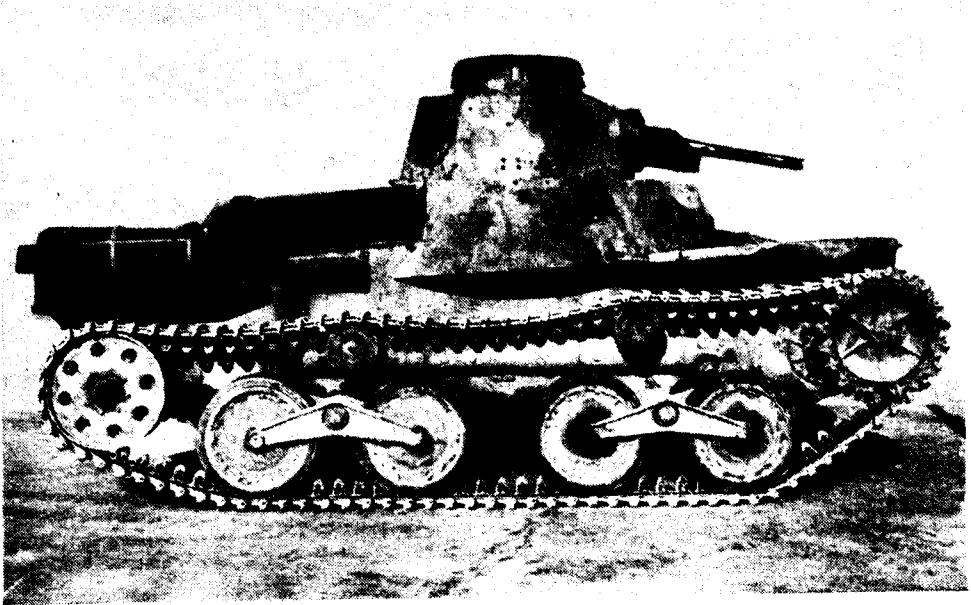


Figure 26.—Model 95 (1935) light tank, right side.

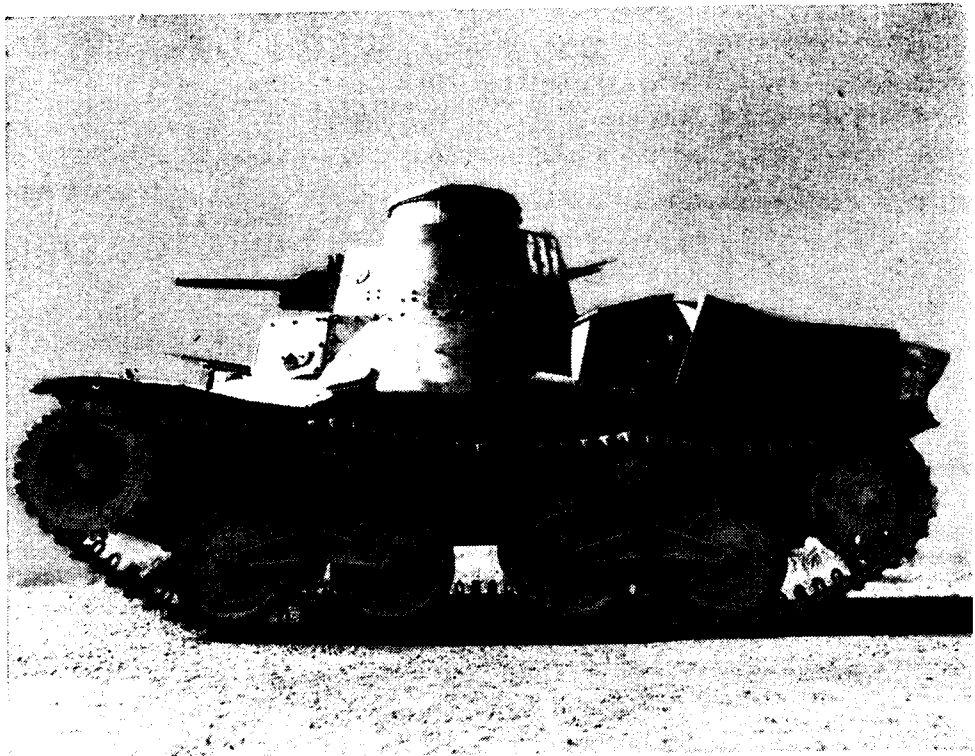


Figure 27.—Model 95 (1935) light tank, left side. Note stowage.



Figure 28.—Model 95 (1935) light tank, right front view.

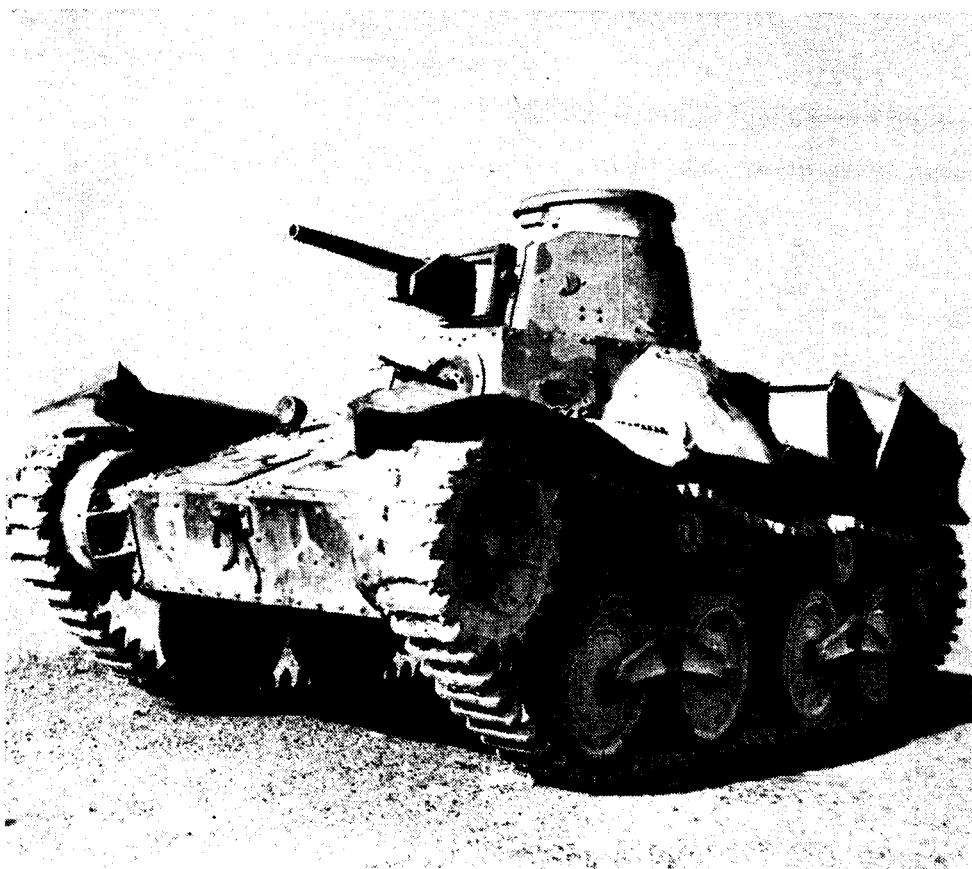


Figure 29.—Model 95 (1935) light tank, left front view.

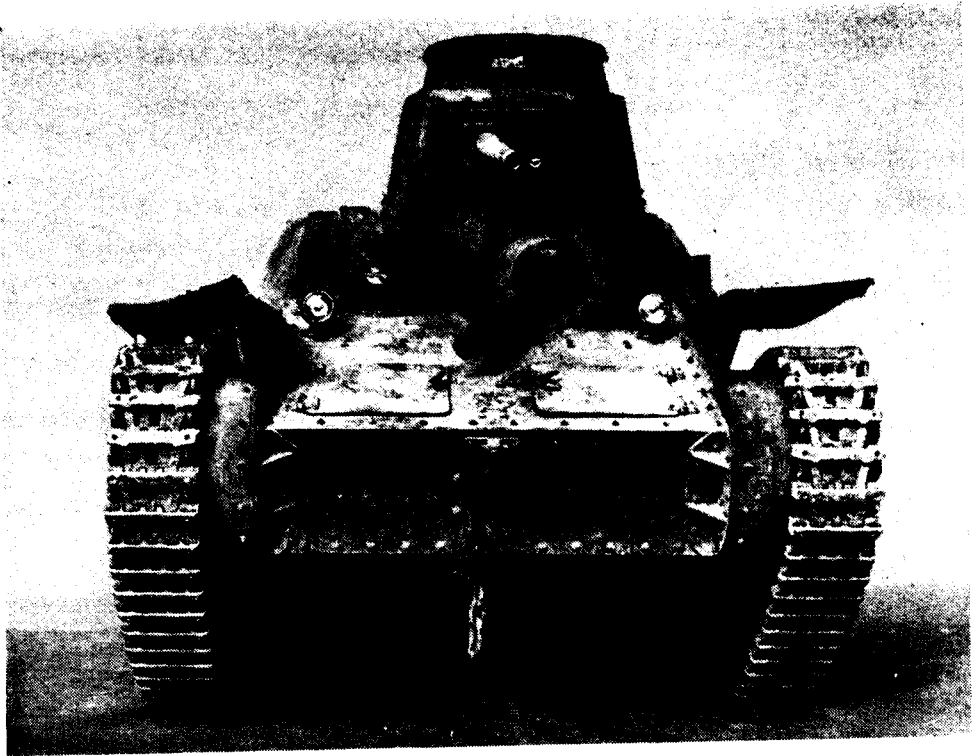


Figure 30.—Model 95 (1935) light tank, front view.



Figure 31.—Model 95 (1935) light tank, rear view.



Figure 32.—Model 95 (1935) light tank, top view.

Idler Is Vulnerable

The vehicle has a front drive sprocket, 21 inches in diameter, and a rear idler of the same size. The rear idler is held by a single bracket, and its design permits quick and easy tightening of the track tension merely by employment of an 8-inch crescent wrench. This idler and its mounting are without covering and therefore very vulnerable. Indeed, there is a verified report that an Australian infantryman crippled a Model 95 tank by a hit on the idler mounting with a .303 caliber rifle bullet.

A rounded turret with a square front is mounted on a medium high superstructure. The sides of the superstructure protrude over the top of the tracks, which are 10 inches wide with a pitch of 4 inches. The turret is manually operated by a lever on the left side. The turret gunner's space is very cramped, and no seat is provided. When the turret is in a position from 1 to 5 o'clock, visibility to the right is very poor. When the turret is in a 1 to 3 o'clock position it overhangs the hull and easily can be wedged and jammed. A gap of from $\frac{3}{16}$ to $\frac{1}{2}$ inch between the turret and the hull, depending upon the position of the former, presents a point of great vulnerability, for when the gunner traverses the turret this slit is open to attack all around.

The driver's hatch is 13 inches square and has a small door 6 inches square. Both horizontal and vertical vision slits are in the door. There is a peep hole, 2 inches in diameter, on each side of the bow gun. Along the top portion of the turret are six equally spaced vertical and horizontal slits which offer limited visibility despite their number. The absence of glass visor blocks makes these slits very vulnerable to machine-gun and even rifle fire. The driver's slit is vulnerable to splash from ordinary .30 caliber rifle ammunition. Two air vents in the engine compartment are open to attack by Molotov cocktails, and only two quart-size hand fire extinguishers are available to the crew to cope with fires started in this fashion.

The vehicle is powered by a 6-cylinder, in-line Diesel engine which develops 110 horsepower at 1,400 revolutions per minute and 200 to 250 horsepower at 2,000. The engine has ample power and good acceleration but its starting is sluggish. It is air-cooled with turbo impellers. Fuel injection system and oil pumps, as well as starter and generator, are of

MODEL 95 (1935) LIGHT TANK

Specifications from actual examination

1. Weight..... 10 tons (loaded).
2. Length..... 14 feet 4 inches.
3. Width..... 6 feet 9 inches.
4. Height..... 7 feet.
5. Clearance..... $15\frac{1}{2}$ inches.

6. Crew 3 men.
7. Armor 6 to 12-mm (0.24 to 0.47 inch).
8. Armament 1 37-mm type 94 tank gun, 1 7.7-mm rear turret MG, 1 7.7-mm hull MG.
9. Ammunition
 - 37-mm 130 rounds.
 - MG 2,970 rounds.
10. Engine 110 horsepower at 1,400 RPM (240 theoretically indicated HP at 2,000 RPM—based on reported engine specifications).
11. Transmission 4 speeds forward, 1 reverse.
12. Steering Clutch brake.
13. Ground contact 7 feet 8 inches.
14. Width of track 9 $\frac{7}{8}$ inches.
15. Track pitch 3 $\frac{3}{4}$ inches.
16. Diam. sprocket 21 inches.
17. Diam. bogie wheel 22 $\frac{1}{4}$ inches.
18. Diam. rear idler 21 inches.
19. Height to center of sprocket 32 inches.

Approximate maximum performance

1. Speed 28 miles per hour.
2. Range of action 100 miles.
3. Gradient 40°.
30° for long climb.
4. Obstacles:
 - Trench 6 feet wide.
 - Step 2 feet 8 inches high.
 - Ford 3 feet 3 inches deep.

THE LIGHT TANK "KENI" MAY BE A FOURTH VARIATION OF THE MODEL 95:

Approximate specifications

1. Weight 7.7 tons.
2. Length 13 feet 6 inches.
3. Width 7 feet.
4. Height 5 feet 11 inches.
5. Ground clearance 14 inches.
6. Crew 3 men.
7. Armament 1 47-mm gun and 1 MG.
8. Armor 6- to 16-mm (0.24 to 0.63 inch).
9. Engine 140 horsepower.

Approximate maximum performance

1. Speed 31 miles per hour.
2. Gradient 34°.
3. Obstacles:
 - Trench 6 feet 7 inches wide.
 - Ford 2 feet 3 inches deep.

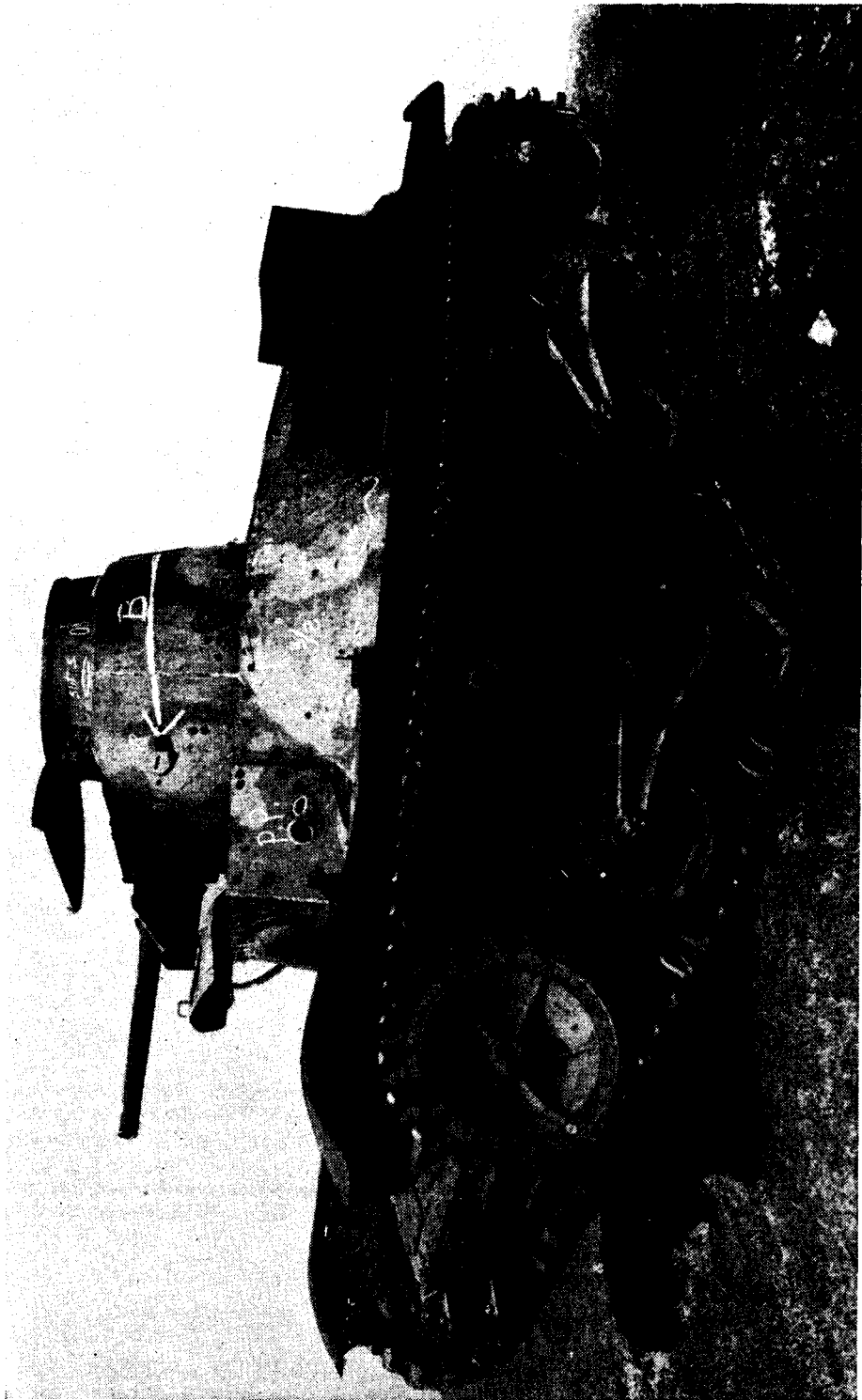


Figure 33.—Model 95 (1935) light tank showing suspension. Note pistol ports.

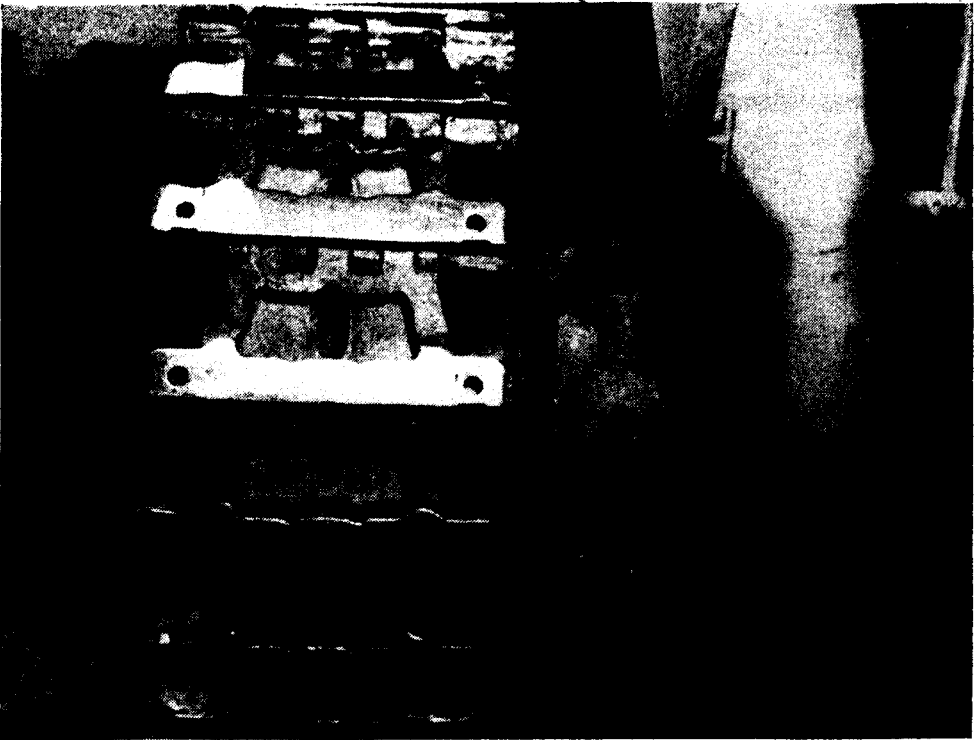


Figure 34.—Model 95 (1935) light tank. Track-adjusting nut and assembly.

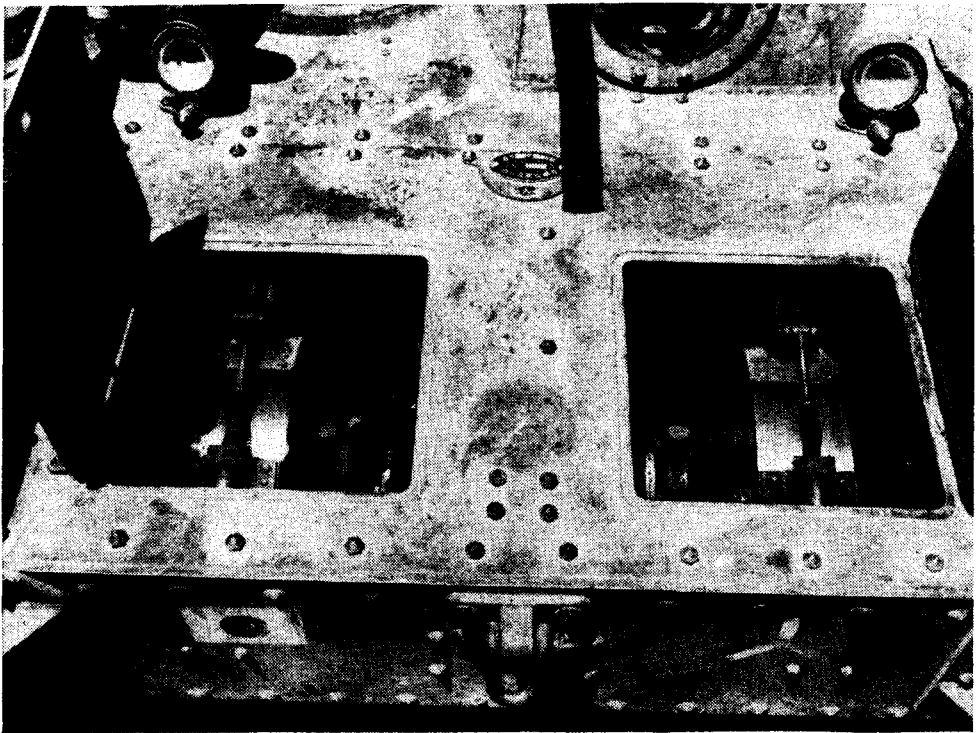


Figure 35.—Model 95 (1935) light tank, steering assembly.



Figure 36.—Model 95 (1935) light tank turret. Photograph shows how a knife blade will jam turret when forced into crevice between turret and tank body.

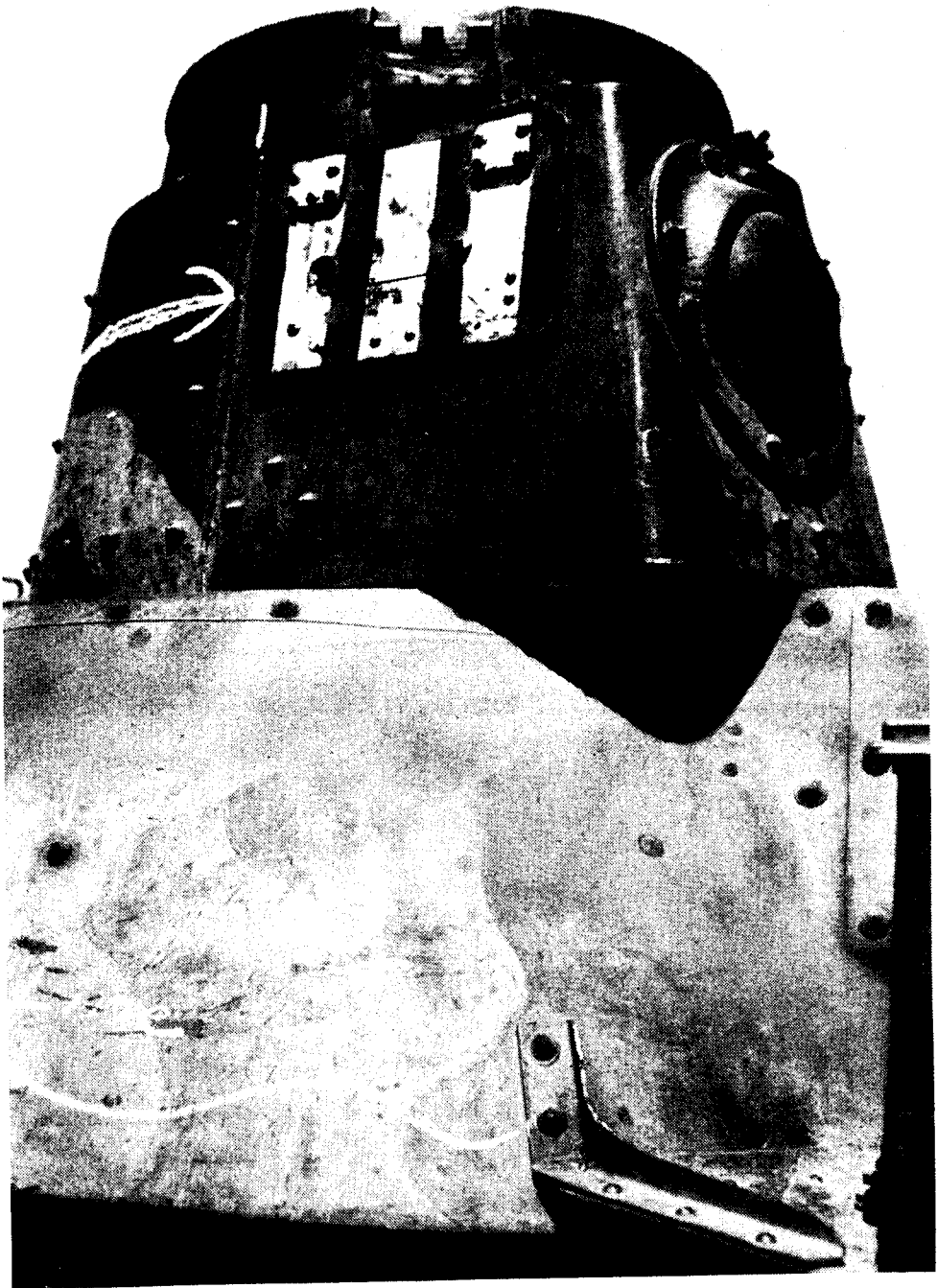


Figure 37.—A small brick or any hard object will jam the turret of the Model 95 (1935) light tank when turret is turned to overhang hull of tank.

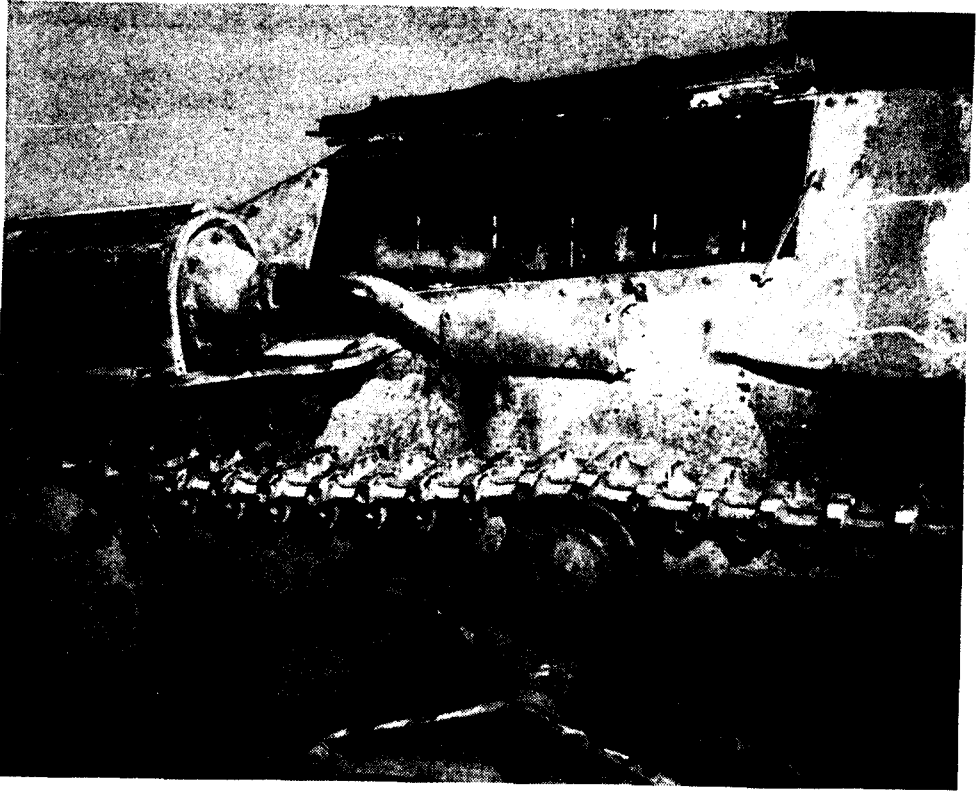


Figure 38.—Model 95 (1935) light tank. Six-cylinder, in-line, air-cooled Diesel engine.

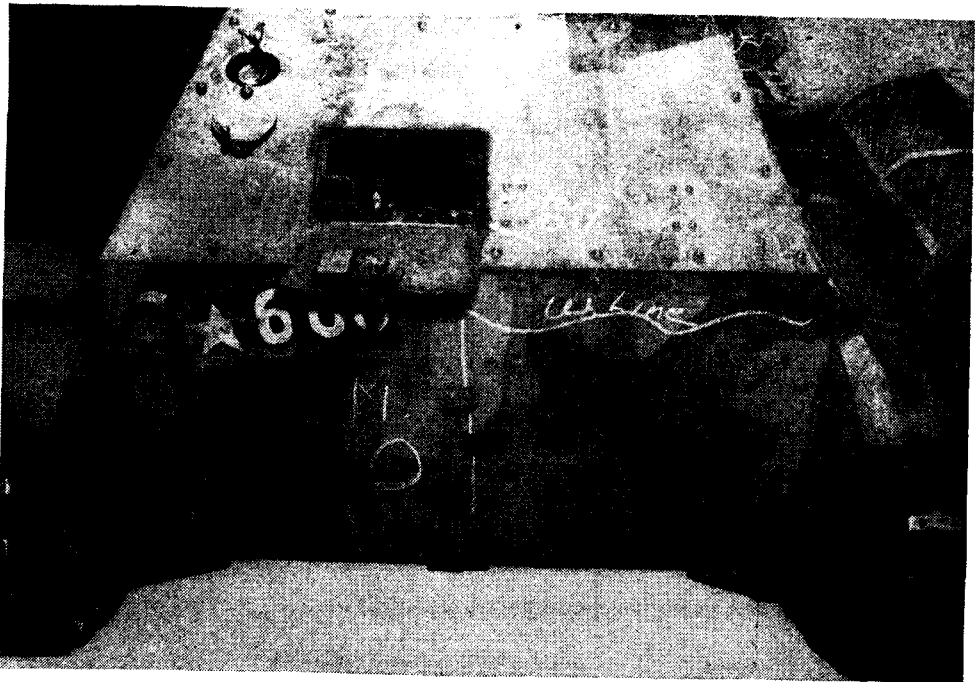


Figure 39.—Rear view of Model 95 (1935) light tank, showing fuel oil filler cap, motor oil storage tank and filler cap, and two rear idler brackets.

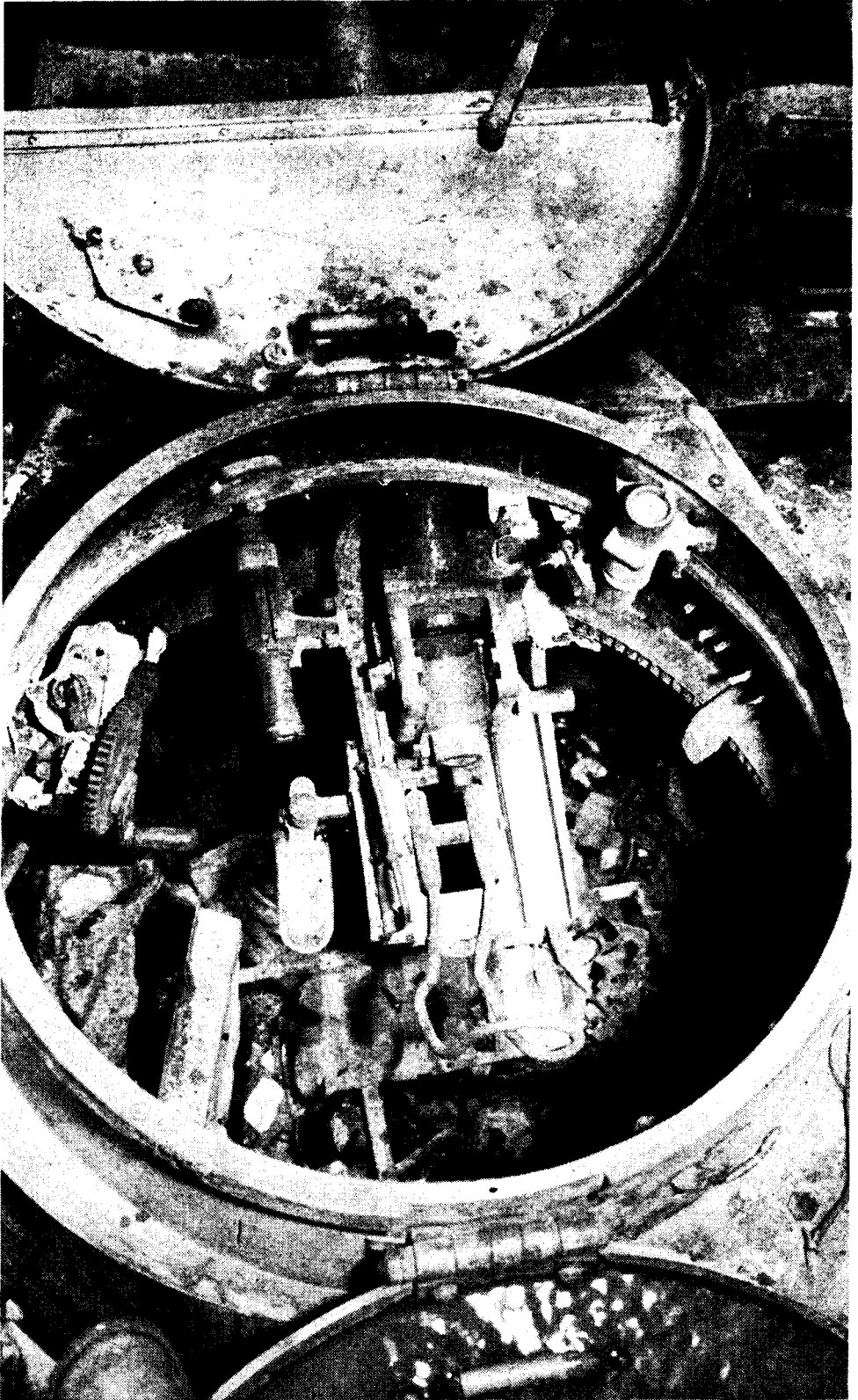


Figure 40.—Interior of turret of Model 95 (1935) light tank.

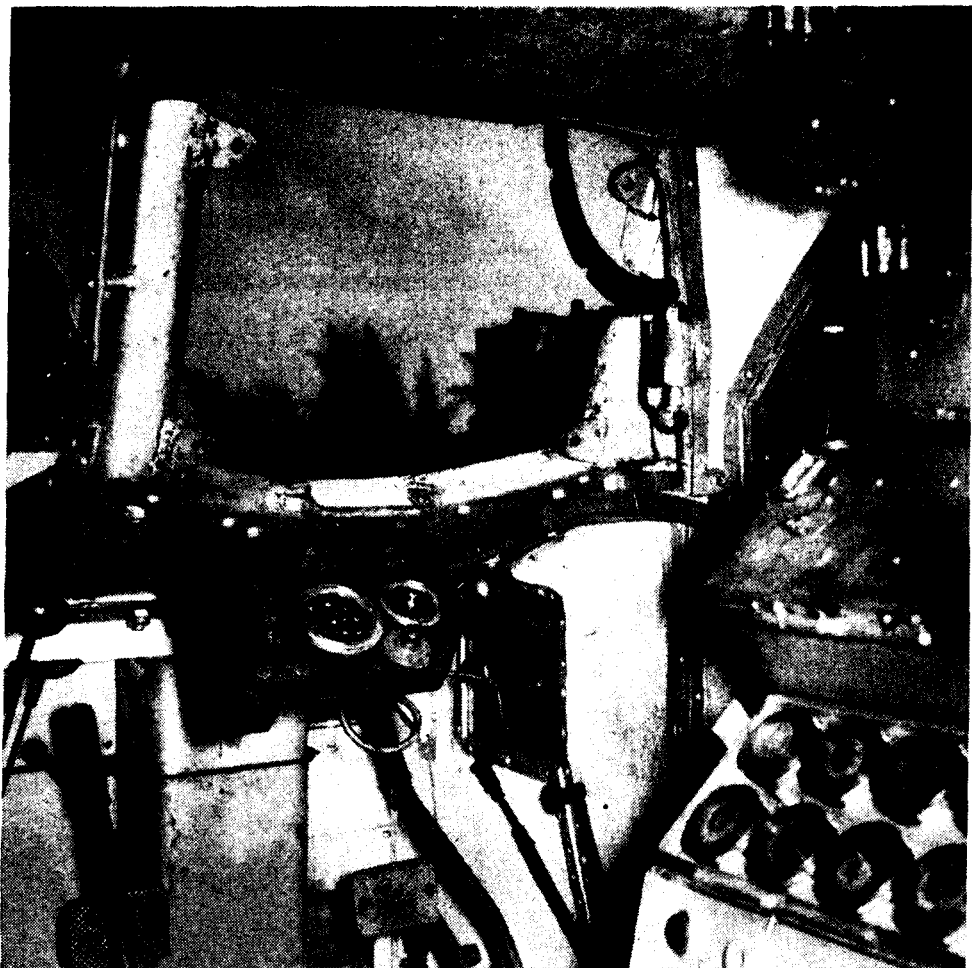


Figure 41.—Interior of driving compartment of Model 95 (1935) light tank.

Bosch manufacture. The fuel capacity is 23 gallons, with six gallons in reserve.

The tank is quite maneuverable, despite the use of disc-clutch steering. When a clutch lever is pulled to a half-way position, the clutch is disengaged; when pulled all the way back, the outside drum brake is set to permit sharper turning.

A 37-mm tank gun is installed in the turret, which also mounts a .30 caliber light machine gun in the right rear. There is another .30 caliber machine gun forward in the hull. The turret guns have a 12-degree elevation, a 16-degree depression, and a traverse (total) of 45 degrees. Ammunition for the 37-mm gun is carried in clips and racks in the fighting compartment; ammunition for the machine guns is carried in magazines under the forward machine gun and in the fighting compartment.

Armor Too Light

Mention has been made of a number of vulnerable points in the design and construction of the Model 95. Its light armor, especially on the under-

side of the sponsons, is perhaps its outstanding weakness. In actual combat, 75-mm HE shells blew the turrets completely off several of these tanks. In another instance, a 75-mm AP shell fired at a range of from 100 to 500 yards entered the right front of a Model 95 and came out the rear, leaving a hole one foot in diameter all the way through. The external exhaust manifold, the suspension mechanism, and the idler are vulnerable to machine-gun fire, while the bogie wheels can be destroyed by hand grenades. While definitely an improvement upon earlier models, the Model 95 is considerably below the standard of the light tanks as used in United Nations armies.

Amphibious Light Tank

A new type amphibious light tank recently found on Kwajalein Atoll shows the most modern trends yet seen in Japanese armored vehicles. The hull, which is not divided into compartments, is larger and roomier than that of the Model 95, and bulkheads have been eliminated. Armor protection is slightly increased with the front and turret having $\frac{1}{2}$ inch; the sides, rear and bottom, $\frac{3}{8}$ inch; and the top of both turret and hull, $\frac{1}{4}$ inch. The tracks have been widened to 12 inches, and the idler has been superseded by a trailing idler. The hull is welded throughout and all reentrant angles have been eliminated. Machine-gun fire of .30 caliber is effective only at the slits, but .50 caliber fire will penetrate the sides of the hull.

Suspension closely resembles that of the Model 94 and Model 97 tankettes except that the compression springs are mounted inside the vehicle. There are four bogies in pairs on each side mounted on a traverse even lever. The rear trailing idler serves as an additional bogie. The engine is a 6-cylinder, air-cooled Diesel with no important new features distinguishing it from that used in the Model 95. Japanese ratings state that the land speed is 23 miles per hour maximum and the speed in water 6 miles per hour. Fuel capacity is 55 gallons.

The round turret is a new design characterized by considerably increased diameter in comparison with earlier models. A Model 1 (1941) 37-mm tank gun, which is a modification of the Model 94 antitank gun, is mounted coaxially with a 7.7-mm machine gun. These guns have a 360-degree traverse, a $5\frac{1}{2}$ -degree elevation, and a $11\frac{1}{2}$ -degree depression. The 37-mm gun has a higher muzzle velocity than the guns of the same caliber mounted in earlier model tanks. Tests have indicated that it is 2,212 feet per second for AP shell that would pierce 1.8 inches of armor at normal impact.

The flotation equipment for using the tank in water is interesting. Pontons are attached to both bow and stern of the vehicle. These pontons conform to the shape of the hull and are attached by a series of pincer clamps controlled by a handwheel inside the tank. The bow ponton, which is in six sections, has a volume of 220 cubic feet; the stern ponton

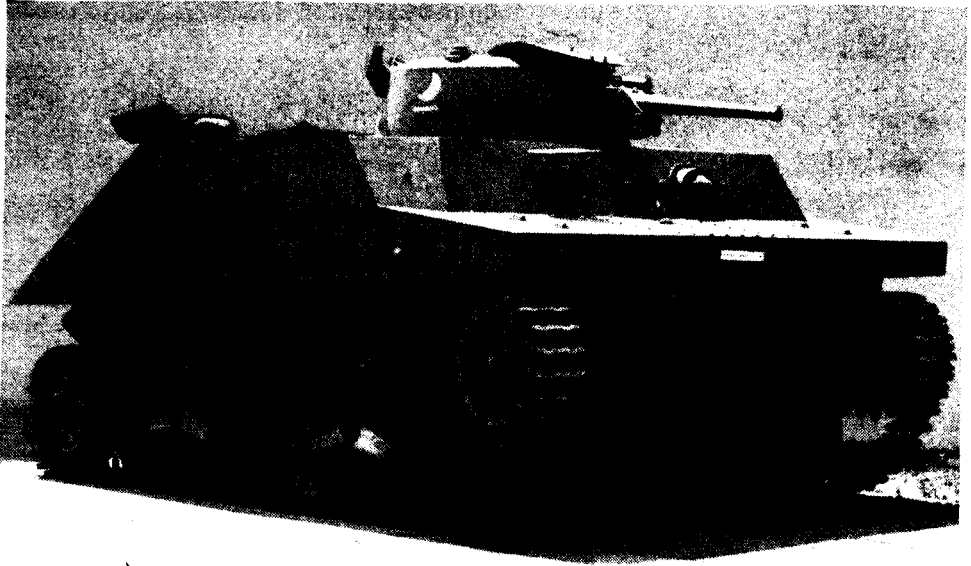


Figure 42.—Right front view of amphibious tank without pontons.



Figure 43.—Rear view of amphibious tank without pontons.



Figure 44.—Rear view of amphibious tank knocked out by Marine artillery at Saipan.

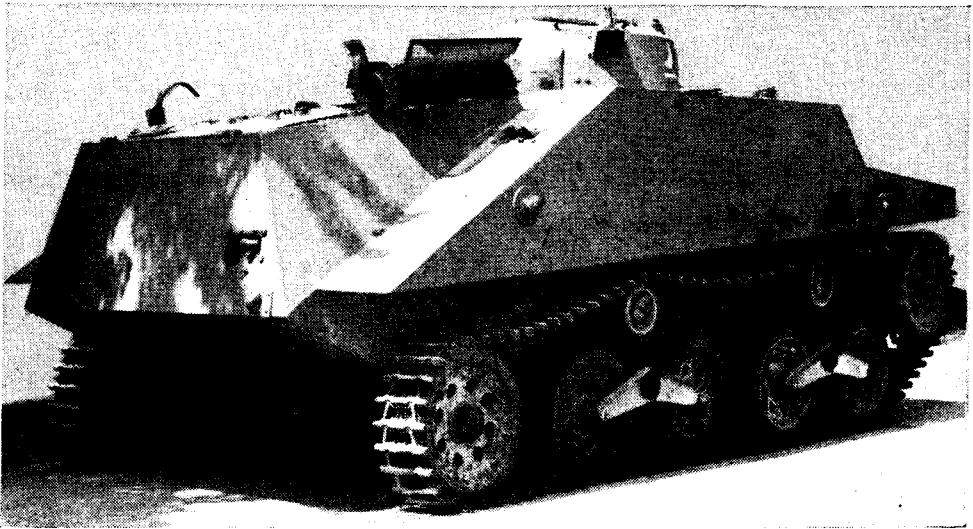


Figure 45.—Rear view of amphibious tank.



Figure 46.—Amphibious tank with bow ponton attached.

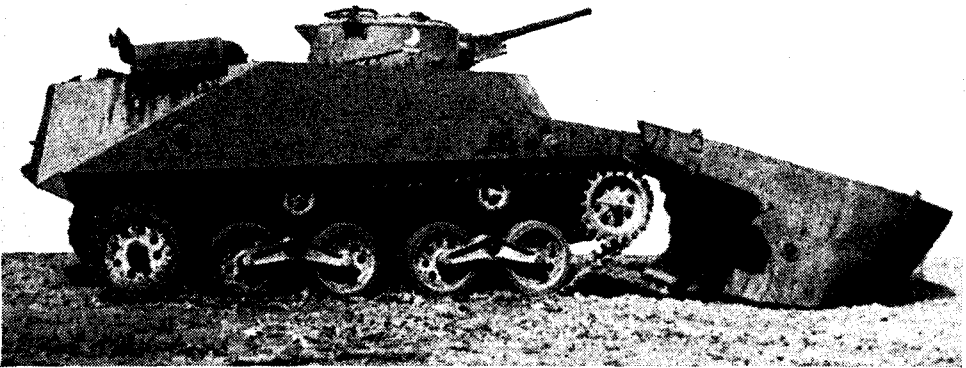


Figure 47.—Disengagement of bow ponton of amphibious tank.

in five sections, 105 cubic feet. The rudders are situated in the stern pontons and are operated from within the hull; the propellers are fitted to the rear of the tank. To prevent entrance of water, all openings up to and including the turret ring are rubber sealed.

AMPHIBIOUS LIGHT TANK

Specifications

1. Weight:
 - Tank (only) 13 tons (estimated).
 - Pontons (only) 3 tons (estimated).
2. Length:
 - Tank (only) 15 feet 8 inches.
 - With pontons 24 feet 7 inches.
3. Width 9 feet 2 inches.

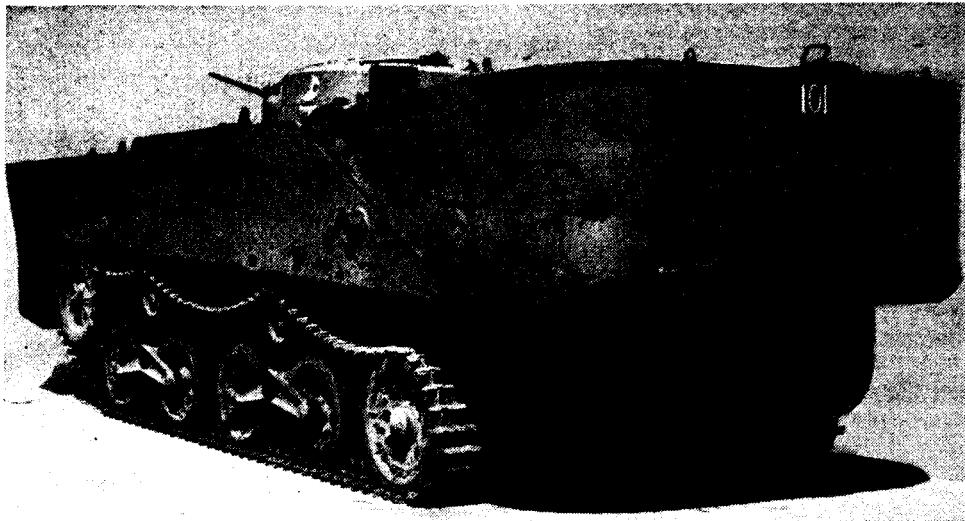


Figure 48.—Amphibious tank showing rear ponton attached.

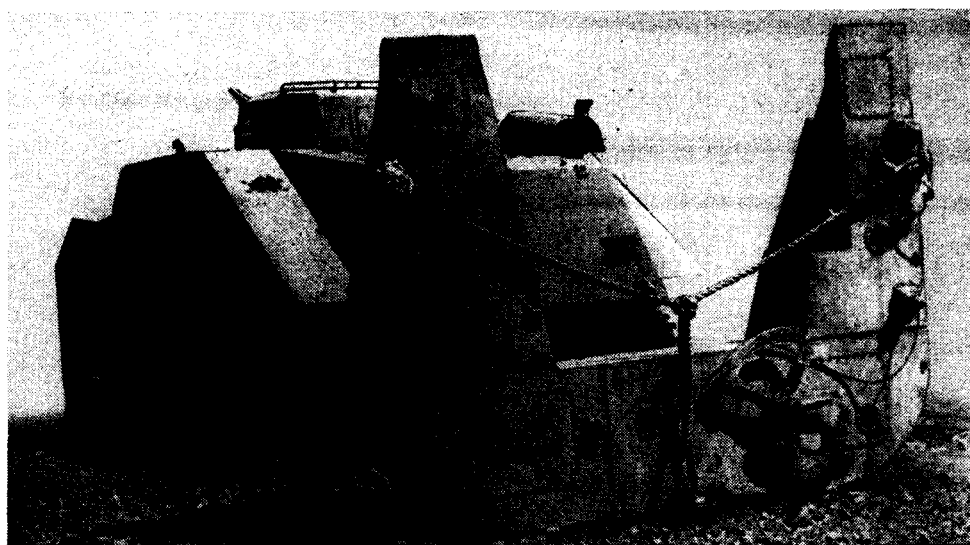


Figure 49.—Section of rear ponton of amphibious tank. Note tiller.

- 4. Height 7 feet 6 inches.
- 5. Ground clearance 14 inches.
- 6. Crew 5 men.
- 7. Armor:
 - Turret:
 - Sides 13.2-mm (0.52 inch).
 - Top 6-mm (0.24 inch).
 - Hull:
 - Front 12-mm (0.47 inch).
 - Sides 9-mm (0.35 inch).
 - Rear 8-mm (0.32 inch).
 - Top 6-mm (0.24 inch).
 - Bottom 8.5-mm (0.334 inch).

- 8. Armament 1-37-mm Model 1 (1941) in turret,
1-7.7-mm MG coaxially mounted,
1-7.7-mm MG in hull forward.
- 9. Engine 6-cylinder air-cooled Diesel (reported to
be identical with that in the Model
95 light tank).
- 10. Fuel capacity 66 gallons (2 tanks).
- 11. Suspension 2 bogies on each side of vehicle. Bogies
consist of 2 wheels mounted on a
transverse even lever. Rear trailing
idler serves as an additional bogie.
- 12. Track:
 - Length, overall 32 feet 1 inch.
 - Ground contact 11 feet 1 inch.
 - Width 1 foot.
 - Angle of approach $56\frac{1}{4}^{\circ}$.
- 13. Vision apertures and pistol ports:
 - Hull 1-4 x 1 inch slit for driver.
1-4 x $\frac{1}{8}$ inch slit for hull gunner.
4 pistol ports, one on each quarter of the
hull.
 - Turret 2-3.75 inch diameter vision ports, one
on each side of 37-mm gun.
2-4 x $\frac{1}{8}$ inch slits, one on each side of
turret.
3 pistol ports, one at each side and one
at the rear.
 - Safety glass Shatter-proof blocks are clamped over
all vision slits to prevent "bullet splash"
or entrance of water. Vision ports are
protected by 3-inch safety glass win-
dows.

Medium Tanks

The oldest model medium tank which has been employed by the Japanese in the current war is the 89A (1929). It is characterized by a box-shaped hull which has a short front plate with a door to the right. Above the short front plate is a vertical front plate, through the right side of which protrudes a light machine gun. A small cupola is hinged to 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 mounted along a girder, and the vehicle is rear-sprocket driven. A protective skirting almost entirely covers the suspension. Power is furnished by a gasoline engine. The main armament is a 57-mm low-velocity gun mounted, with a 360-degree traverse, in the turret. There also is a rear-turret light machine gun.

MODEL 89A (1929) MEDIUM TANK

Approximate specifications

1. Weight 13 tons.
2. Length 19 feet 3 inches.
3. Width 7 feet 1 inch.
4. Height 8 feet 6 inches.
5. Clearance 19 inches.
6. Crew 4 men.
7. Armor 6 to 17-mm (0.24 to 0.67 inch), also reported as 17- to 25-mm (0.67 to 0.98 inch).
8. Armament 1 57-mm, 1 hull MG, 1 rear turret MG.
9. Ammunition 57-mm 100 rounds, SAA 2,745 rounds.
10. Engine 136 brake horsepower.
11. Ground contact 12 feet.
12. Width of track 12 inches.
13. Track pitch 6 inches.
14. Diam. rear sprocket 30 inches.
15. Diam. bogie wheel 9 inches.
16. Diam. front idler 36 inches.
17. Height to center of idler 33 inches.
18. Fuel Gasoline.

Approximate maximum performance

1. Speed 15 miles per hour.
2. Range of action 100 miles.
3. Gradient 34°.
4. Obstacles:
 - Trench 8 feet 3 inches wide.
 - Step 2 feet 9 inches high.
 - Ford 3 feet 3 inches deep.

Model 89B (1929)

The Model 89B (also sometimes reported as Model 92 [1932]) medium tank differs from the Model 89A in that it has a longer front which combines with the driver's front plate. Also, the turret has been completely redesigned to include a new type of cupola and a more satisfactory aperture for mounting the 57-mm gun. While armament and armor thickness have remained the same, the gasoline engine of the 89A has been replaced by a Diesel engine.

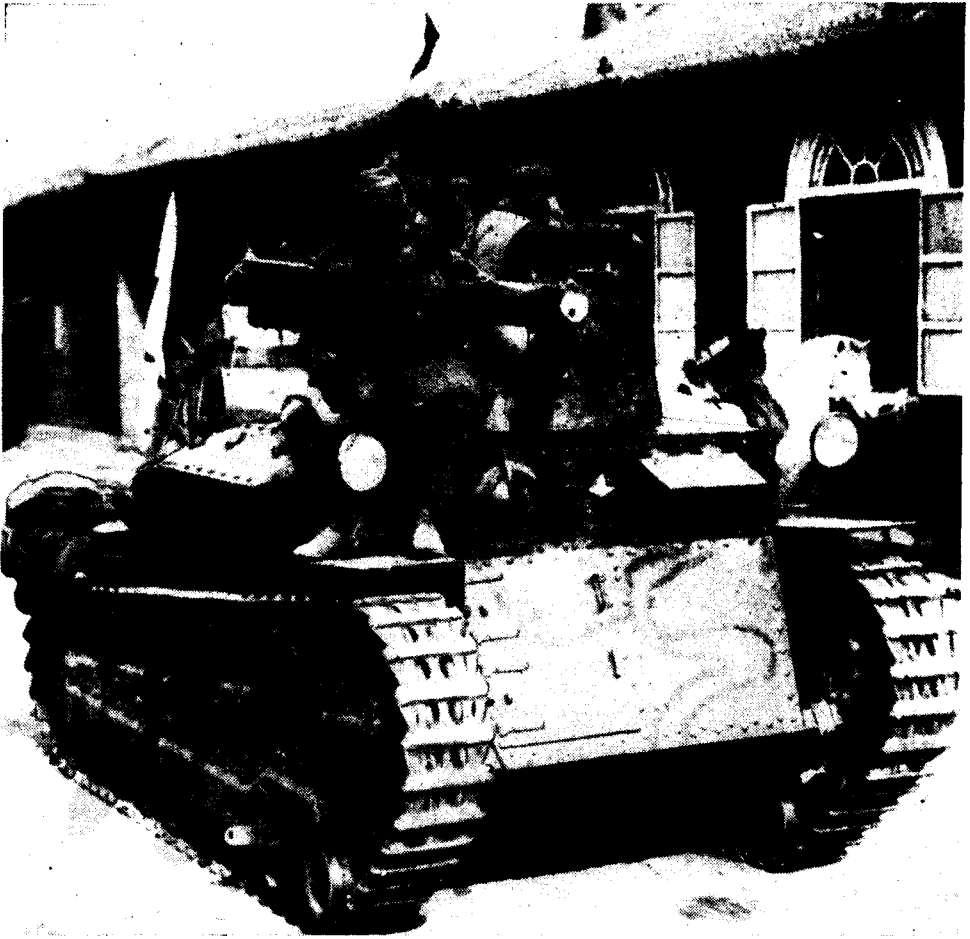


Figure 50.—Right front view of Model 89A (1929) medium tank.



Figure 51.—Right front view of Model 89A (1929) medium tank.



Figure 52.—Right front view of Model 89A (1929) medium tank.



Figure 53.—Left front view of Model 89B (1929) medium tank.

MODEL 89B (1929) MEDIUM TANK

Approximate specifications

1. Weight..... 13 tons.
2. Length..... 19 feet 3 inches.
3. Width..... 7 feet 1 inch.
4. Height..... 8 feet 6 inches.
5. Clearance..... 19 inches.
6. Crew..... 4 men.
7. Armor..... 6 to 17-mm (0.24 to 0.67 inch), also reported as 17 to 25-mm (0.67 to 0.98 inch).
8. Armament..... 1 57-mm, 1 hull MG, 1 rear turret MG.
9. Ammunition..... 57-mm 100 rounds, SAA 2,745 rounds.
10. Engine..... 120 Brake horsepower.
11. Ground contact..... 12 feet.
12. Width of track..... 12 inches.
13. Track pitch..... 6 inches.
14. Diam. rear sprocket..... 30 inches.
15. Diam. bogie wheel..... 9 inches.
16. Height to center of idler..... 33 inches.

Approximate maximum performance

1. Speed..... 15 miles per hour.
2. Range of action..... 100 miles.
3. Gradient..... 34°.
4. Obstacles:
 - Trench..... 8 feet 3 inches wide.
 - Step..... 2 feet 9 inches high.
 - Ford..... 3 feet 3 inches deep.

Model 94 (1934)

The Model 94 (1934) medium tank has been used extensively by the Japanese in China, although it now is considered obsolete. There are a number of resemblances between this tank and Models 89A and 89B. The Model 94, however, has a long front plate with a door on the left, above which is mounted the hull machine gun.

Suspension is similar to that of the earlier models except that, while there are still nine bogie wheels on each side, the number of return rollers has been reduced from five to four. The girder upon which the return rollers were mounted in the 89A and 89B models has been removed and the skirting has been redesigned. The superstructure protrudes over the top of the bogie wheels which are almost completely hidden by the skirting. The tank often is equipped with a ditching tail which, by increasing its length, improves its performance in crossing trenches.

The armor is 0.67 inches thick on the front; the turret is 0.43 inches on the sides. It is reported without confirmation that armor thickness may

have been increased to 0.98 inches. The turret is more rounded than in the earlier models and has sloping sides. The power of the engine has been increased to about 160 brake horsepower.

A 37-mm tank gun is mounted in the turret, and a machine gun on a ball mount is installed in the rear of the turret. There is another light machine gun in the left front of the hull.

MODEL 94 (1934) MEDIUM TANK

Specifications

1. Weight 15 tons.
2. Length (including ditching tail). 23 feet.
3. Width 7 feet 1 inch.
4. Height 8 feet 6 inches.
5. Clearance 19 inches.
6. Crew 4 men.
7. Armor 6 to 17-mm (0.24 to 0.67 inch).
8. Armament:
 - Main 1 57-mm gun.
 - MG 1 Hull MG.
 - 1 rear turret MG.
9. Ammunition 57-mm 100 rounds, SAA 2,750 rounds.
10. Engine 160 brake horsepower air-cooled Diesel.
11. Ground contact 12 feet.
12. Width of track 12 inches.
13. Track pitch 6 inches.
14. Diam. rear sprocket 30 inches.
15. Diam. front idler 36 inches.
16. Diam. bogie wheel 9 inches.
17. Height to center of front idler . . 33 inches.

Approximate maximum performance

1. Speed 20 miles per hour.
2. Range of action 100 miles.
3. Gradient 34°.
4. Obstacles:
 - Trench 9 feet wide.
 - Step 2 feet 9 inches high.
 - Ford 3 feet 3 inches deep.

Model 97 (1937)

Another Japanese tank that has been encountered in several combat theaters, including Guadalcanal and Burma, is the Model 97 (1937). It probably was produced in the period 1937–1940, and its design represents the incorporation of experience gained in the Chinese operations. It is the first tank to be found equipped with smoke projectors. Another interesting feature is the installation of glass visor blocks over vision apertures, correcting a serious deficiency that existed in earlier models.

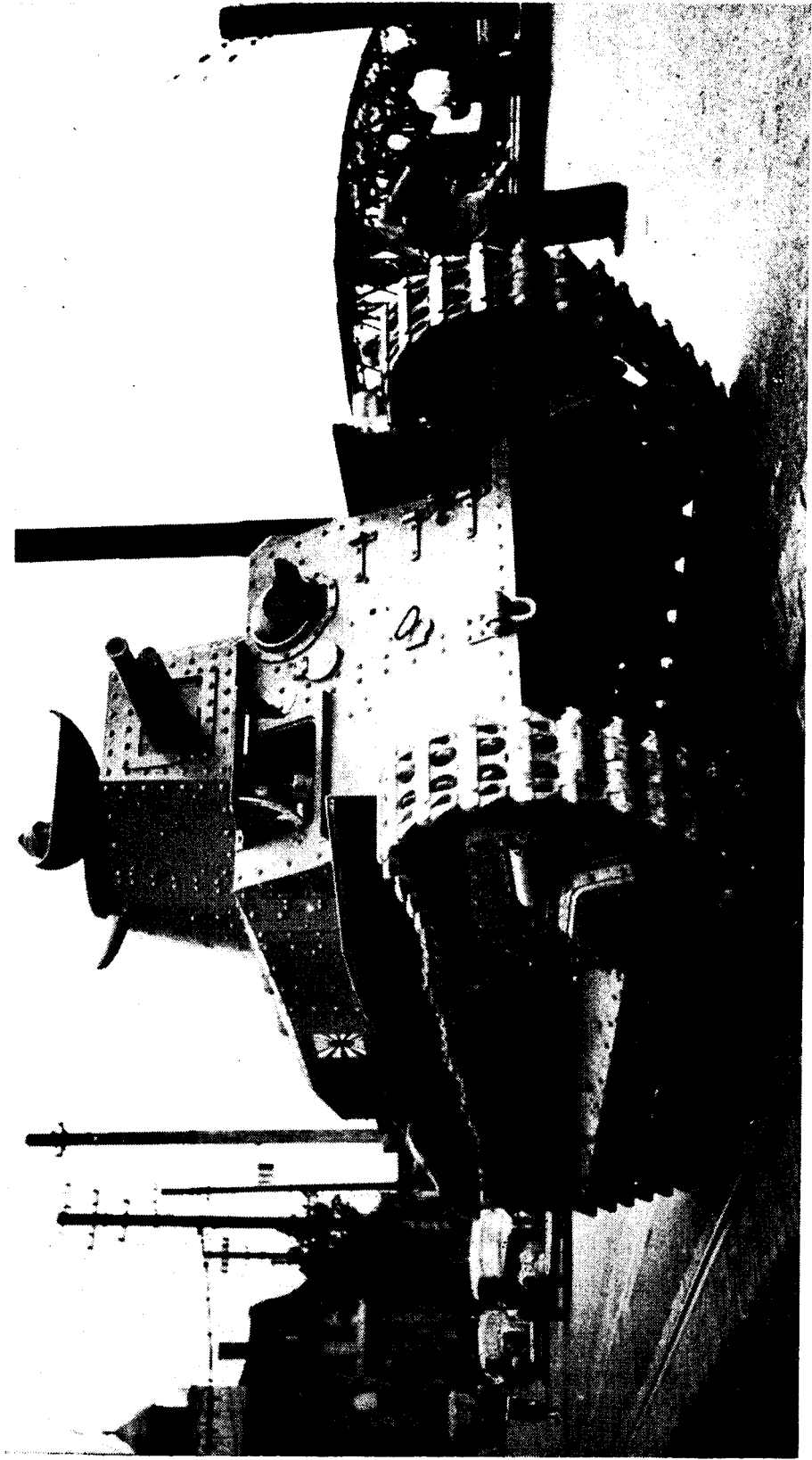


Figure 54.—Model 94 (1934) medium tank, right front view.

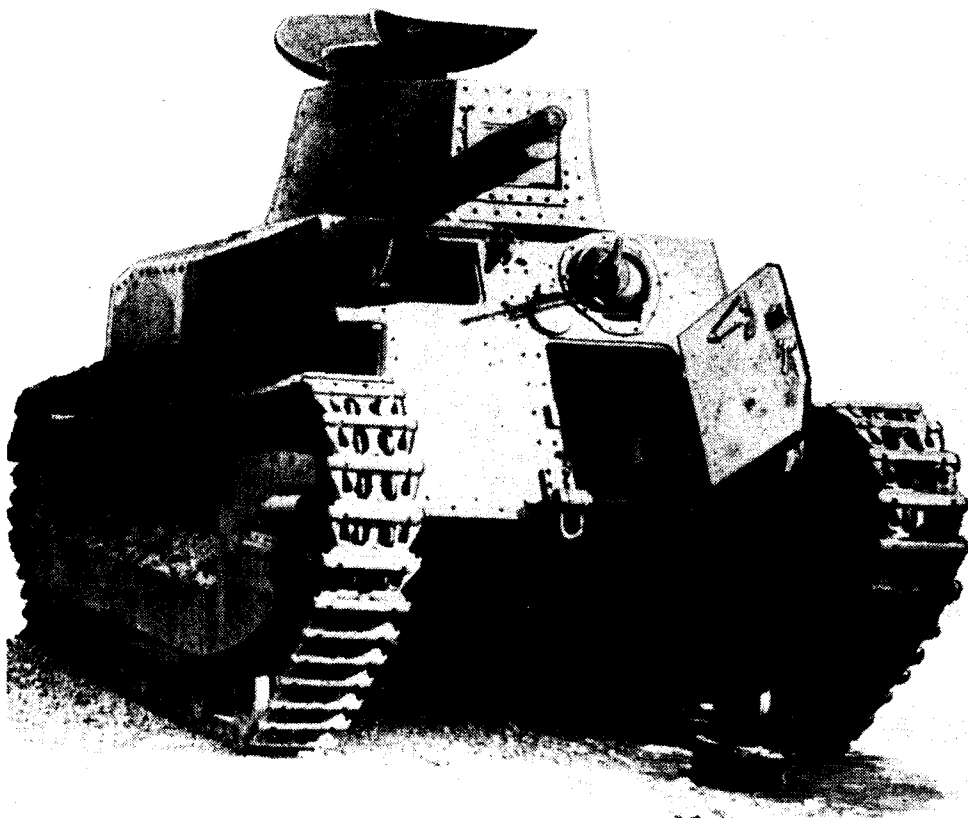


Figure 55.—Model 94 (1934) medium tank, front view with driver's hatch open.

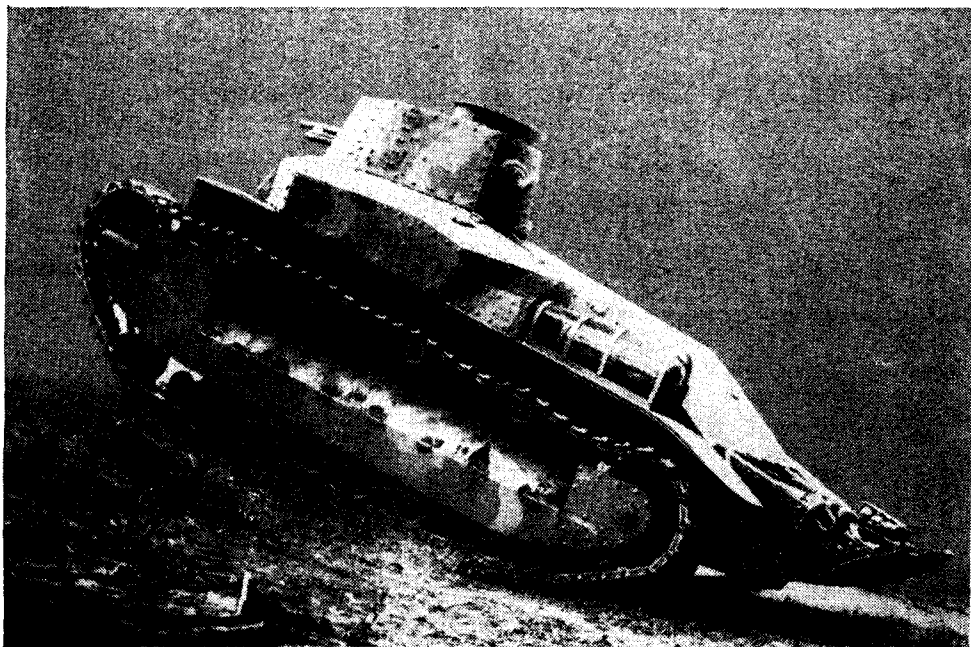


Figure 56.—Model 94 (1934) medium tank, left side. Note ditching tail.

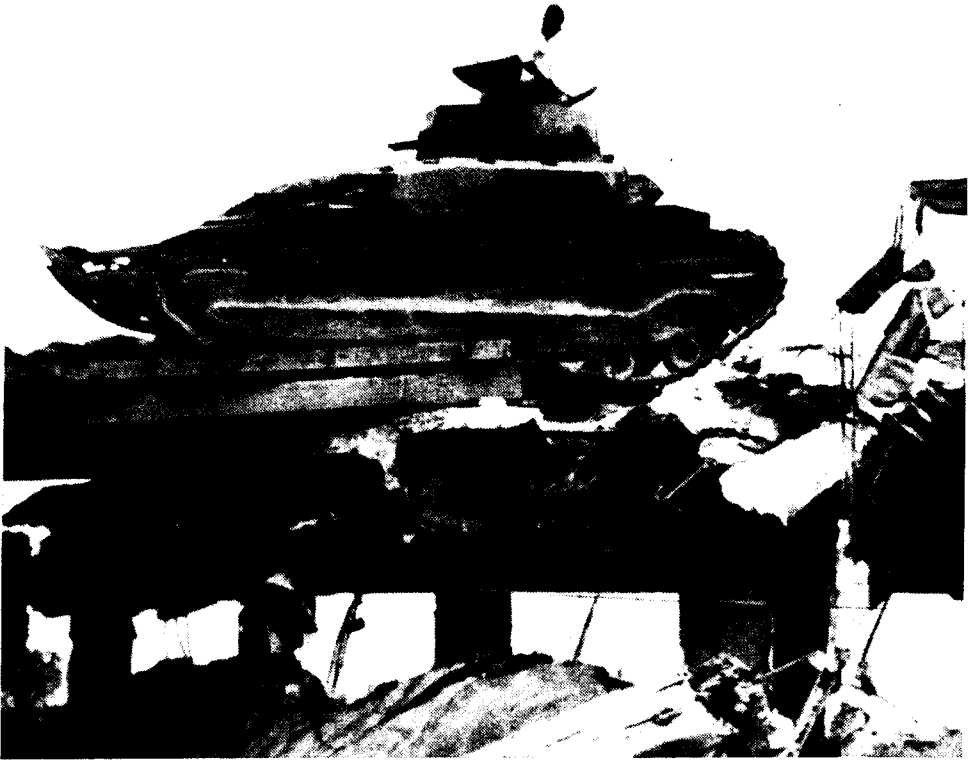


Figure 57.—Model 94 (1934) medium tank, right side.



Figure 58.—Model 94 (1934) medium tank, left front. Note exterior turret machine-gun mount.



Figure 59.—Model 94 (1934) medium tanks on a road in China.

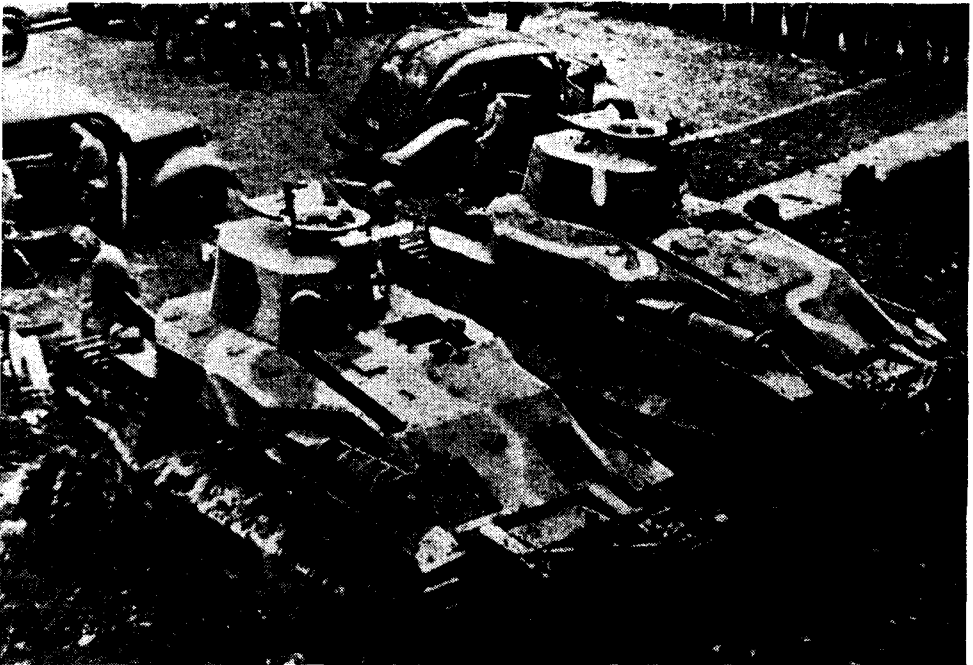


Figure 60.—Top view of Model 94 (1934) medium tank.

Armor is considerably thicker than in earlier medium tank models, with 1 inch in front and on the turret, and 0.86 inch on the sides. Backing plates are used to reinforce the hull joints and corners. The vehicle is quite vulnerable, however, not only because of the lightness of the armor in comparison with tanks of other armies but also because of the absence of welded construction. Both hull and turret plates are assembled almost entirely by bolts and rivets.

Suspension differs sharply from that of previous models. There are six bogie wheels on each side, with the four central ones on each side paired, while each end bogie wheel is independently bell-crank mounted to the hull. When viewed from the side, all the wheels seem independently mounted. There are three return rollers on each side, with the center one carrying only the inside half of the track. Drive is of the front-sprocket type.

The rounded turret is set centrally; the handrail sometimes seen around it is not always installed. The main armament is a 57-mm tank gun, which has a 20-degree traverse but no elevating mechanism. There is a 7.7-mm machine gun in the rear of the turret, and a similar weapon is installed in the front of the hull.

Power is provided by a Diesel, 12-cylinder, V-type engine. It is air-cooled and valve-in-head, developing 170 horsepower at maximum output. Cylinder heads and crankcase are made of cast aluminum. The fuel system is the high-pressure type, with Bosch injectors placed directly over the pistons.

Two types of steering are utilized. One is the clutch-brake type, similar to that on other Japanese tanks, which is used for skid turns. External dry brake bands increase the sharpness of the turn after the clutch is disengaged. A form of epicyclic steering is used for normal turning movements. Clutches which are of the multiple-disc type have cast aluminum housings. Transmission is of the conventional sliding-gear type, with five forward speeds and one reverse.

MODEL 97 (1937) MEDIUM TANK

Specifications by examination

1. Weight..... 15 tons.
2. Length..... 18 feet.
3. Width..... 7 feet 8 inches.
4. Height..... 7 feet 8 inches.
5. Clearance..... 16 inches.
6. Crew..... 4 men.
7. Armor..... 8 to 25-mm (0.32 to 0.98 inch).
8. Armament:
 - Main..... 1 57-mm Model 97 gun.
 - Hull..... 1 7.7-mm Model 97 MG.
 - Rear Turret..... 1 7.7-mm Model 97 MG.

- 9. Ammunition..... 57-mm 80 rounds HE—40 rounds APHE,
MG 2,350 rounds ball, 1,350 AP.
- 10. Engine..... 12 cylinder Diesel.
- 11. Horsepower..... 150 (365 theoretically indicated HP at 2,000
RPM—based on reported engine specifica-
tions.
- 12. Transmission..... 4 speeds forward, 1 reverse—high low range.
- 13. Steering..... Clutch brake.
- 14. Ground contact..... 12 feet 8 inches.
- 15. Width of track..... 13 inches.
- 16. Track pitch..... 5 inches.
- 17. Diam. front sprocket..... 23 inches.
- 18. Diam. rear idler..... 23 inches.
- 19. Diam. bogie wheel..... 21 inches.
- 20. Height to center of sprocket. 32½ inches.
- 21. Fuel consumption..... 4 gallons per hour.

Approximate maximum performance

- 1. Speed..... 25 miles per hour.
- 2. Radius of action..... 100 miles.
- 3. Gradient..... 34°.
- 4. Obstacles:
 - Trench..... 8 feet 3 inches.
 - Step..... 2 feet 6 inches high.
 - Ford..... 3 feet 3 inches deep.

Model 97 Modified

A medium tank very similar to the Model 97 was used by the Japanese in the operations on Corregidor. With the exception of the turret and main armament it is the same as the Model 97. The turret is modified to accommodate a high-muzzle-velocity gun believed to be of 47-mm caliber. It also has a rear turret machine gun. The long over-hanging rear portion of the turret probably has been designed to permit simultaneous firing of the tank and machine guns.

Variations of Model 97 captured on Saipan had a much longer turret to accommodate a long-barreled Model 1 (1941) 47-mm gun. Another captured near Imphal likewise was armed with a 47-mm gun but did not differ materially from the specifications listed in other respects.

Heavy Tanks

Little is known about Japanese heavy tanks. Those reported have been characterized as slow, clumsy, and lightly armored. The performance of none of them thus far encountered is sufficiently effective to make them usable against modern vehicles of this type used by other armies. Production of heavy tanks is not beyond the capabilities of Japanese industry, however, and in suitable terrain satisfactory armored vehicles of this type may be encountered.

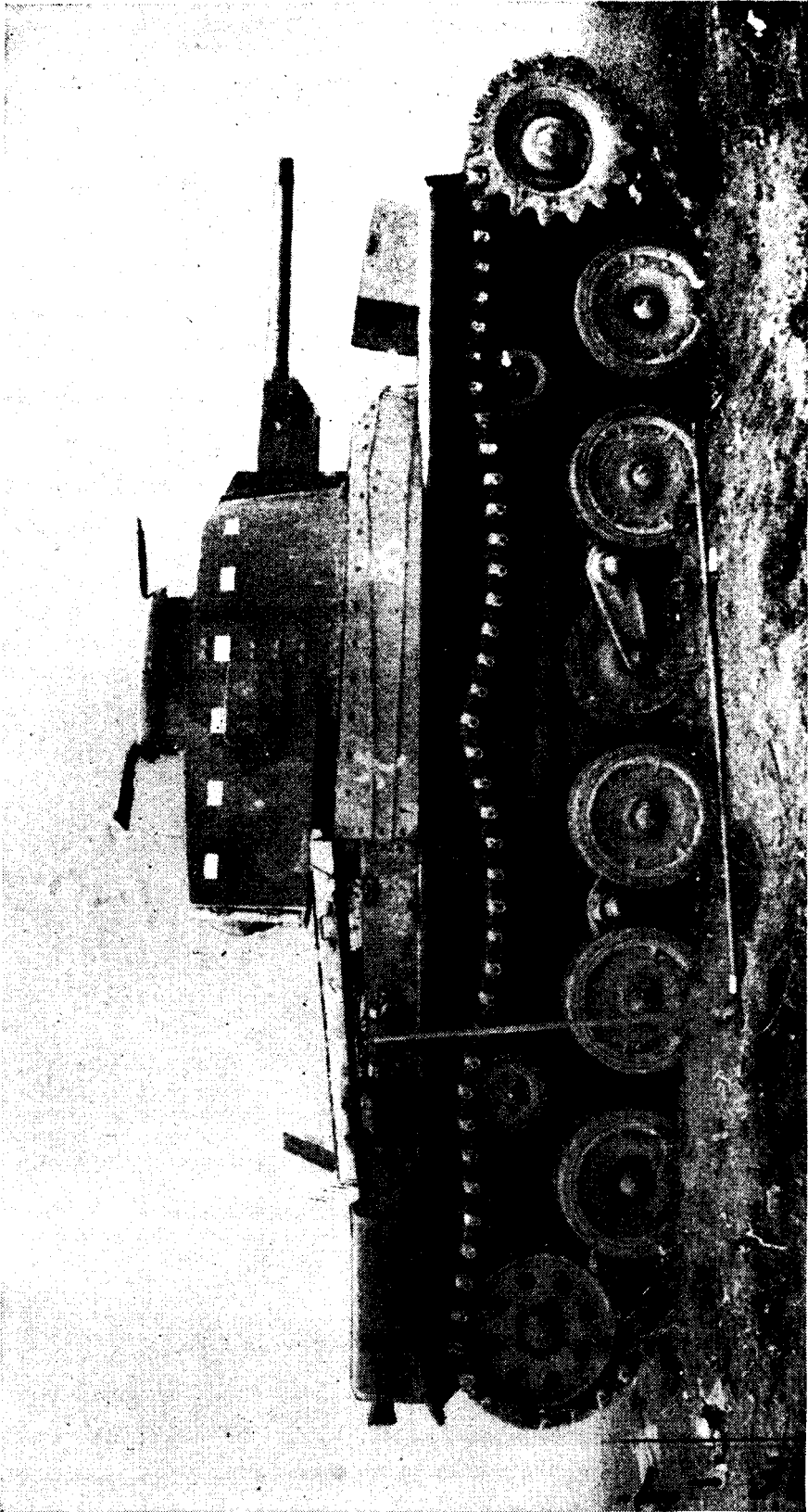


Figure 61.—Model 97 (1937) special medium tank, with elongated turret to mount long-barreled 47-mm tank gun.



Figure 62.—Front view of Model 97 (1937) medium tank.

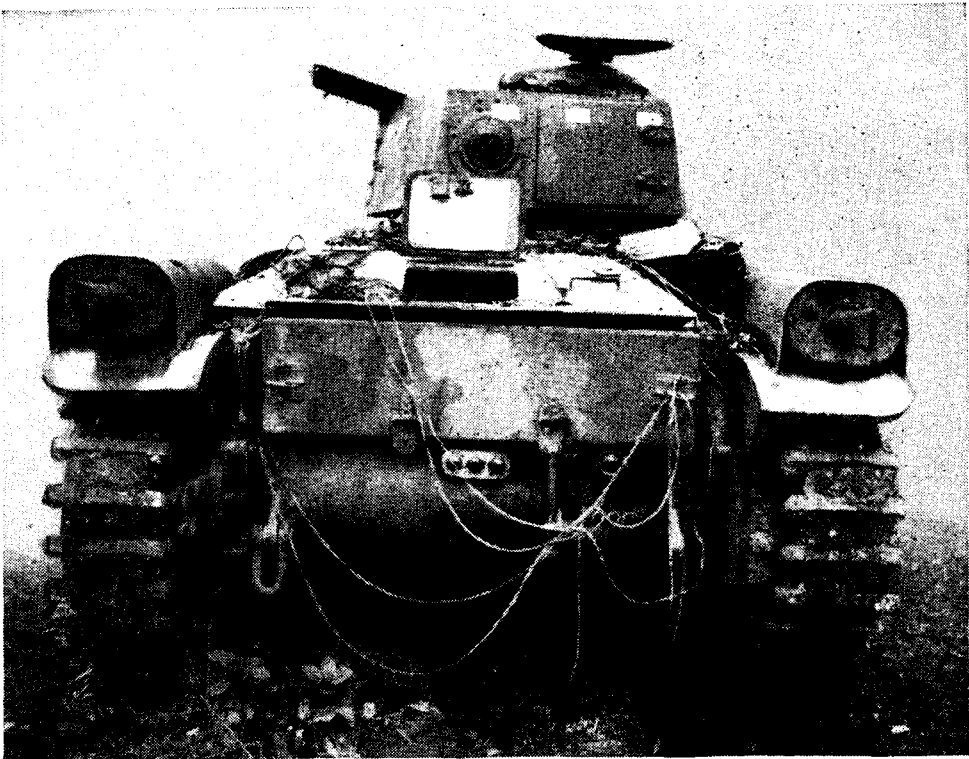


Figure 63.—Front view of Model 97 (1937) medium tank with turret trained to left.



Figure 64.—Right front of Model 97 (1937) medium tank. Note suspension and handrail around turret.



Figure 65.—Right side of Model 97 (1937) medium tank.

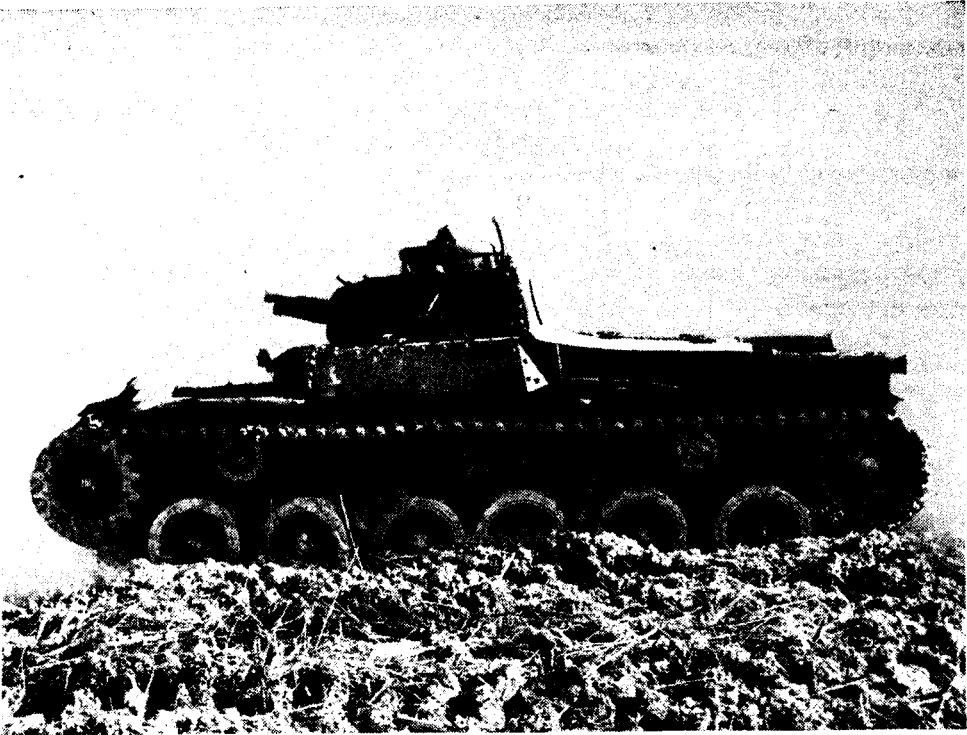


Figure 66.—Left side of Model 97 (1937) medium tank.



Figure 67.—Right side of Model 97 (1937) medium tank.

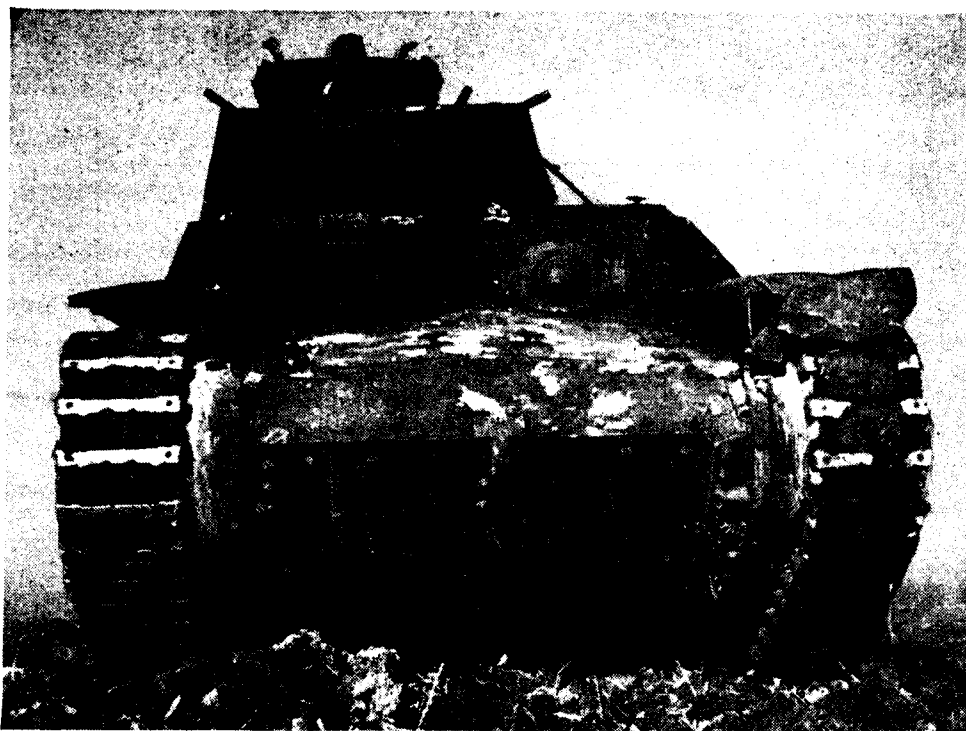


Figure 68.—Front view of Model 97 (1937) medium tank.



Figure 69.—Rear view of Model 97 (1937) medium tank.

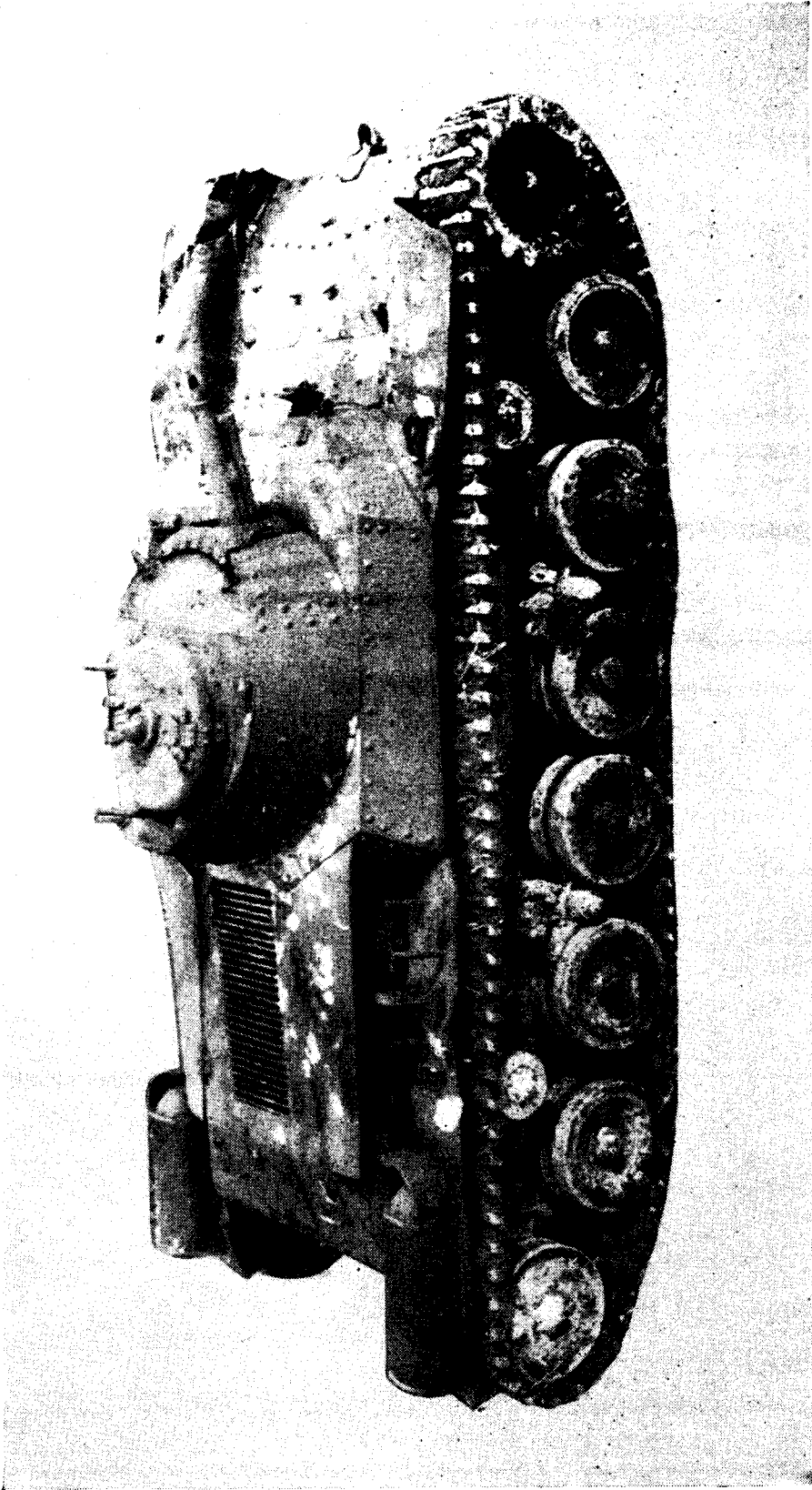


Figure 70.—Top view of Model 97 (1937) medium tank.



Figure 71.—Front view of Model 97 (1937) medium tank disabled at Saipan.

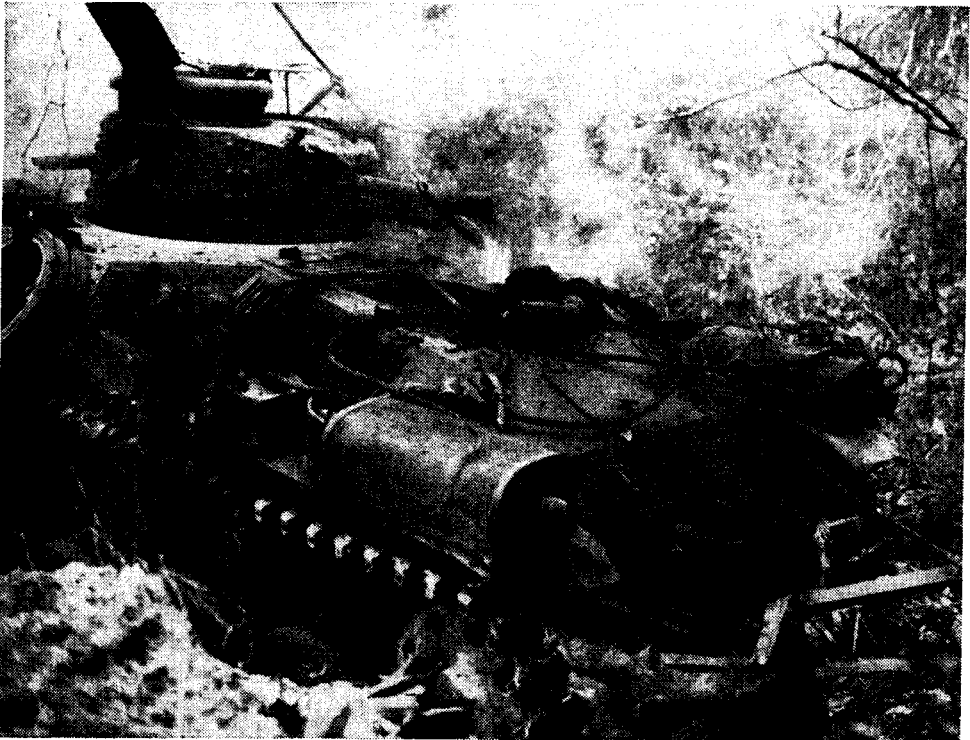


Figure 72.—Top frontal view of Model 97 (1937) medium tank disabled at Saipan.

The Model 97 (1937) heavy tank, about which considerable data has been secured, weighs 32 tons and is 24 feet 5 inches long, 9 feet 10 inches wide, and 9 feet 6 inches high. A crew of six is carried. Maximum road speed is reported to be 28 miles per hour. The trench is 7 feet; ford is 4 feet 2 inches. Maximum armor thickness is 1.38 inches.

The suspension has a U-shaped scissor articulation. There are six bogie wheels on each side arranged in pairs, with horizontal coiled spring resistance.

In addition to the large main turret which mounts a 75-mm gun and at least two machine guns, there are two auxiliary turrets forward, each of which mounts a light machine gun. In addition to the 75-mm gun the main armament may include a lighter tank gun.

Armored Cars

A curious and somewhat ingenious Japanese armored vehicle is the Model 93 (1933) *Sumida*, sometimes called the "armored trolley car", since, by changing wheel rims, it can be used either as a car or an armored "trolley" on railway lines. To change it from a rail to road vehicle, the car is raised by four built-in jacks. The flanged steel tires are removed and solid-rubber tires then are placed over the wheels, an operation taking 10 to 20 minutes. The vehicle then can be driven off the rails onto the road. Substitution of the flanged tires for rubber tires adapts it for rail use. When traveling the set of tires not in use is attached to the sides of the hull.

The engine is in front, and there is a round cupola on the van-shaped hull. Road speed is estimated at about 25 miles per hour, but on rails the vehicle can attain a speed of about 40 miles per hour. Maximum armor thickness is 0.63 inch. The car is armed with one or more heavy machine guns, and there are seven rifle slits.

MODEL 93 (1933) "SUMIDA" ARMORED CAR

Approximate specifications

1. Weight 7.5 tons.
2. Length 21 feet 6 inches.
3. Width 6 feet 3 inches.
4. Height 9 feet 8 inches.
5. Ground clearance 16 inches.
6. Crew 6 men.
7. Armament 1 MG mounted in turret. Slits for rifles or LMGs.
8. Armor Up to 16-mm (0.63 inch).
9. Engine 40 horsepower.
10. Fuel Gasoline.
11. Vision Drivers visor slits and gun ports.

Approximate maximum performance

Speed:

On rails 37 miles per hour.

On road 25 miles per hour.

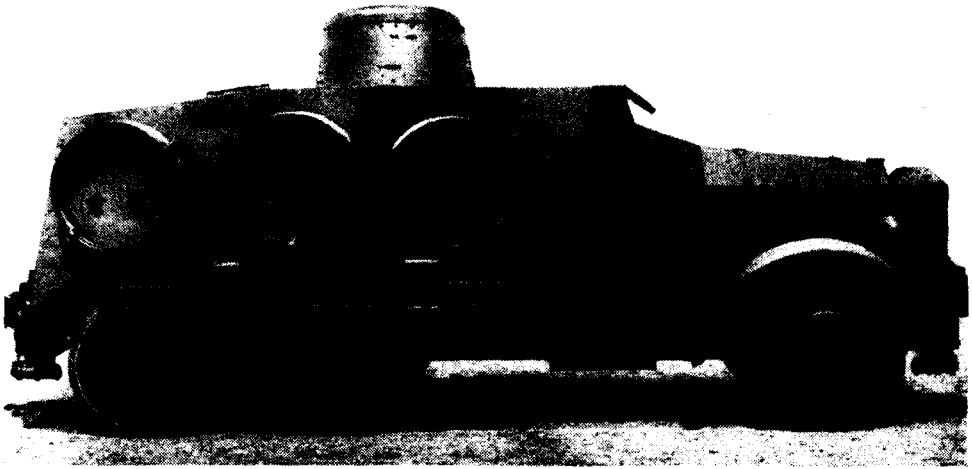


Figure 73.—“Sumida” armored car, fitted with rubber tires for road travel.



Figure 74.—“Sumida” armored car, fitted with flanged steel tires for rail travel. Note that two cars have been coupled back to back, permitting rapid movement in either direction.

Model 92 (1932)

The Model 92 (1932) *Osaka* armored car is widely used by the Japanese. It is believed to be of Japanese design and manufacture, utilizing a standard Japanese commercial chassis. It is rubber tired with dual mounting on the rear wheels. It carries a crew of four or five and is armed with two light machine guns.

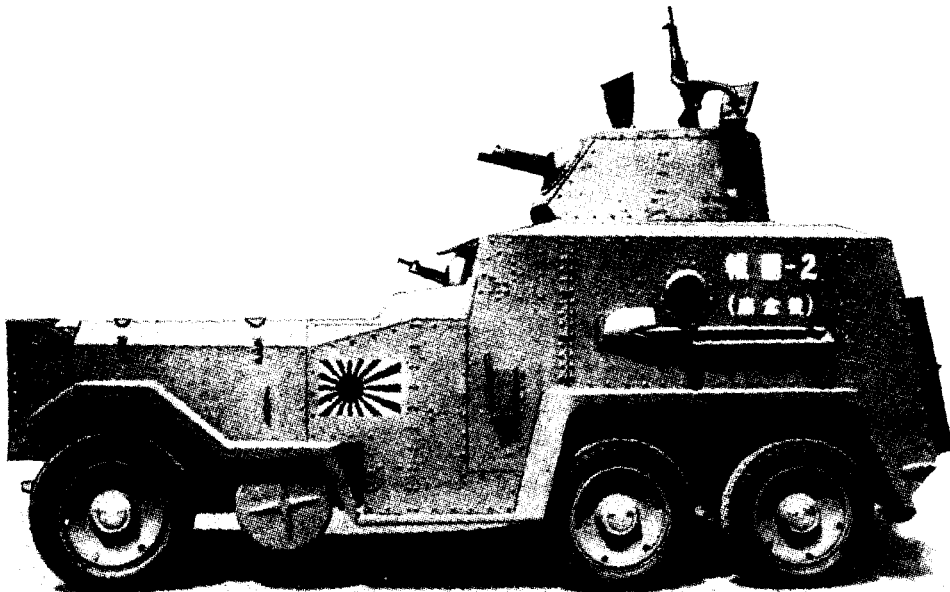


Figure 75.—Model 92 (1932) naval armored car.

MODEL 92 (1932) "OSAKA" ARMORED CAR

Approximate specifications

1. Weight 6.4 tons.
2. Length 16 feet 5 inches.
3. Width 6 feet.
4. Height 8 feet 8 inches.
5. Ground clearance 11 inches.
6. Crew 4 to 5 men.
7. Armament 2 MGs.
8. Armor 8 to 11-mm (0.32 to 0.43 inch).
9. Engine 4 cylinder, 35 horsepower.
10. Fuel Gasoline.
11. Cooling Water.

Approximate maximum performance

1. Speed 37 miles per hour.
2. Range of action 150 miles.

Naval Type Model 92

Japanese naval landing parties, especially those preparing to assume garrison duties, often are landed with varying numbers of the Model 92 (1932) naval type armored car. It has six disc wheels, which are pneumatic tired, and semielliptical springs. There are auxiliary wheels just to the rear of the front wheels to prevent bellying when the vehicle is crossing rough terrain. Four light machine guns are installed.

MODEL 92 (1932) NAVAL TYPE ARMORED CAR

Approximate specifications

1. Weight 7 tons.
2. Length 15 feet 9 inches.
3. Width 5 feet 11 inches.
4. Height 7 feet 6 inches.
5. Ground clearance 16 inches.
6. Crew 4 men.
7. Armament 5 MGs.
8. Armor 8 to 11-mm (0.32 to 0.43 inch).
9. Engine 6-cylinder, 85 brake horsepower.
10. Cooling Water.

Approximate maximum performance

Speed 50 miles per hour.

Armament

The main armament of Japanese medium tanks usually is the Model 94 (1934) 37-mm tank gun. It is a short-barreled, medium-velocity gun primarily designed for antipersonnel use. This factor, of course, was in keeping with the former Japanese policy of utilizing tanks mainly for infantry support. There is also a Model 98 (1938) 37-mm tank gun, thus far found mounted only in a Japanese fighter plane. It is a single shot with a semiautomatic sliding-wedge breechblock. The barrel is 49.5 inches long and the chamber is of the same size as the Model 94. This model, like the 94, is a medium-muzzle-velocity weapon. Replacement of low- or medium-muzzle-velocity guns by high-velocity weapons seems to be a reasonably certain trend in the modernization of Japanese armored vehicles.

There also are 47-mm and 57-mm tank guns installed in medium tanks but little is known about them. The 47-mm probably is a high-velocity antitank piece that has been modified for use as tank armament. It is likely that this weapon will be found with increasing frequency.

The Model 97 (1937) 57-mm tank gun has a tube 3 feet, 1.6 inches long. The gun has a vertical sliding breechblock actuated by a hand-operated lever which is counterbalanced by a breech-closing spring. There is no

elevating mechanism but the gun is capable of a total traverse of 20 degrees without turning the turret. Two recoil cylinders of equal size are installed in the cradle.



Figure 76.—Model 94 (1934) tank gun.

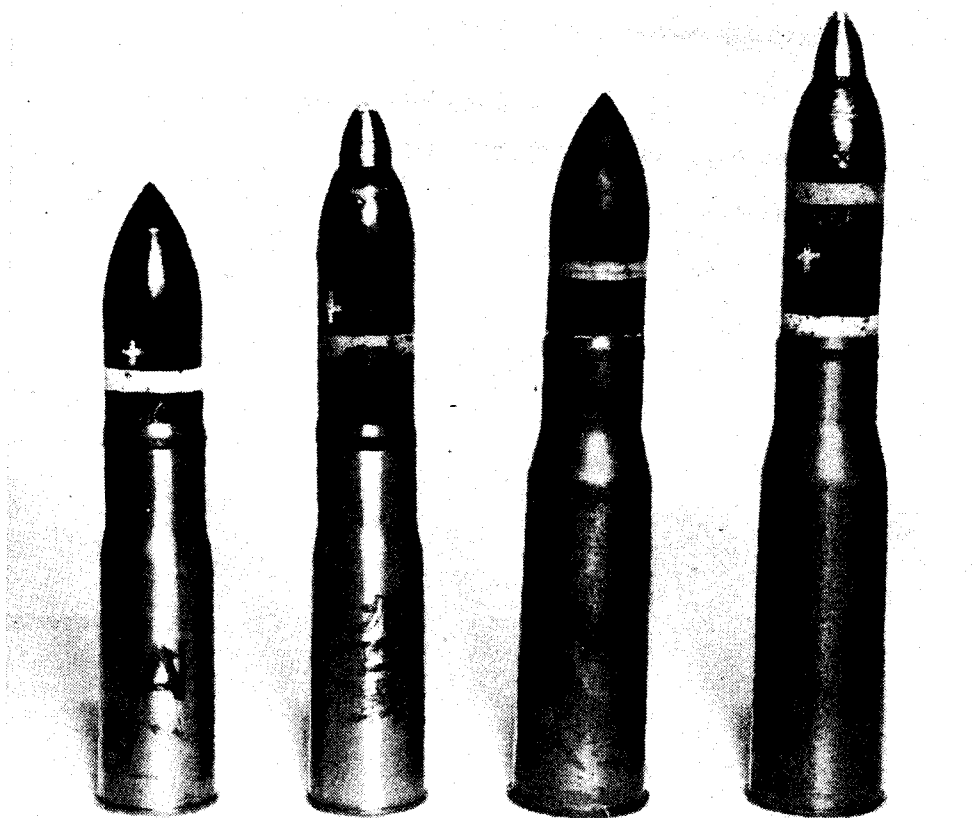


Figure 77.—Comparison of ammunition for the Model 94 (1934) 37-mm AT gun and the Model 94 (1934) 37-mm tank gun. Left to right: AP-HE and HE rounds for the AT gun; AP-HE and HE rounds for the tank gun.

MODEL 94 (1934) 37-MM TANK GUN

Characteristics

Caliber	37-mm (1.46 inch).
Muzzle velocity	2,100 feet per second (estimated).
Maximum elevation	+24°.
Maximum depression	-20°.
Traverse	10° right, 10° left, without rotating the turret.
Breech mechanism	Vertical sliding, semiautomatic in action.
Recoil system	Hydrospring.
Ammunition	APHE and HE.

MODEL 97 (1937) 7.7-MM TANK MACHINE GUN

Characteristics

Caliber	7.7-mm (0.303 inch).
Principle of operation	Gas operated, full automatic only.
Type of feed	Vertical box.
Magazine capacity	30 rounds.
Length of barrel	28 inches.
Overall length	46 inches.
Weight	34 pounds.
Cyclic rate of fire	500 rounds per minute.
Ammunition	Fires special Model 99 rimless.

MODEL 97 (1937) 57-MM TANK GUN

Characteristics

Caliber	57-mm (2.24 inches).
Weight	283 pounds.
Length of tube	3 feet 1.6 inches.
Length of chamber	5.1 inches.
Number of lands and grooves	20.
Maximum length of recoil	11 inches.
Maximum elevation	+45°.
Traverse	10° right, 10° left, without rotating the turret.
Type of breechblock	Vertical sliding.
Ammunition	Only high explosive rounds have been recovered to date. They are characterized by a rather short cartridge case.

Light Machine Gun

The light machine gun almost invariably installed in Japanese tanks is the Model 97 (1937) 7.7-mm machine gun. This weapon is gas operated and air cooled. It is a shoulder-controlled weapon with a specially designed stock and is fitted with conventional sights. When used for tank purposes, however, a telescopic sight of 1½ power and 30-degree field of view usually is fitted. To prevent injury to the gunner, a heavy rubber

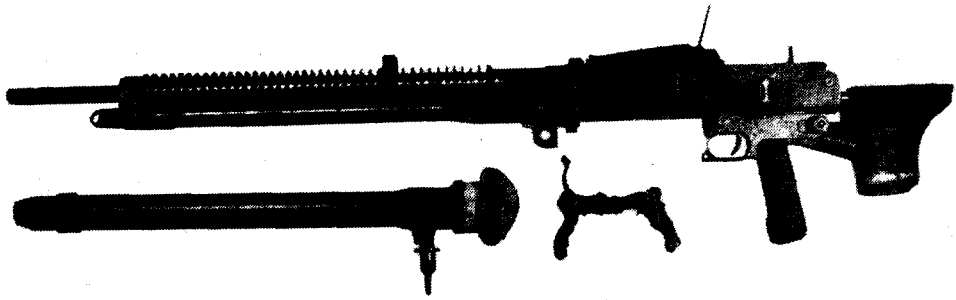


Figure 78.—Model 97 (1937) 7.7-mm tank machine gun, with telescope and barrel guard removed. Telescope and telescope clamp are illustrated in the lower part of the photo.

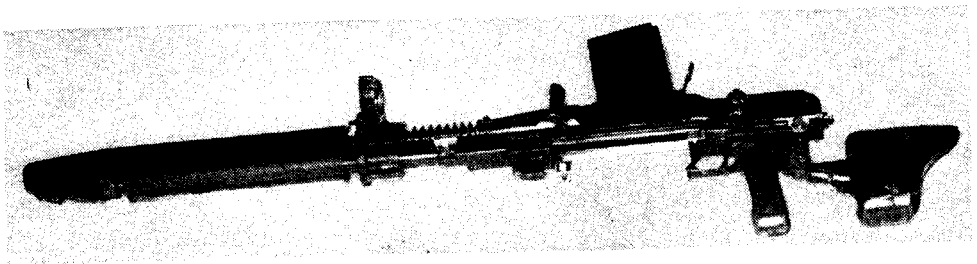


Figure 79.—Model 97 (1937) 7.7-mm tank machine gun.

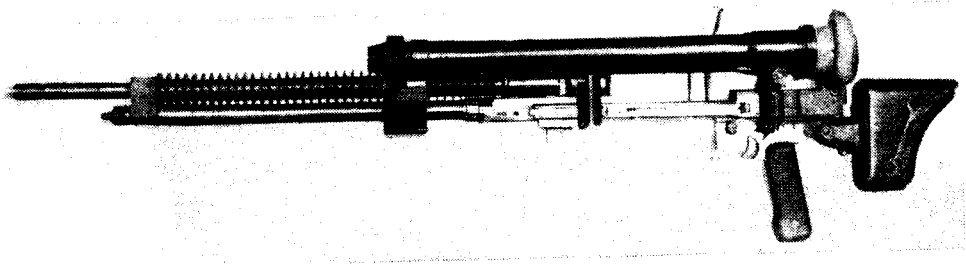


Figure 80.—Model 97 (1937) 7.7-mm tank machine gun with telescope in place.

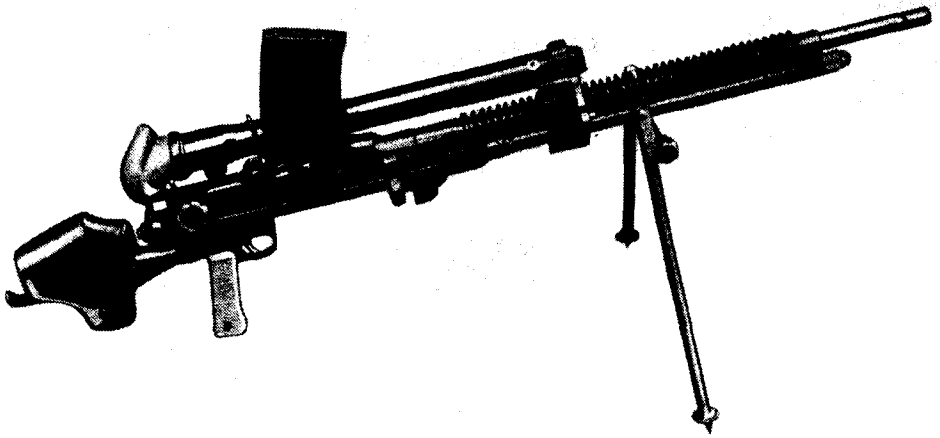


Figure 81.—Model 97 (1937) 7.7-mm tank machine gun with bipod for use as a ground gun. Telescope and magazine are in place.

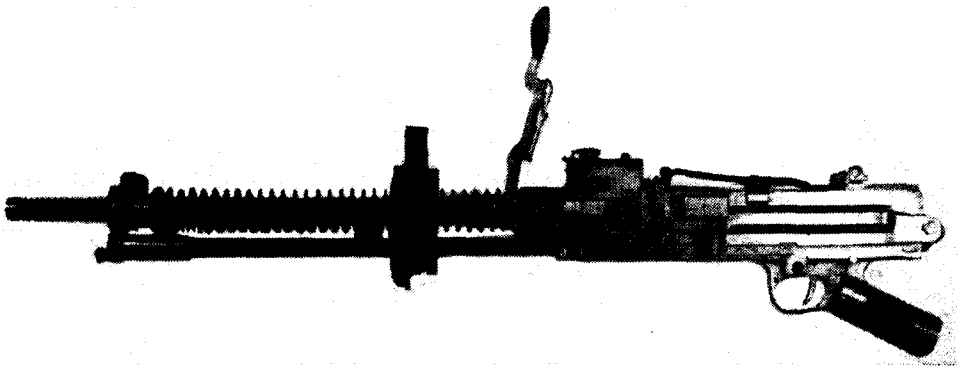


Figure 82.—Model 91 (1931) 6.5-mm tank machine gun. Hopper and butt are missing.

eye-pad is attached to the rear of the telescope. The design is similar to that of Model 99 (1939) 7.7-mm light machine gun, an infantry weapon. The Model 91 (1931) 6.5-mm machine gun—actually the Model 11 (1922) 6.5-mm infantry weapon modified for tank use by removal of the bipod—also still may be encountered, although it probably is being replaced by the Model 97 (1937) 7.7-mm gun.

