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TACTICAL AND TECHNICAL TRENDS

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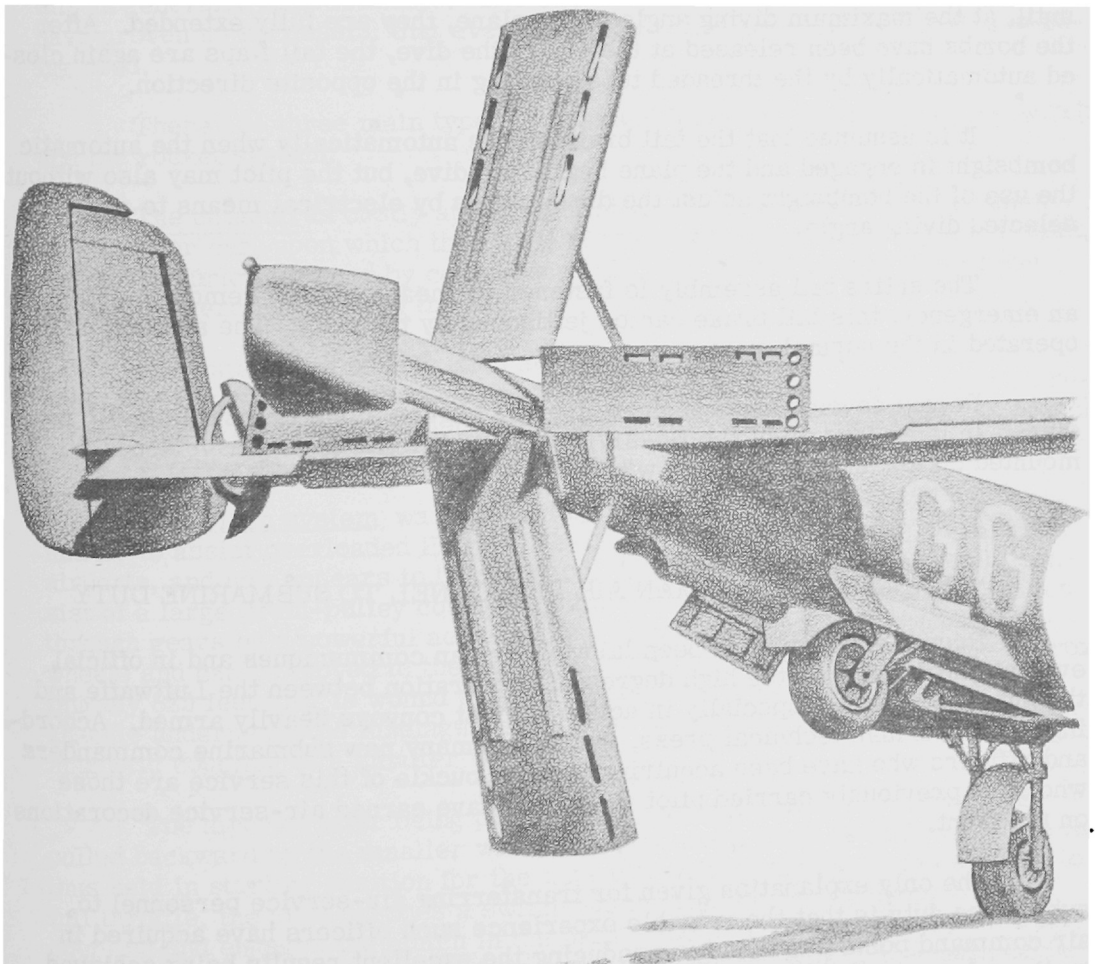
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SECTION I

1. THE GERMAN AIRPLANE WITH AN UMBRELLA

Much has been written about the Dornier Do-217E but not until recently have details of its construction been known.

As can be seen from the sketch, one of the most interesting features of this twin-engined bomber is the tail dive-brakes. These brakes when closed form a "cigar-like" extension to the tail, causing it to look very much like the rear section of a giant grasshopper.



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The dive-brakes consist of two pairs of flaps arranged at right angles to each other. In a fully extended position, the upper and lower or main flaps approach a vertical position, while the shorter and narrower horizontal flaps lie immediately behind the trailing edges of the elevators.

The rear ends of the dive-brakes are hinged to a threaded collar that rides on a threaded tube. They are centrally supported by four brace rods hinged at both ends. This arrangement produces the effect of an umbrella and has given rise to the expression "umbrella" or "parachute" bomber. Slots and holes along the edges of the flaps act as vents when the plane is in a dive. Upon entering a dive it is possible to set in operation an automatic electrically operated mechanism which turns the threaded tube and causes to travel forward the nut-like device to which the flaps are hinged. This opens the brakes gradually until, at the maximum diving angle of the plane, they are fully extended. After the bombs have been released at the end of the dive, the tail flaps are again closed automatically by the threaded tube rotating in the opposite direction.

It is assumed that the tail brake works automatically when the automatic bombsight is engaged and the plane begins its dive, but the pilot may also without the use of the bombsight adjust the dive-brakes by electrical means to any selected diving angle.

The entire tail assembly is fastened by means of four removable pins. In an emergency, this tail brake can be jettisoned by the pilot. The airplane is then operated in the normal manner.

Recent developments indicate that this brake alone is insufficient in steep dives. In later models of the Do-217E types additional brakes have appeared, mounted on the underside of the wings, inboard of the engines.

2. TRANSFER OF GERMAN AIR PERSONNEL TO SUBMARINE DUTY

Recent emphasis has been laid in German communiques and in official evaluation of them, on the high degree of cooperation between the Luftwaffe and the submarine arm, especially in action against convoys heavily armed. According to the German technical press, among the many new submarine commanders and officers who have been acquiring the war buckle of this service are those who have previously carried pilot wings and have earned air-service decorations on the front.

The only explanation given for transferring air-service personnel to submarine duty is that the valuable experience such officers have acquired in air command posts has aided in producing the excellent results being achieved by the submarines.

The possibility also arises, however, that physical disabilities which

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disqualify an officer for active flight duty in the Luftwaffe may not render him unfit for service aboard a submarine.

3. GERMAN DEVICES FOR ASSISTING THE TAKE-OFF OF OVERLOADED PLANES

In order to increase the loads and ranges of their bombers and observation planes, the German Air Force has resorted to overloading. Once in the air, planes can fly with a considerable overload, although their speed is somewhat reduced; the main operational difficulty lies in the take-off. A normal take-off under overloaded conditions will require a runway of abnormal length; this is generally impracticable. The Germans have devised other means which have proven so successful that even smaller fields than heretofore are now being used.

There are three main types of assisted take-off: the catapult, the winch, and the rocket system.

a. The catapult is costly and complicated, and is not mobile. It consists of a dolly or car, upon which the airplane is placed. Upon a signal from the pilot, the car is hurled forward by compressed air, and the plane with its engines full-on is literally shot into the air.

The catapult is mainly used aboard ship where the take-off must of necessity be extremely short. The aircraft employing this method must be reinforced to withstand the sudden strain put upon it. The catapult has not proven itself very adaptable for ground operations.

b. The winch system was adopted by the German Air Force in 1940 primarily to assist overloaded Heinkel He-111 bombers in taking off from small airports, and now appears to be standard. This equipment is believed to consist of a large drum-pulley coupled by a clutch to a fly-wheel which is driven through gears by a powerful aero-engine. The entire device is mounted on wheels and can be moved to the required location by a tractor. A cable approximately 825 feet long is wound over the pulley and attached by a hook to a shackle underneath the fuselage. The tail of the plane is fastened by an electromagnetic coupling to a smaller winch.

The aircraft, after being placed in approximate take-off position, is pulled backward by the smaller winch until the main cable is taut; the plane is thus held in starting position for the take-off. After running up his engines to full throttle, the pilot presses a switch which simultaneously drops the tail coupling and engages the clutch in the main winch. The aircraft is pulled forward at a high speed and, as it rises and flies over the winch, the main cable is disengaged by its own weight. The clutch is thereupon automatically disengaged and a brake applied to the winding drum. Attachments found on planes

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such as the Do-17 lead to the belief that devices of this or similar types are probably in general use.

c. The cheapest and most convenient form of assisted take-off is probably the rocket device now in use by the German Air Force on the Ju-88, Me-110, and other aircraft. It usually consists of two large pear-shaped rockets attached by special fittings to the underside of each wing. These rockets may have a venturi-type discharge nozzle and are believed to be activated by slow-burning cordite or some other fuel and compressed air. It is possible that if it is cordite, the powder is stowed in sections or layers which are progressively ignited by electrical means.

After a short take-off run the pilot presses an electrical switch, igniting the rockets; should the need arise, he may extinguish them almost instantaneously by turning off the switch. The thrust of these rockets lasts about 30 seconds. When the aircraft has risen about 500 feet, the rocket gear, which is quite large and heavy, is jettisoned and drops to the ground by parachute. It is believed that the rockets can be reloaded and used again.

While aircraft must be specially equipped to use this device, the apparent simplicity of the rocket method will no doubt increase its use for planes operating from restricted fields under conditions of overload.

4. GERMAN GLIDERS

A German glider tentatively known as the "Merseburg," with an estimated span of 178 feet, is believed capable of transporting 40 to 50 fully equipped men.

A model, possibly called "Goliath," with span estimated at 270 feet, probably could accommodate about 140 fully equipped men.

The Junkers Ju-90 transport is reported to have more than twice the capacity of the Ju-52. It is not new.

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5. GERMAN 105-MM ANTI-AIRCRAFT GUN

Although it is probable that the Germans will retain the 88-mm gun as the main armament of their heavy AA artillery, due to its successful employment in the past and particularly because of its value as a mobile dual-purpose weapon, it is known that the 105-mm AA gun ranks high in German priorities for war production.

At present it is believed that the 105-mm gun is employed purely as a fixed weapon. A limited number of mobile mounts appeared at Hitler's birthday parade in 1939, but the mount proved to be unsatisfactory. Recent reports indicate, however, that a new tractor-drawn mount is being developed, and it is probable that the Germans intend to use this weapon in both an anti-aircraft and antitank role.

Particulars of the 105-mm gun are as follows:

Muzzle velocity	2,890 f/s
Length of bore	60 cals
Maximum horizontal range	19,075 yds
Effective vertical range	36,700 ft
Rate of fire (practical)	8 to 10 rpm
Weight in action	11.56 tons
Elevation	-3° to +85°
Traverse	360°
Weight of projectile	32 lbs
Types of ammunition	HE with time fuze HE with percussion fuze AP shell

6. ANTI-AIRCRAFT FIRE CONTROL BY RADIOLOCATORS

It is known that production of radiolocation equipment is being given a high priority by the Germans. There are indications that in many areas one radiolocation set is being employed to control the fire from several gun positions. In order to provide one set per gun position, a very considerable scale of production will obviously be required.

Equipment in use is believed to be highly developed from a radio point of view. Apparently, however, a corresponding degree of accuracy has not yet been attained in the method of transmitting firing data to the director. This latter problem can be expected to be a primary subject of German technical research in the immediate future.

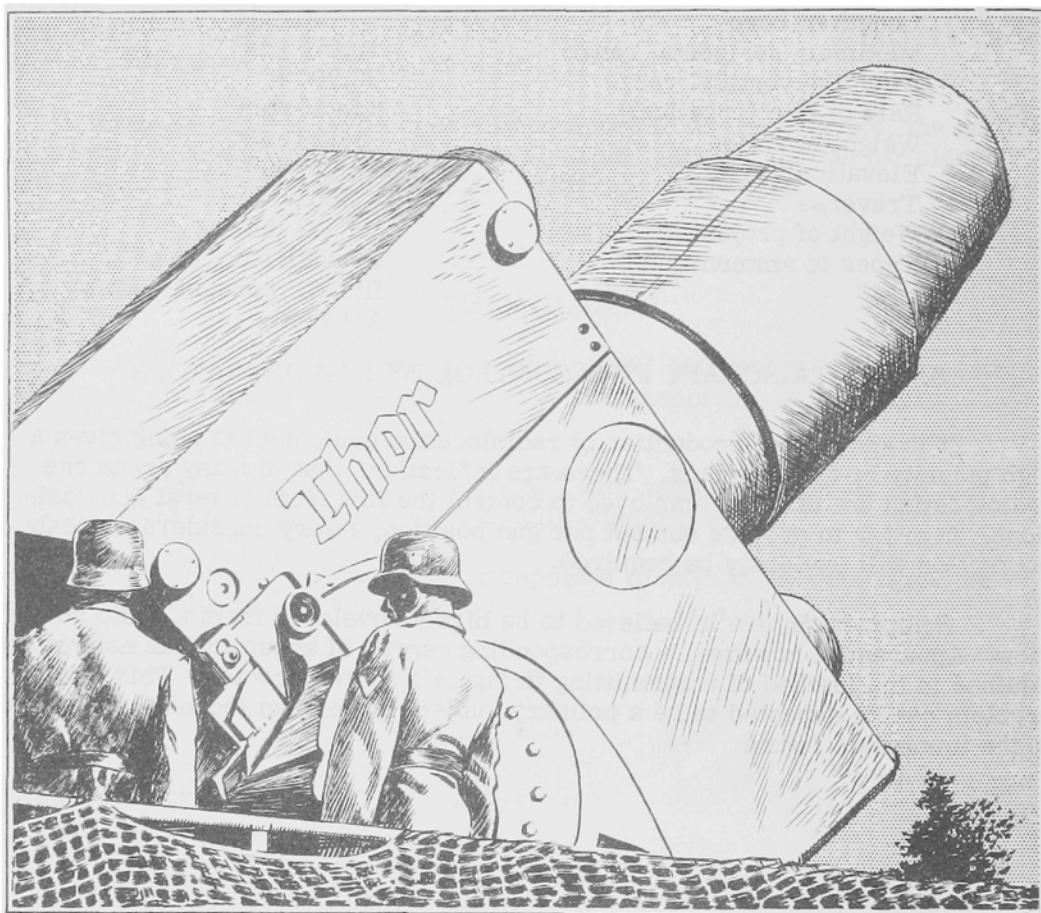
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7. NEW GERMAN HEAVY ARTILLERY

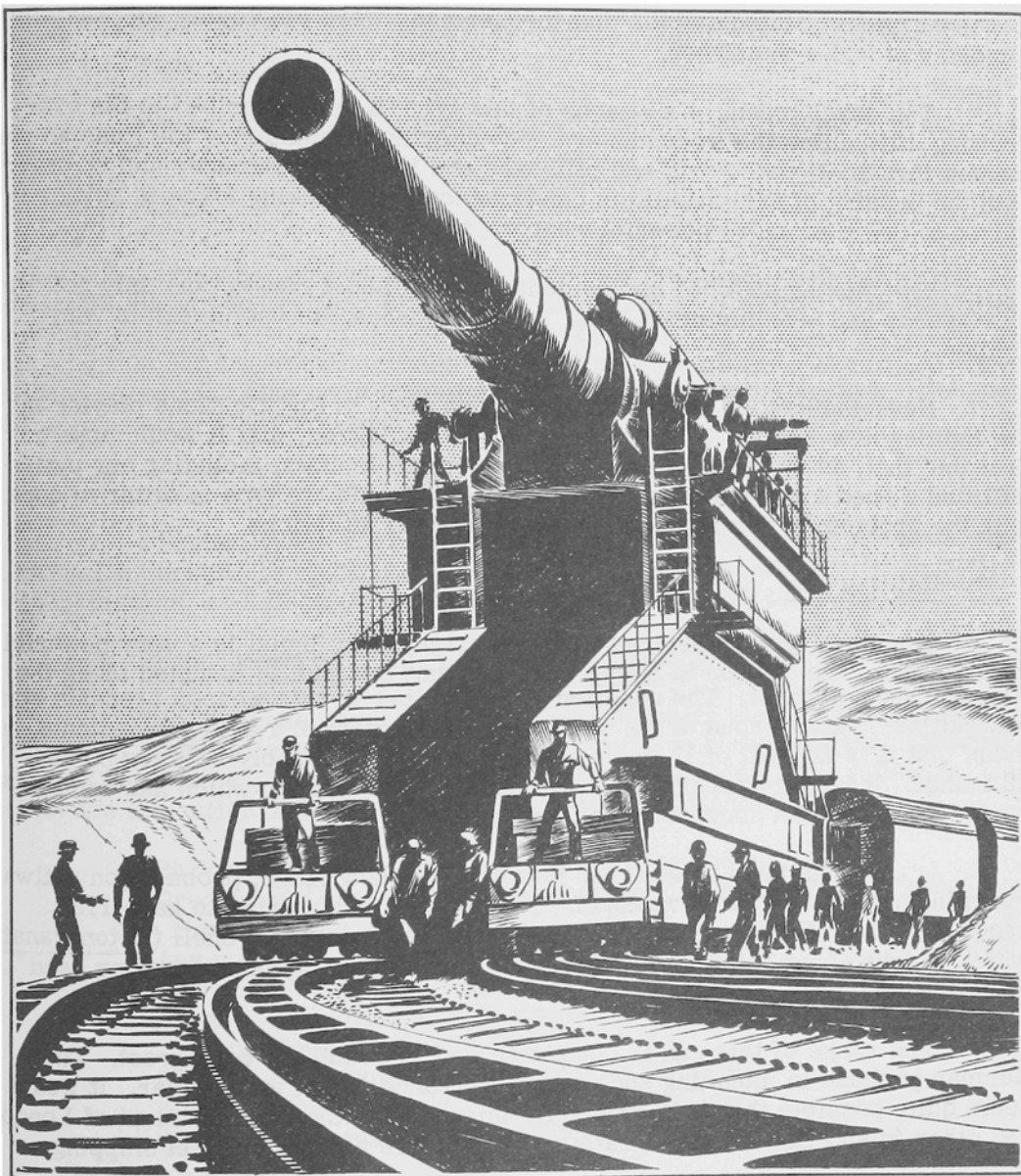
Indications that the Germans have recently introduced two new specialized heavy artillery weapons are found in photographs and captions appearing in a recent number of the German magazine Signal. The two accompanying sketches have been prepared from these photographs.

a. Heavy Mortar

The mortar piece labelled "Thor" is stated in the caption to have been used in the Sevastopol siege operations. Other photographs appearing in the same number of the magazine depict this mortar mounted on a caterpillar tractor, from which it is being fired. An examination of this photograph by U. S.



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artillery and ordnance officers resulted in a consensus of opinion that the caliber of this mortar was probably between 500-mm and 600-mm. It will be remembered that at the time of the Sevastopol siege, both the German and neutral European press printed stories that the Germans were employing successfully a mortar of 560-mm caliber.

The development of a weapon of this type is to be ascribed to the ever-growing difficulties the Germans are encountering in mastering the Russian permanent fortifications. Forts and pillboxes are becoming stronger and stronger with the passing of each month; in consequence the attacking force is being required to use ever more powerful weapons of offense.

The mortar pictured has evidently a very short range, certainly not over 5,000 yards and possibly much less. In consequence, its usefulness is very limited.

Nevertheless, so important a role are modern fortifications playing in the fighting now raging in Russia, notably at Stalingrad, that it would appear probable that, as the war continues to develop, all armies, including our own, will find a need for artillery mortars of this approximate type in order to cope with the problem of destroying permanent land fortifications.

b. Railway Gun

The other type of German weapon portrayed in Signal is a very powerful railway gun. The caption in Signal suggests that this gun is mounted along the French Channel Coast. The question of the caliber of this weapon presents some difficulties. Photographs of the shell appearing elsewhere in Signal indicate, however, that it is at least of 16-inch caliber, but more probably between 20 and 22 inches. It is quite possible that this is the same weapon which has been reported on by British sources as follows:

"It has been established that 61.5-cm howitzers, probably on railway mountings, were used at Sevastopol. This weapon is reported to have 112 grooves in the rifling, and to fire a base-fuzed 'anticoncrete' shell (Betongranate) which weighs about 4,400 lbs, is 6 ft 9 in long, and has a copper driving band 2.76 in wide."

The range of this gun is not known, but is doubtless very great. The German purpose in mounting such a gun in France is not at all clear. It would seem quite possible that it is primarily intended for the bombardment of London and other inland British cities rather than for fire against channel shipping.

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8. JAPANESE DOCTRINE ON OBSTACLES

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The following is a summary of a translation of portions of the Japanese Field Fortification Manual:

a. Electrical Obstacles(1) Principle

Electrified wire is used to cause casualties to men and horses and to hamper hostile attacks.

(2) Construction

Normally, wire is strung on dry poles with bark removed, or on poles with all buried portions insulated with asphalt or coal tar. The bare wire is strung and connected with a high-tension source (1,000 to 2,000 volts AC), so that a person coming in contact with the obstacle wire closes the circuit. Transmission wires may also be strung along the ground, or under ground. (No details of the generating plant are given.)

(3) Use

Ordinarily, the current is not turned on except during actual attacks. A variation consists in electrifying certain sections of the wire during hostile reconnaissance, and electrifying additional sections during the attack.

(4) Reconnaissance of Hostile Electric Obstacles

The Japanese consider it important to locate electrical obstacles prior to an attack. Reconnaissance parties attempt to determine the characteristics of the source of power, and of the transmission lines. The following points are indicative of the presence of electrified obstacles:

- Bark stripped off lower portions of wire obstacle poles.
- Presence of asphalt cloth or other insulation around the buried portions of posts and pegs.
- Any noticeable decrease in the number of wires, posts, and pegs.
- Low wires free from contact with the ground.
- Absence of additional loose barbed wire (used in some cases to strengthen obstacles).
- Presence of insulators or transmission wires.
- Burnt or smoldering grass close to wire lines.
- Sparks when small-arms fire cuts the wire.

(5) Use of Detectors

The Japanese use several types of electrical detectors. One appears to be a simple voltmeter. Another type is a field telephone to pick up earth currents resulting from electric wire at distances of over 100 feet. Also mentioned are a magnetic induction detector with a range up to 1,300 yards, and an

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improvised detector using a radio receiver amplifier with a range up to 500 yards.

(6) Destruction of Electrical Obstacles

Destruction is accomplished by demolition, wire cutting, and artillery fire. In some cases lines may be shorted by throwing water or brine on the posts. Bangalore torpedoes are the best means of demolition. After the use of both demolitions and artillery fire, loose wire ends are dangerous and must be avoided. Special squads equipped with rubber gloves, rubber boots, wire-cutters, and some type of nets for cutting paths through wire are trained in following up demolition work. No matter what the method of demolition, it is emphasized that a path wide enough for the passage of the attackers must be created, and all loose wire ends must be wrapped around posts. The resulting paths should be clearly marked.

b. Mines and Traps

(1) Mine Detection

The Japanese emphasize the necessity for studying the functioning of enemy mines and the enemy procedure for mine laying. Mine detection is generally a mission of technical troops.

(2) Elements of Detection

A detailed search for enemy mines should include attention to the following:

- Those regions from which the enemy purposely keeps away.
- Presence or absence of sentries.
- Removal of civilians.
- Intelligence re enemy's mine laying.
- Change in color of soil, small swells, and mud cracks.
- Exposures or traces of plates, wire, etc.
- Any trip wire and rope on ground, or roads, or in forests.
- Presence of poles and pegs whose use is unusual.
- Waste paper or packing bits used in mine laying.
- Mechanical noise coming from clock-run delay device.
- Smell of chemical from chemical delay device.
- Connection wire between obstacle and ground.
- Wire connecting abandoned weapons and other booby traps.
- Rocks scattered on roads.
- Wire fastened to doors and windows.

(3) Probing Rods

A mine-detecting rod for probing is mentioned. Lacking other means, spades are employed.

(4) Mine Destruction

The Japanese prefer to remove discovered mines, but on occasion will mark located mine fields or will destroy mines by firing them.

c. Antitank Obstacles(1) Types

The Japanese recommend use of the triangular trench, circular pit, and side-hill barriers for antitank defense. In the use of portable obstacles, two rows on level ground and single rows on steep slopes are suggested.

(2) Destruction of Obstacles

The destruction of steel-rail obstacles and side-hill barriers by explosives is recommended. It is suggested that generally it is best to fill trench-and-pit-type obstacles, using crib-work and earth-filled baskets.

Comment: It is recognized that this particular Japanese text deals with obstacles in a very superficial manner. This summary is presented in order to give a Japanese approach to the obstacle problem. Nothing has occurred in the war thus far to indicate a general Japanese weakness in dealing with mines or obstacles.

9. JAPANESE DEFENSIVE TACTICS IN THE SOLOMONS

The following are notes on Japanese defensive tactics encountered by our forces in recent actions in the Solomon Islands:

"Japanese trenches and shelters on the islands attacked by U.S. forces were skillfully emplaced under buildings and hedges. All dirt excavated in constructing shelters had been carried away so that detection of field works was very difficult.

"Telephone lines of galvanized wire were laid between Japanese strong-points. Our shell fire and bombing had disrupted their communications. No evidence of visual signalling or arm and hand signals was observed. At night the Japanese used whistle signals, but their meaning was not established.

"Japanese weapons noted were rifles, pistols, light machine guns and grenades. Mortar fire was encountered on some islands but not on others.

"The flanks of Japanese positions and weapon emplacements were covered by snipers. Snipers were concealed in the tops of palm trees and were not detected until they opened fire, despite careful observation of tree tops. The Browning automatic rifle proved to be an excellent weapon for dealing with snipers.

"On several occasions, the Japanese were called upon to surrender but ignored the opportunity. Two Japanese were observed to throw down their rifles and run toward our lines with their hands in the air. Our forces ceased fire, but a Japanese machine gun shot down the would-be prisoners before they reached our lines.

"The Japanese made extensive use of natural caves, and replaced casualties at near-by guns from personnel in reserve in the caves.

"When grenades were first tossed into Japanese positions, the Japs threw them back. It was found necessary by our troops to release the firing mechanism and count to three before throwing, in order that grenades would explode before the Japs could throw them back.

"Fighting took place at ranges of 50 to 100 yards.

"The Japanese staged several small local counterattacks of 8 to 10 men led by an officer. The Japanese were nearly invisible but disclosed their positions by holding their rifles, with fixed bayonets, aloft while they assembled.

"The slit trenches employed by the Japanese gave excellent protection from bombing.

"When questioned about the lack of prisoners, a U.S. officer said that apparently a great deal of propaganda had been spread among the Japanese soldiers about the horrible things that would happen to prisoners.

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"Naval gunfire and dive-bombing was still going on when the initial wave landed. No fire was received by this first wave, as all the Japanese had taken cover. After cessation of naval gun fire and bombing, the Japanese began firing from dugouts on the island and fire was received from an adjacent island.

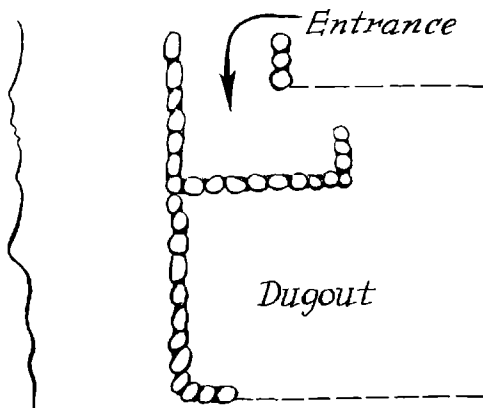
"The first wave tossed grenades into the entrance to the dugouts that they passed. Although the grenades exploded within the entrance, it was later found that they were ineffective due to the type of entryway. Enemy troops fired from dugouts on the rear of the first wave and into the second and third waves, aided by snipers in the tops of coconut trees.

"Japanese dugouts were cut back into the hill on the island and were faced on the front and flanks with sand bags and steel plates. A U.S. sergeant sketched one of these dugouts as follows:

"The Sergeant stated that the Japanese fired from the entry of the dugout. Each dugout had about eight men in it.

"Fourteen dugouts were seen by the sergeant. He stated that they were close to the water's edge and were mutually supporting.

Water



"The Japanese had installed no obstacles nor rigged any booby traps.

"One double-barreled light machine gun was captured. It fed alternately right and left from a central clip.

"The Japanese were very adept at concealing themselves. Some hid under their shelter halves and others under fallen palm fronds. One sniper shot down from a tree had coconuts hung around his neck to help conceal him. One sniper in a palm tree had protected himself with armor plate.

"No means of communication between dugouts were seen nor did the sergeant see any control exercised by officers or noncommissioned officers. Soldiers appeared to fight as individuals.

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"Japanese marksmanship was characterized as poor and not very dangerous if one kept moving and avoided lying in the open.

"It was emphasized that no flash, smoke or muzzle blast was visible from Japanese weapons and this materially aided the Japanese in remaining concealed.

"The Japanese snipers paid particular attention to picking off officers and noncommissioned officers whose exterior garments carried insignia or markings indicating their rank."

* * * *

Further information on the Solomon Islands campaign and on the tactics and fighting qualities of the Japanese soldier is contained in the following abstract of a personal letter from a Marine officer serving with our forces in the Solomons.

"I want to try and describe some of the characteristics of the Japanese soldier. Some of it may sound like so much hokey but it is an actual fact.

"Individually, he is a good soldier; in fact, an excellent one. They very, very seldom give up but will fight until killed, even after being badly wounded. Of a force of well over 700 that we wiped out, we were only able to take 34 prisoners, and 33 of them were so badly wounded that they couldn't do anything. We asked each one if they had been told that they would be killed if captured and they said "No," but that they expected to be. All insisted that they would never be able to return to Japan, so that probably is the answer.

"The first bunch that hit my right flank at 3 a.m. on the 21st, evidently didn't realize that they were approaching our positions. They were walking right in the edge of the surf and got tangled up in some barbed wire that we had salvaged from fences. They started jabbering so our bunch let go with everything they had. They immediately rushed our positions and it was a grand mess for a few minutes. After driving them from our positions they took refuge right in the edge of the surf underneath a 3-foot bank and there they stayed about 50 yards from our line. By that time their main force closed in and tried to advance down the narrow sandspit; naturally, the slaughter was terrific. The rest of the main body had deployed on the east side of the river--about 100 yards from our lines--and a beautiful fire fight continued for many hours. They were well equipped with mortars, 70-mm cannons, flame-throwers, and heavy machine guns.

"There were probably close to 200 that were actually piled up along the narrow sandspit. The ones that were wounded would lie perfectly still but continued to snipe at us all during the day. We had one captain wounded by one even after we had, we thought, cleaned them out thoroughly. As we closed in through the mass of bodies, one man happened to step on a hand and he thought he felt it move so he kicked it. As he did, the Jap jumped up and tried to throw a grenade at a group near but the pin never came out. I actually saw dead Japs

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with grenades in their hands with the pins pulled. Others that I saw had two or three wounds that had been bound up, but they stayed right there until the end.

"After it was all over, we saw one swimming well out to sea so we sent a boat out to get him. As the boat came alongside he made a dive and never came up. In other words, they kill or get killed. You must give them that credit.

"As you have been told before, they are great on sniping. After our initial landing, and after they had taken to the mountains, they worried us quite a bit, as they would slip in at night (or hide out during the day) and do a lot of firing. For two nights we actually had them running around inside Regimental Headquarters lines. As it was as dark as pitch we couldn't fire and they would outrun our boys. We had one sniper near our galley that would take one shot of a morning and one in the evening. We combed the fields and the coconut trees but we never found him. I am glad to say that he was a damn poor shot and he didn't get anyone before he finally beat it.

"Each Jap carried a camouflage net made of mesh with wood-fiber strands, and it is actually impossible to see them at 50 yards if they lie still with it on.

"The unit that hit us had landed 40 miles down the beach two nights before, so they had hiked and carried all of their heavy equipment that distance in less than 22 hours' hiking time. They hid in the brush during daylight. They had no food except what little each man carried and it was practically nil--I imagine they had eaten what they brought ashore and I can't figure out what they expected to do for more. Maybe they expected to get ours.

"In my opinion it boils down to this. The Japs are excellent individual soldiers but their headwork is very poor. They have gotten away with murder so many times maybe they think that it only takes a small force to lick a big one. Well, they got badly fooled once anyway."

10. LESSONS IN ATTACK

Certain cardinal tactical principles cannot be violated in battle with impunity. We may take, for example, the case which unfortunately occurred when a Soviet unit was ordered to capture a village and hill for the purpose of assisting the neighboring units to surround and destroy enemy troops in the vicinity. The particular village was considered important as the key to avenues of supply and evacuation. For this reason, the enemy established strong defensive fortifications there.

The first and most important mistake made by the Soviet commander was the failure to make a sufficiently detailed reconnaissance. Although the terrain was not familiar to him, he relied on information supplied by friendly troops in

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embrasures. Meanwhile, the artillery and mortars kept up neutralizing fire on the rear firing points.

"Attacking in formation of two battalions in line, one in reserve, our leading company was able to capture the enemy positions near the church. It was then possible for the remainder of the two attacking battalions, with supporting artillery and machine-gun fire, to develop their attack to the north and to the southwest. By committing his reserve battalion at the proper time, the Red Army commander succeeded in occupying all three villages by noon.

"Several important conclusions may be drawn from the above tactical operation. First of all, it is necessary to utilize every means of reconnaissance to discover as nearly as possible the exact positions of the enemy's forward firing points and his main line of resistance. A plan for coordinated infantry-artillery action must then be drawn up. In this plan it is essential to designate which unit will dispose of each individual firing point, and when and how it will be done. Reserve units must be designated to deal with new firing points as they are discovered.

"Fire and movement are still the cardinal principles of infantry, down to the last rifleman. They must eliminate enemy riflemen, machine-gun nests, etc. as they move forward across the battlefield. They must use every means to discover and destroy the enemy before he can employ direct fire.

"The artillery is not the only arm which can neutralize a firing point. Infantry with light mortar, machine-gun, and automatic rifle fire can also be used to this end, especially in cases where the enemy's cover is light or non-existent. It is necessary to have good observation of the field of fire for our infantry and to deny the same to the enemy. If these precepts are followed, fire superiority and the success of the attack will be assured."

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Comment: The above report was received in the form of a translation of an article written by a Colonel in the Soviet Army.

11. BREAKTHROUGH AGAINST GERMAN DEFENSES

The German defensive system employed on one sector of the Eastern Front and the methods employed by Soviet infantry and artillery units in breaking through these defenses are described in the following article written by a Red Army officer:

"In many battles on the Leningrad front, it has been ascertained that the German system of defense is usually based on the establishment of a series of separate firing points which mutually support each other. In one small operation, the distinguishing characteristics of their defenses were irregularity of pattern, and the width of front covered in establishing these firing points. They were placed along two general lines. Some had embrasures and overhead cover while others were open. At distances from 50 to 200 yards in the rear were dugouts used for rest purposes, or for protection from artillery and machine-gun fire.

"In the forward firing points were the German light and heavy machine guns. Some of these were protected by a single row of barbed wire. In the rear firing points were mortars and light artillery. All firing points were assigned regular and supplementary sectors of fire. The sectors were overlapping and, in the case of machine guns, final protective lines were interlocking. Initial fire adjustment was made on the east bank of the river, the Soviet jump-off line. Mortar fire was used en masse and was shifted from target to target. In their retreat the Germans had burned all villages on the east bank of the river, thus materially improving their observation and field of fire.

"After careful study of the terrain and the enemy defenses, the Red Army regimental commander decided to strike at the enemy center of resistance near the church. After it had been reduced, it would then be possible to make a flank attack to the north, or to strike at the village held by the 6th Company of the German infantry. The local defenses of the latter comprised only four completed firing points, which were occupied by two light and two heavy machine guns. Two of the emplacements were of the open type, and communication between them and to the rear was difficult because of the heavy brush.

"On the morning of the attack, the Red Army infantry was deployed along the east bank of the river. After the artillery preparation, during which the Germans followed their customary practice of taking cover in their dugouts on the rear slopes, the infantry jumped off at dawn. As the artillery fire was lifted to the rear firing points and enemy reserve concentrations, our mortars and machine guns placed direct fire on the forward firing points. The result was that the Germans were so pinned down that they were unable to get back to their firing positions. Our small-arms weapons which were brought forward proceeded to destroy the effectiveness of the forward firing points by direct fire at the

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that area. Thus he did not know at first hand the enemy system of defense or the grouping of its units.

This mistake resulted in others. The commander had received orders to move into this region 4 days prior to that set for his attack. He was given preliminary instructions then, and the attack order on the following day. His men should have been fully ready for the attack, but were not, because the commander hesitated to make a decision. He finally made his decision and issued his attack order on the day preceding the attack. The various sections were assigned various objectives, and the artillery given widely-spread targets.

Only a few hours prior to the jump-off time, the commander, who was still in doubt due to lack of reconnaissance, issued a countermanding order. There was insufficient time to reorganize the infantry units or to obtain proper cooperation between them and the tanks and the artillery. Furthermore, the new decision did not guarantee fulfillment of the task set. Instead of making a concentrated attack, the commander decided to use small portions of his forces in several diverging attacks. Battle experience has decisively proved that frontal attacks, especially over a wide front, are made only in the most exceptional cases. Here it would have been better to have made the main attack on the right flank, thus holding the main force together and providing distribution in depth.

After an artillery preparation the Soviet infantry moved into the attack. The tanks with "desyanti" troops (infantry on tanks) moved out 30 minutes ahead. Since they were not supported by the main body of the infantry, they were easily driven away from the village by the enemy. Then the well-coordinated fire of the German infantry cut off the opposing infantry which followed.

It is thus clear that the artillery preparation had not been effective. The reasons were: they received the final order too late to conduct thorough reconnaissance and organize advance OP's properly; they did not have complete firing data; and their fire could not be properly observed. The commander did not utilize radio to reestablish lost control.

Instead of bettering his situation when he committed his reserves, he made it worse. The commander brought them into the attack prematurely and in piecemeal formation. After getting tangled up in the forest, they had to retreat to their jump-off position in the face of strong enemy fire and subsequent counterattack.

The general reasons for the failure of this attack can be attributed to;

- (a) Inadequate reconnaissance;
- (b) Sluggishness in making the decision and issuing the attack order;
- (c) Incorrect attack order;
- (d) Loss of control.

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12. MARK III TANK - THREE BASIC DESIGNS

Close examination of a considerable number of photographs of Mark III tanks, together with those available for examination in the Western Desert, indicates that the Mark III fighting-type tank is found in three basic designs.

Of these, the first has an armor basis of 30 mm (1.18 in) all around. The front sprocket has eight spokes, and the rear idler, though having eight spokes, is almost solid. This type is known originally to have been produced mounting a 37-mm gun and either one or two machine guns coaxially in the turret, with one machine gun firing forward in the hull. Later, however, the 50-mm was substituted for the original principal armament, and this mounting has only one machine gun mounted coaxially in the turret, the hull machine gun being retained. Of the actual specimens examined, all mounted the 50-mm gun (many are now mounting the long-barrelled type), and in these there has invariably been a Variorex gear-box, the steering being hydraulically operated. This basic type, irrespective of armament, has not been found to carry any additional armor, improvised or otherwise.

The second type has an armor basis of 30 mm all around with additional 30-mm plates bolted on. This type has a six-spoke front sprocket, and the rear idler, although having eight spokes, is more open than the first type. An ordinary six-speed gear box and hydraulically operated steering gear are fitted. Neither photographs nor specimens of this type have shown any principal armament other than the 50-mm gun with one coaxial machine gun. Moreover, every individual tank of this type has had similar additional 30-mm plates on the front and rear, this additional armor not having been found on any other type of Mark III fighting tank. The inference is, therefore, that this additional armor is actually part of the design of the tank and probably incorporated during manufacture. There have been no indications that this type originally mounted a 37-mm gun, although this remains a possibility.

The third type has 50-mm armor on the front and rear, with 30-mm armor on the sides. No additional armor has been found on any tanks of this type, and the armament has always been found to be the 50-mm gun with a coaxial machine gun and one machine gun in the hull. The front sprocket and rear idler are similar to those in the second type, and an ordinary six-speed gear box is fitted, the steering being operated by mechanical linkage. The driver's and hull gunner's entrance doors have been changed from the former double doors to single doors hinged at the forward edge. In place of the normal mantlet protecting the hull machine gun, a more hemispherical mantlet is fitted.

The following minor differences of design between these three basic types have also been noted. Originally on the first type the armor protecting the driver's visor consisted of two plates, one being raised, and the other lowered, to give protection. The third type, and probably the second type as well, have had a single-hinged piece of armor which can be lowered to give protection. The third type has also had a slightly different design of the two shields protecting the exhausts from the steering tracks. In the first and second types the air filters were located between the rear bulkhead of the fighting compartment and

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the engine, air being drawn from the fighting compartment. These filters were believed to be an oil-soaked gauze type. On the third type this arrangement was superseded by four oil bath filters, installed over the top of the engine blocks.

The suspension on all these types has been the same, the familiar six small bogie wheels with three return rollers, a front sprocket, and a rear idler. Two early types, however, are known to have had respectively five large bogie wheels and eight small bogie wheels. Both these types mounted a 37-mm gun. Nothing has been heard of either type over a considerable period, and it is probable that they were prototypes only and not produced in significant numbers.

It is known that Mark III fighting tanks have been produced in at least five models designated 'E', 'F', 'G', 'H', and 'J'. These models have consecutive chassis number blocks, and it is logical to assume that they are successive developments. There should therefore be a link with the development shown above, but so far it is not possible definitely to say what each model designation represents. It is, however, known that the first type described above has included Model 'G' tanks, and the third type has included Model 'J' tanks. All three types are known to have been in existence early in 1941, the third type probably being at that time a very new production.

It should be specially noted that, in describing German armor thickness, round numbers are almost invariably given. Careful measurement, has shown that these figures are frequently incorrect. 30-mm, for example, should almost invariably be up to 32-mm.

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13. JAPANESE PRISONERS OF WAR

In the last issue of Tactical and Technical Trends an article appeared on the methods of dealing with German prisoners of war as reported in a personal letter written by a British Intelligence Officer in the North African desert. Some interesting observations on this question concerning Japanese PW are brought out in the report which follows.

* * *

Though it is true that the experiences gained from interrogating Japanese PW have not been as numerous as in the case of the Germans or Italians, nevertheless, it has been possible to indicate a pattern of behavior. However, no hard and fast rules can be made, since the problems of interrogation are as varied as human nature itself, and each case has to be treated on its merits. National and personal idiosyncrasies must be taken into account, and it is almost literally true that one PW's food is another's poison.

Such a contingency as capture by the enemy is not recognized by the Japanese military authorities. It is carefully inculcated into the Japanese soldier that to allow himself to be captured is a disgrace worse than death. Indeed, to some extent, he even welcomes the chance to die for his country. "Meet you at Yasukuni" is a popular parting expression used by a Japanese soldier to a comrade when leaving for the front. Yasukuni is a shrine in Tokyo where the ashes of "fallen heroes" are enshrined and paid homage to by millions every year.

The Japanese is therefore a difficult fish to catch. He will resist to the last, and under the circumstances one can hardly be blamed for helping him to achieve his ambition. Moreover, unauthenticated reports from Malaya mentioned cases of Japanese pilots who made successful forced landings, but blew out their brains before they could be disarmed.

According to the account of one Japanese PW, the Japanese troops who had been captured in Russia during the Nomonhan incident in 1939, and afterwards returned to Japan, were given a knife with which to commit "hara-kiri." Names of "missing" Japanese soldiers are officially reported as "killed," and their names removed from the family registers. Indeed, urns containing cremated ashes may be sent to their next of kin as proof that the "missing" are no longer alive.

Schooled in the code of honor which requires suicide rather than capture, the Japanese cannot easily be taken prisoner. Even after capture under circumstances entirely beyond his control, (e.g. a pilot who has crashed, and regained consciousness only in hospital), the well-trained Japanese officer may still demand a pistol to shoot himself, though this attitude then smacks somewhat of a theatrical flourish to save face. But once beyond the reach of help and the immediate opportunity of self-destruction, a complete mental reconstruction is not uncommon.

The following incident shows the typical attitude of the PW as soon as the self-destruction phase passes.

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One Japanese interrogated in Melbourne said he had no desire to return to Japan. He believed that his former friends would have nothing to do with him because he had been taken alive by the enemy and that he would be unable to get back into the army. He preferred to stay in Australia.

Coupled with the comparative leniency of his captors, this conviction induces in the prisoner a pliancy unusual in PW's from other nations, say, Nazi Germany. The self-justification is: "Officially, I am dead; legally, I am stateless; why not talk if I can thereby mitigate or improve my position with my captors."

In other words, his security has been more a matter of external training than of inner conviction. In an entirely new environment the traditional supports of his loyalty fall away and leave him ready to answer most questions, though he does occasionally salve his conscience by showing unwillingness to reveal matters which, in his own words, he describes as "firing a bullet at the heart of the Emperor." The names of his superior officers are revealed with reluctance.

The above remarks apply particularly to Japanese officers, who have been given some instruction on security. So far as the rank and file are concerned, they do not seem to realize that by talking they may be betraying their comrades. This serves to emphasize the necessity of segregating officers from other troops, as soon after capture as possible. Segregation should be arranged immediately and prisoners sent back to the next higher echelon under separate guard.

Aside from officers, information has been forthcoming from straightforward interrogation. Although the Japanese soldier may prefer death to capture, yet, when captured, he has been a valuable source of information.

This should be pointed out to all troops, and the importance of preserving and sending back documents captured with the prisoner should also be stressed. The Intelligence Officer's task is greatly facilitated if he has been able to examine relevant documents before he does his interrogation. As regards the treatment of prisoners when captured, it is very understandable that troops in the heat of battle cannot be expected to be overgentle, but if it is explained to them that prisoners are more amenable when treated well, they will be prepared to cooperate. They should be made to realize that from the intelligence point of view one live Japanese is worth more than fifty dead ones.

One PW disclosed that he had been told of the capture of a British pilot who, though subjected to an intense interrogation, had refused to talk at all. When asked as to what measures the Japanese would be likely to take with a prisoner of this description, he said he was certain that no attempt would be made to extract information by third-degree methods, as the Japanese nature was such as to admire reticence on the part of a soldier. (Comment: It is evident that this particular PW was indulging in some artful practices in order to secure better treatment for himself).

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14. GERMAN PARACHUTE CARTRIDGE FOR WIND MEASUREMENT

A captured document from the Middle East gives some information on these cartridges, which are fired from a standard Very pistol, either held in the hand or placed on a stand. The size and weight of the cartridges are as follows:

length - 135 mm (5.3 in)

weight - 96 gm (3.3 oz)

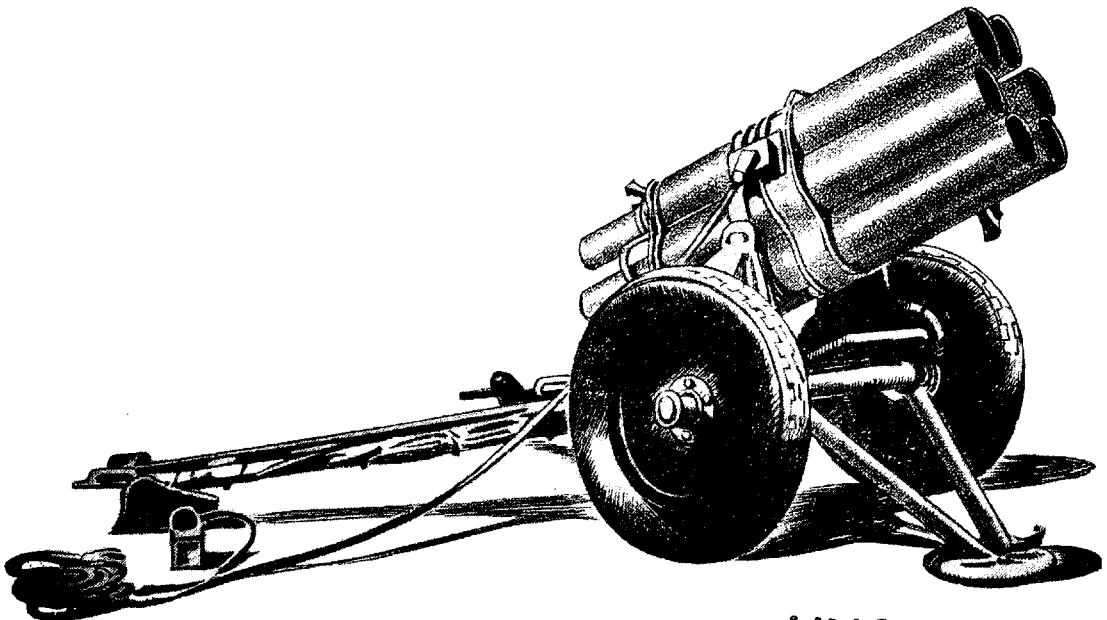
The cartridge may be easily recognized by the closing disk, painted white, with the inscription Fallschirmpatrone für Windmessung on the side.

At the highest point of flight, about 70 meters, a red parachute to which is attached a silk ribbon 1 meter long and 4 centimeters wide is released. This ribbon is held taut by a small iron weight.

Comment: This parachute would give wind data accurate enough for use by field artillery. Although no details are available as to the scale of issue of this equipment, it would be of value to units other than artillery.

15. NEW GERMAN ROCKET WEAPON

The existence of a new German rocket weapon, the Nebelwerfer 41, has been recently reported. As is shown in the accompanying sketch, the weapon has six barrels. Each barrel has a caliber of 150 mm and a range of 6,600 yards.



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The barrels are not rifled but have within them three straight guide rails, about one-third of an inch deep. The projectiles rotate in flight, however, apparently due to the set of the venturis. The barrels have no breech and are open at both ends. Each barrel, however, contains a spring-operated latch, presumably to retain the projectiles in position after they have been loaded.

Firing is electrical. The separate barrels fire at intervals of 1 second, and thus the complete series of six rounds can be fired over a period of 5 seconds. This complete series can be repeated every 90 seconds.

This rocket weapon can be used for firing either HE or gas projectiles, and also probably smoke shells.

16. GERMAN TANK MAINTENANCE AND RECOVERY

Some of the maintenance units attached to German tank regiments were discussed briefly in Tactical and Technical Trends, No. 4, p. 10. More information is now available on these units and is presented here in a summary which involves some revision of the earlier material.

a. Organization

In the German armored divisions, the maintenance and recovery units are ordinarily organized as follows:

(1) Company Repair Section

Each tank company has a repair section consisting of:

- 1 NCO (tank mechanic), section leader,
- 3 NCO's, tank mechanics,
- 13 privates, tank mechanics,
- 2 privates, tank radio electricians,
- 1 private, armorer's assistant,
- 4 privates, chauffeurs.

Total: 4 NCO's and 20 EM.

This repair section has the following vehicles:

- 1 small repair car (Kfz. 2/40),
- 1 medium crosscountry repair truck, for spare parts and tools,
- 2 half-track vehicles (Sd. Kfz. 10) for personnel, capable of towing 1 ton,
- 3 motorcycles with sidecars.

(2) Battalion and Regimental Repair Sections

The headquarters of each tank battalion and each tank regiment has a repair section consisting of:

- 1 NCO (tank mechanic), section leader,
- { 3 privates, tank mechanics (for a tank regimental headquarters),
- or
- { 5 privates, tank mechanics (for a tank battalion headquarters),
- 1 private, motorcyclist, tank radio electrician,
- 1 private, chauffeur, tank radio electrician,
- 1 chauffeur.

Total: for Hq, tank regiment, 1 NCO and 6 men;
for Hq, tank battalion, 1 NCO and 8 men.

This repair section has the following vehicles:

- 1 small repair car (Kfz. 2/40),
- 1 medium crosscountry repair truck, for spare parts and tools,
- 1 motorcycle with sidecar.

(3) Workshop Company

A captured German document gives the following detailed organization of a Panzer workshop company, as of September 15, 1941. It is believed that the organization given in this document is not that of tank units in a particular theater but has general application.

The document sets forth the organization of a workshop company in a Panzer regiment with six companies (as in Libya), but makes provision for added strength (as noted below) in regiments of eight companies, and in regiments of three battalions.

(a) Headquarters Platoon

- 1 crosscountry truck (Kfz. 1) -- 1 chauffeur, 1 company commander (engineer), 1 officer for special duties (engineer), 1 clerk (draftsman). (One of the two officers may be other than an engineer officer.)
- 1 motorcycle -- 1 motorcyclist (orderly).
- 1 medium truck -- 1 chauffeur, 2 men for salvaging spare parts (M)*.
- 1 light personnel car -- 1 chauffeur, 1 official (K -motor transport), 1 NCO for spare parts, 1 clerk (asst. chauffeur).
- 1 motorcycle with sidecar--1 motorcyclist (orderly), 1 foreman for motor transport equipment (Maybach Specialist).

(b) 1st and 2d Platoons

- 1 motor bus (Kraftomnibus)

* Here, and later, where the meaning of technical abbreviations is not certain, they are given as they appear in the document.

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- 1 chauffeur, 4 NCO's for workshop service (Vorh.W=craftsmen?)
- 1 tank electrician and mechanic, 1 tank electric welder, 1 saddler, 1 tinsmith, 1 carpenter, 1 painter, 7 tank motor mechanics, 3 tank transmission mechanics, 1 automobile mechanic, 1 clerk.
- 5 medium trucks, for spare parts and assemblies
(each) 1 chauffeur, 1 tank transmission mechanic (asst. chauffeur), 1 automobile mechanic.
- 1 medium truck for spare parts and assemblies
1 chauffeur, 1 NCO in charge of spare parts,
1 depot chief (M).
- 1 truck with special workshop and trailer for arc-welding apparatus
1 chauffeur, 1 NCO for workshop service (vorhandwk), 1 tank electric welder (asst. chauffeur).
- 1 heavy truck, tools and equipment
1 chauffeur, 1 tank motor mechanic, 1 blacksmith.
- 1 workshop truck (Kfz.19), with trailer for heavy machine apparatus, Set A
1 chauffeur, 1 foreman (leader), 1 turner.
- (c) 3d Platoon (Recovery Platoon)
 - 1 light crosscountry automobile (Kfz.1)
1 chauffeur, 1 officer (platoon leader), NCO (Panzer-Wart, tank mechanic)
 - 1 medium crosscountry truck (Kfz.100) for towing apparatus, with rotating crane (3 tons)*
1 chauffeur, 1 asst. chauffeur (automobile mechanic).
 - 1 medium half-track prime mover (8 tons)
1 chauffeur, 1 assistant chauffeur (automobile mechanic).
 - 2 medium half-track prime movers (8 tons) with underslung trailers (10 tons)
(each) 1 chauffeur, 1 asst. chauffeur (mechanic), and (for one only of these trucks) 1 NCO (tank mechanic).

* A note on the document states that this apparatus will be delivered later.

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- 2 vehicles (with apparatus)* (6 tons, Sd. Kfz. 41)
(each) 1 chauffeur, 1 assistant chauffeur (automobile mechanic).
- 5 heavy half-track prime movers (18 tons), with underslung trailers (20 tons)
(each) 1 chauffeur, 1 assistant chauffeur (automobile mechanic), 1 steerer for trailer; one prime mover has, in addition, an NCO (tank mechanic).
- 2 motorcycles with sidecars
(each) 1 chauffeur (tank mechanic), 1 NCO (tank mechanic).
(One of the NCO's is second in command.)

(d) Armory Section

- 1 medium crosscountry automobile (Kfz. 15 m.G.)
1 chauffeur, 2 armorers (one is section leader), 1 armorer's helper.
- 1 motorcycle with sidecar
1 NCO armorer (O), 1 helper.
- 3 vehicles (not described), for armorer's tools
One with 1 chauffeur, 1 NCO, armorer (O), 1 tank electrician and mechanic (asst. chauffeur);
One with 1 chauffeur, 1 tank electrician (asst. chauffeur), 1 armorer's helper;
One with 1 chauffeur, 2 armorer's helpers (one is asst. chauffeur).
- 1 light crosscountry car for supply of tools
1 chauffeur, 1 armorer's helper.

(e) Workshops for Communications Equipment

- 1 battery-charging truck (Kfz. 42)**
1 chauffeur, 1 NCO mechanic (leader), 1 mechanic.

* The designation of this apparatus and the vehicle model number are not clear on the original document. The apparatus is designated as not yet available. The vehicles are apparently heavy half-track prime movers.

** According to the document, there is a trailer attached to this truck, but no description is given.

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1 communications workshop truck* (Kfz. 42)
1 chauffeur, 1 mechanic (asst. chauffeur).

1 light crosscountry truck
1 chauffeur, 1 mechanic (asst. chauffeur).

(f) Company Supply

1 medium truck for rations and baggage
1 chauffeur, 1 NCO in charge of equipment (leader).

1 motorcycle with sidecar
1 supply sergeant (K). 1 clerk (asst. motorcyclist).

1 antiaircraft truck (Kfz. 4)
1 chauffeur, 1 NCO (in charge), 1 machine-gunner.

2 medium trucks for fuel -
One, with 1 chauffeur and 1 tailor (asst. chauffeur);
One, with 1 chauffeur and 1 shoemaker (asst. chauffeur).

2 medium trucks for large field-kitchen stoves
One, with 1 chauffeur, 1 NCO in charge of rations (asst. chauffeur), 1 cook, 1 asst. cook;
One, with 1 chauffeur, 1 NCO (accountant), 1 NCO (cook), 1 asst. cook (asst. chauffeur).

1 light automobile
1 chauffeur (clerk), 1 master sergeant, 1 medical officer.

(g) Total Strength of Workshop Company

3 officers, 5 officials,** 29 NCO's, 158 EM (total, 195 men)
and 1 shop foreman for motor transport equipment (group leader).

(h) The document makes the following provisions for enlargement of the workshop company:

- (1) For tank regiments with three battalions, add one workshop platoon (same organization as 1st Platoon above).
Add to the Recovery Platoon two heavy half-track prime

* An ambiguous note suggests that this equipment had not yet been delivered.

** Only one official is designated as such in the preceding breakdown of the company's organization. If the foreman and depot chief in each of the 1st and 2d Platoons are officials, this would clear up the discrepancy.

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movers (18 tons) with 22-ton trailers, each to have 1 chauffeur, 1 asst. chauffeur (automobile mechanic), 1 trailer steerer. This involves additional personnel of 1 official, 6 NCO's, 49 EM - total, 56 men. The workshop company then has a total strength of 251 men.

- (2) For tank regiments with 4 companies in a battalion (i.e., two battalions to the regiment), add:

To each of the 1st and 2d Platoons -
2 medium trucks for spare parts, each with 1 chauffeur and 1 motor mechanic (asst. chauffeur).

To the Recovery Platoon -
1 half-track prime mover (18 tons) with trailer (22 tons), and personnel of 1 chauffeur, 1 asst. chauffeur (automobile mechanic), and 1 trailer steerer.

(4) Light Workshop Platoon

According to pre-war organization, a tank regiment of three battalions had (in addition to the workshop company) a regimental workshop platoon. This unit comprised 1 officer, 2 officials, 3 NCO's, and 48 EM; the vehicles consisted of 1 automobile, 13 trucks (5 to 7 with trailers), and 3 motorcycles with sidecars.

There has been little available information on the workshop platoon since 1940. It is believed that the unit has been enlarged.

A captured document from Africa (1941) gives detailed instructions for organizing a workshop platoon in a two-battalion tank regiment of the Afrika Korps (which normally would not have this unit). In this case, an example of the flexibility of German organization, the personnel assigned to the platoon was obtained by breaking up the battalion headquarters repair sections of the two battalions. This workshop platoon was smaller than normal and was to operate, in place of the battalion headquarters repair sections, under command of the regiment.

The platoon was composed of:

- 1 sergeant mechanic (platoon leader),
- 1 Maybach specialist (for engines and Variorex gears),
- 2 NCO's tank mechanics (one an engine mechanic and electrician, the other to be also a welder),
- 2 tank mechanics,
- 1 car chauffeur,
- 2 motorcyclists (mechanics),
- 3 truck chauffeurs.

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The platoon had the following equipment in vehicles:

- 1 light crosscountry automobile (for platoon leader and Maybach Specialist),
- 2 motorcycles with side cars (for the two NCO's),
- 1 truck with repair equipment (for 1 mechanic, 1 tank fitter),
- 2 trucks with materials and spare parts (each for 1 mechanic, 1 tank fitter),
- 1 light two-wheeled trailer,
- 1 trailer with reserve of oxygen and acetylene containers.

(5) According to pre-war organization, each armored division had, as part of divisional services, 3 divisional workshop companies. These companies would, on occasion, presumably aid the workshop units of the tank regiments, but information on this function is not available.

b. Functions of Tank Repair and Workshop Units

(1) The repair sections (the available information apparently applies to both types of repair section mentioned above) are responsible for the general maintenance of the tanks, and of their armament and radio apparatus.

In camp and rest areas, they keep a check upon the serviceability of vehicles in the unit to which they are attached; during this period, mechanics are given advanced training through attachment to the workshop company or under master-mechanics transferred to the unit.

On the march, repair sections travel with the tank units and deal with any breakdowns in vehicles or equipment, in so far as these repairs can be effected in less than 4 hours and with field equipment. If a tank breaks down, the repair section leader inspects it and determines the nature of the damage. If the damage warrants it, the tank is handed over to the recovery platoon to be towed away; otherwise, a motorcycle with mechanics stays with the tank to effect repairs, while the other elements of the repair section go on with the column. In this way, one vehicle after another of the repair section stays behind; ordinarily the motorcycles, but, if damage is serious, a half-tracked vehicle. The repair automobile always goes on with the column, while the repair truck always stays with the repair vehicle left farthest to the rear.

In the assembly area, the repair sections thoroughly test all tanks and equipment as to fitness for battle. Any breakdowns are reported at once to the unit motor-transport sergeant.

In battle, the company repair sections are under the order of the battalion commander and are directed by a battalion motor-transport officer. As a rule they follow closely behind the fighting units and range over the battle area looking for broken-down tanks. If the tank cannot be repaired on the spot it is made towable and its position reported to the recovery platoon (of the workshop company).

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In one tank battalion in Libya, an armor-repair section was added to the normal repair sections. The personnel was made up of armorer mechanics detached from other repair units, and included an armorer sergeant, an armorer corporal, and seven armorer's assistants. The equipment included an automobile, a motorcycle, and two trucks. This section was to follow the tanks in battle and to work with repair sections on weapons and turrets.

Repair sections are not allowed to undertake the welding of armor gashes longer than 4 inches. In battle, the regimental headquarters repair section is attached to a battalion.

(2) The armored workshop company operates as far as 15 to 20 miles behind the fighting tanks of its regiment, except that the recovery platoon works in the battle area, mainly to tow out disabled tanks.

The workshop company handles heavier repair jobs, up to those requiring 12 hours. Repair jobs requiring up to 24 hours are sent back to rear repair bases.

The workshop company has its own power tools, a crane, and apparatus for electric welding and vulcanizing. Its platoons may be separated, and may operate independently. According to one captured document, a workshop company dealt with 18 tanks in 17 days, under conditions where there was no shortage of spare parts.

(3) The light workshop platoon in the Afrika Korps tank regiment (discussed earlier) replaced the battalion headquarters repair sections and operated under command of the regiment as a connecting link between the workshop company and the company repair sections. Like the latter, it would handle work requiring less than 4 hours. In attack, this platoon would follow along the central axis of advance, in close touch with the recovery platoon of the workshop company.

The platoon was to carry out work as follows: on brakes, gears, and clutches of Mark II (light) tanks; on damaged gear-mechanism of Mark III tanks; and on valve defects of all types of truck and tank engines except Mark III and IV tanks. They were to remove electrical and fuel-system faults; salvage and tow wheeled vehicles; make repairs on wheeled vehicles; perform autogene welding and soldering work; and charge and test batteries and electrical apparatus.

c. Tank Recovery Methods

All observers stress the efficiency of the German recovery and maintenance units. The following points have been noted:

(1) The Germans will use combat tanks to tow disabled tanks in case of retirement; even during a battle, instances are reported, both from France and Africa, where combat tanks were employed both to protect towing operations and to assist in the towing. The recovery platoon, with its trailers,

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is not given the whole burden of this main job of salvage.

(2) The same principle of cooperation prevails on repair jobs in the field. Tanks carry many tools, spare parts, and equipment for repair work, and observers believe that the tank crews are trained to assist the repair crews as well as to service and maintain their own vehicles.

(3) Not only is the recovery of German vehicles very efficient, but units will often send out detachments to recover those of the enemy. For instance, a tank battalion may send out a detachment consisting of an officer, one or two NCO's, and six or eight men, transported in one or two crosscountry vehicles and protected by one or two light tanks, to search for and recover disabled hostile vehicles.

17. STANDARD JAPANESE WEAPONS

The following list gives the more important characteristics of the standard Japanese weapons now in use. The details given may contain slight inaccuracies, since a few figures are estimated, and many others have varied in different tests. The muzzle velocity of an old gun, for example, may be considerably lower than that of a new one. Ranges, also, may contain some errors, for they have been taken from tables which reported figures sometimes as "range," at other times as "effective range," and at others as "maximum," effective range," or merely "effective range." Usually there has been no indication of which of several possible propelling charges has been used.

Minor modifications make no change in the model designation, but a major improvement, even though the weapon remains basically the same, will give the equipment a corresponding new model number. The model numbers are based on the Japanese calendar.

More complete details on the individual guns have been published in previous issues of Tactical and Technical Trends, and these articles will be continued in the future. A large amount of enemy materiel is now being examined at Aberdeen Proving Grounds, and the tests conducted there should provide the most complete reports yet available on all types of enemy armament.

The next issue of Tactical and Technical Trends will contain similar data on Italian weapons.

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Name	Caliber (inches)	Muzzle Velocity (foot- seconds)	Max Range (yards)	Weight of Projec- tile	Rate of Fire (RPM)		Remarks
6.5-mm rifle Model 38 (1905)	.256	2,510	2,600	.304 ozs	—	—	Weight, 8 lbs 11 ozs; 4 ft 2 in long without bayonet; Mauser design; 5-round magazine. There is another model, shorter and lighter, otherwise almost identical.
6.5-mm carbine Model 44, Arisaka (1911)	.256	2,500	2,200	.304 ozs	—	—	4 ft 3 1/2 in long with bayonet, weighs 8 lbs 6 1/2 ozs; 5-round magazine.
6.5-mm LMG Model 11, (1922) (Nambu)	.256	2,375	4,400	.304 ozs	500	150	Air-cooled; 30-round hopper; superseded by Model 96, but not obsolete; weight, 22 lbs 8 ozs; bipod and tripod.
6.5-mm LMG Model 96, (1936)	.256	2,400	—	.304 ozs	550	—	Air-cooled; fired from bipod or hip; Hotchkiss design; 30-round magazine; weight, 19 lbs 2 ozs.
6.5-mm Hv MG Model 3, (1914)	.256	2,437	4,374	.304 ozs	500	200	Weight, 119 lbs; air-cooled; Hotchkiss design; tripod mount; fed by 30-round strips; tripod mount.
7.7-mm Hv MG, (1932)	.303	2,700	4,587	Ball, .467 ozs	450	200 to Standard 250	Hv MG; air-cooled; weight, 122 lbs; fed by 30-round strip; tripod mount.
8-mm pistol, semi- automatic, Model 14	.315	2,100	550	.233 ozs	—	—	Weight, 1 lb 12 1/2 ozs; 8-round magazine; 4 1/2-in barrel.
9-mm revolver Model 26 (1893)	.355	1,050	330	.32 ozs	—	—	Weight, 2 lbs; 6-round cylinder.
13-mm AT rifle Arisaka (1939)	.512	—	3,280	1.55 ozs	—	—	Air-cooled; weight, 50 lbs; 25-round magazine; not yet identified in action.
13.2-mm AA MG	.520	2,722	7,085 (vert 13,120 ft)	1.82 ozs	—	—	Weight, 213 lbs; Hotchkiss design.
20-mm AA gun	.788	2,720	5,450 (vert 12,000 ft)	8.8 ozs	—	120	Weight, 836 lbs; Oerlikon design.

Name	Caliber (inches)	Muzzle Velocity (foot- seconds)	Max Range (yards)	Weight of Projec- tile	Rate of Fire (RPM)		Remarks
					Theor- etical	Prac- tical	
37-mm AT gun Model 94	1.46	2,300	5,450	under 1 lb	—	—	Weight, 815 lbs; bore, 40 calibers.
50-mm grenade thrower, Model 89	1.97	—	700	Mortar bomb, 1 lb 9 ozs	—	1 man, 10 2 men, 20	Weapons supported on thigh (in kneeling position) or (usually) ground (in lying position); effective burst radius, 5 yds; weight 10 lbs 1 oz; rifled barrel.
50-mm grenade thrower, Type 10	1.97	—	—	—	—	—	Lighter, shorter, and barrel not rifled, but other- wise similar to above weapon.
70-mm battalion howit- zer Model 92	2.76	650	2,800	8 lbs 5.7 ozs	—	10	Weight, 180 lbs; 4 propelling charges.
72-mm mortar	2.84	482	1,695	4.7 lbs	—	—	Weight, 116 lbs.
75-mm infantry how- itzer Model 41 (1908)	2.96	1,250	7,675	13.85 or 14.1 lbs	—	10	Weight, 1,200 lbs.
75-mm mountain gun Model 94 (1934)	2.96	1,670	11,000	—	—	—	Weight, 1,200 lbs.
75-mm field gun Model 38 (1905)	2.96	1,710	11,800	13.85 or 14.1 lbs	—	—	Weight, 2,500 lbs; to be replaced by Model 90 (1930).
75-mm field gun Model 90 (1930)	2.96	2,230	15,000	13.85 or 14.3 lbs	—	—	Future service gun for division artillery.
75-mm AA gun (1922)	2.96	1,800	11,000 (vert 19,725 ft)	14.5 lbs	—	12	Length of barrel, 35 calibers.
75-mm AA gun (1928)	2.96	2,450	15,200 (vert 33,000 ft)	14.3 lbs	—	15	Length of barrel, 44.5 calibers; an improved type of the 1922 model.

Name	Caliber (inches)	Muzzle Velocity (foot seconds)	Max Range (yards)	Weight of Projec- tile	Rate of Fire (RPM) Theor- etical Prac- tical		Remarks
81-mm mortar	3.19	656	1) 3,280 2) 1,312	1) 7.2 lbs 2) 14.3 lbs	—	—	1)= Light bomb, 2)= Heavy bomb; weight, 129 lbs.
90-mm mortar Type 94	—	—	612 to 4,155	11 lbs 10 ozs (chem filling)	—	—	Used mainly for firing gas shells.
105-mm howitzer Model 91 (1931)	4.14	1,790	11,500	35 lbs	—	—	Weight, 4,250 lbs; a new weapon.
105-mm field gun Model 38 (1905)	4.14	1,770	10,900	39 lbs 10 ozs	—	—	Weight, 4,950 lbs; obsolescent.
105-mm gun Model 26	4.14	2,300	17,000	35 lbs	—	—	Split trail; obsolescent.
105-mm gun Model 92 (1932)	4.14	—	20,000	33 lbs	—	—	Weight, 7,700 lbs; range 20,000 yds with "steam- lined" ammunition.
120-mm howitzer Model 38 (1905)	4.73	900	6,300	44 lbs	—	—	Obsolete.
150-mm howitzer (1915)	5.91	1,130	8,300	79.2 lbs	6 to 8	1	Weight, 4,477 lbs; standard type; later models are believed to have ranged of from 11,000 to 13,000 yards.
150-mm gun L30	5.91	2,260	19,800	80 lbs	—	—	Weight, 7,360 lbs; details unconfirmed.
150-mm gun M18	5.91	2,500	17,900	99 lbs	—	—	Weight, 15,000 lbs; other models are available.
240-mm howitzer M12	9.46	1,280	11,300	440 lbs	—	—	Fixed mount; probably coast defense.
240-mm railway gun	9.46	3,560	54,500	440 lbs	—	—	Several types of this gun.

Information on larger guns is too unreliable to warrant inclusion.

CHANGES IN PLACE NAMES - NORTH CAUCASUS.

Difficulty in following operations in Russia is sometimes caused by the fact that many place names have been changed under the Soviet regime and may not be easy to identify on available maps. The list given below, for the region of the North Caucasus, shows the present place names in capitals, and the older names in capitals and lower case. For convenience, both old and new names are arranged alphabetically in the left-hand column.

Similar lists for other selected regions will be issued later.

ADIGEISKAYA	Cherkess
Alyeksandrovsk-Grushevskoi	SHAKHTI
APANASENKOVSKOYE	Mitrofanovskoye
APANASENKOVSK	Mitrofanovsk
ASLANBEKOVSKOYE	Mikhailovskaya
Azov-Black Sea area divided	KRASNODAR TERRITORY
into	ROSTOV PROVINCE
Batalpashinsk (Sulimov)	YEZHOV-CHERKESSK
Blagodatnoye	VOROSHILOVO
BUDYONOVSK	Prikumsk (Svyatovo Kresta)
BUINAKSK	Temir-Khan-Shura
Cherkess (Aut. Area)	ADIGEISKAYA
GALSKI (Canton)	Samurzihanski
GUMISTINSKI (Canton)	Sukhumski
IPATOVO	Vinodyelnoye
IPATOVSK (Area)	Vinodyelyensk
KARACHAYEVSKAYA (Aut.	Karachayevskaya-
Area)	Cherkesskaya
KAMENSK-SHAKHTINSKI	Kamensk (Kamenskaya)
KRASNI SULIN	Sulin
KRASNODAR	Yekaterinodar
KRASNODAR TERRITORY	Part of Azov-Black Sea
	Territory
KROPOTKIN	Romanovski-Khutor
MAKHACH-KALA	Petrovsk
Medvezhe Syelo	YEVDOKIMOVSKOYE
Mitrofanovsk	APANASENKOVSK
Mikhailovskaya	ASLANBEKOVSKOYE
Mitrofanovskoye	APANASENKOVSKOYE
ORDZHONIKIDZE	Vladikavkaz
Petrovsk	MAKHACH-KALA
Prikumsk (Svyatovo-Kresta)	BUDYONOVSK
PROLYETARSKAYA	Velikoknyazheskaya
Romanovski-Khutor	KROPOTKIN
ROSTOV PROVINCE	Part of Azov-Black Sea
	Territory
SALSK	Torgovaya
Samurzikanski (Canton)	GALSKI
SHAKHTI	Alyeksandrovsk-Grushevskoi

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SHAKHTINSKO-DONYETSKI
(District)

Stavropol

Sulimov (Batalpashinsk)

Sulin

Svyatovo Kresta (Prikumsk)

Temir-Khan-Shura

Torgovaya

Velikoknyazheskaya

Vinodyelnoye

Vinodyelyensk (Area)

Vladikavkaz

VOROSHILOVO

VOROSHILOVSK

Yekaterinodar

YEVDOKIMOVSKOYE

YEZHOV-CHERKESSK

Shakhtinski

VOROSHILOVSK

YEZHOV-CHERKESSK

KRASNI SULIN

BUDYONOVSK

BUINAKSK

SALSK

PROLYETARSKAYA

IPATOVO

IPATOVSK

ORDZHONIKIDZE

Blagodatnoye

Stavropol

KRASNODAR

Medvezhe Syelo

Sulimov (Batalpashinsk)

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SECTION II

GERMAN ANTITANK UNITS AND TACTICS

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GERMAN ANTITANK UNITS AND TACTICS

EQUIPMENT

Successful offensive and defensive action against mechanized forces demands specialized equipment. The principal weapons employed by the Germans against opposing armor are guns of various calibers, mines, obstacles, and grenades. This materiel has been developed over a period of several years and has withstood the test of combat.

A list of the standard German antitank guns has been given in Tactical and Technical Trends, No. 5, p. 9.

An obstacle is any object or device capable of halting a tank or of impeding its progress. Some of the more common forms of obstacles used by the Germans are minefields, road blocks, antitank ditches, and concrete barriers. Obstacles are also constructed from damaged vehicles, trees cut and placed across an avenue of approach, explosive charges which make craters in a roadway, coils of wire disposed in depth to foul the tracks of tanks, and mines suspended from the branches of trees. Antipersonnel mines and booby traps are often used to make obstacles more difficult to remove. Obstacles and barriers are habitually covered with fire to insure their continued effectiveness.

The pole charge consists of a small explosive charge attached to the end of a fairly long pole. The most effective explosive used by the Germans for this purpose is a prepared demolition called the Pionier-Sprengbüchse. It contains slightly more than 2 pounds of explosive and can disable most tanks. Other kinds of explosives are used in makeshift pole charges with almost equal effectiveness.

The "Molotov cocktail," which proved its effectiveness during the Spanish Civil War, has been adopted and used by the German Army. It consists in essence of a quart bottle of gasoline with a gasoline-soaked rag attached to its base. The infantryman lights the rag and throws the bottle at the tank. When the bottle breaks, the tank is immediately engulfed in flame. Improved models of this bomb have been used in which the gasoline is ignited by a substance which explodes on contact with a hard surface. The bottle is sometimes filled with smoke-producing materials to blind the tank crew or with slow-burning combustible oils.

The stick or "potato-masher" grenade (M24) normally contains 1 1/4 pounds of explosive and has a 5 1/2-second time fuze. For use against tanks, the heads of five or six grenades are tied in a bunch around a seventh.

The grenade PH 39 is newer than the M24 and is said to have from six to eight times greater effect. It contains 1 5/16 pounds of explosive and has a 4 1/2 second time fuze. One of these grenades is usually sufficient to put a light or medium tank out of action if it strikes a vital spot.

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ORGANIZATION

Small antitank units such as the platoon and company are organic parts of larger organizations (regiments and battalions), and their mission is to provide these organizations with defense from armored attack. Large antitank units such as battalions and GHQ forces are used as general reserves, and either allotted according to the requirements of lower units or committed at critical points during an action. Normally, the antitank units which are employed as reserve forces are given a large number of self-propelled guns to provide the mobility essential to their missions.

Flexibility, which is a characteristic of all German organization, is especially apparent in the makeup of antitank units. This is partly because antimechanized forces are employed in support of other arms and change their composition according to the task, and partly because of the shift from 37-mm to 50-mm AT guns. As units have their armament and number of guns changed, they have a corresponding change in personnel and services.

At present it is difficult to say with any exactness what type of guns any given antitank unit will have. Weapons are issued to units from the available supply, and the newer types are being allotted as rapidly as they are produced. The unit organizations given below are standard, but not necessarily the only types which the German Army will employ.

The GHQ reserve pool contains heavy antitank battalions, antitank battalions, and probably some self-propelled tank-hunter battalions.

The infantry division's antitank units include one antitank battalion; in addition, each of its three infantry regiments has an antitank company.

The armored division has one antitank battalion, in addition, in each heavy weapons company of its reconnaissance battalion, motorcycle battalion, and two motorized rifle regiments, there is an antitank platoon.

Both the mountain division and the motorized infantry division each have one antitank battalion. The latter also may have one tank-hunter battalion for each of its three motorized rifle regiments.

COMPOSITION OF ANTITANK UNITS

The antitank battalion comprises headquarters and staff; three companies, each with four 37-mm AT guns six 50-mm AT guns, six machine guns, organic transportation, and a maintenance section; and a signal section with 6 pack radios, 2 armored radios, and a lineman's section.

Arms carried in the antitank battalion are twelve 37-mm AT guns, eighteen 50-mm AT guns, 18 machine guns, 315 rifles, 204 pistols, and 13 machine pistols (submachine guns). Accompanying the guns at all times are 180 rounds of 37-mm ammunition per gun, 38 to 72 rounds of 50-mm ammunition

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per gun, and 1,000 rounds of machine-gun ammunition per gun.

The heavy antitank battalion is a GHQ unit made up of 88-mm and 50-mm guns. Its exact composition is not known, but is believed to vary widely according to the number of weapons available.

The tank-hunter battalion contains two companies of 47-mm antitank guns on self-propelled mounts (Mark I tank chassis), or as a variation, one company of 47-mm AT guns and one company of 37-mm AT guns. These tank-destroyer units may also be organized as GHQ troops.

The antitank company of an infantry regiment is fully mechanized, and consists of headquarters and four platoons. Each of the platoons consists of three sections, each armed with a 37-mm AT gun, and one light machine-gun section. Some 50-mm guns have replaced the 37-mm guns which have formerly made up this company's armament.

The antitank platoon of the heavy weapons company is thought to be the same as a platoon of an infantry antitank company.

Barrier detachments are not part of the antitank forces, but their approximate makeup is given here because of their important tactical mission of constructing antimechanized obstacles. Since barrier detachments are engineer task forces constituted for specific missions, no definite organization exists. A typical barrier detachment (Sperr Abteilung) for a corps would comprise an engineer battalion; a mechanized column (Sperr Kolonne) equipped with explosives; one or more bicycle companies; one or more battalions of artillery; and a signal platoon. Such a unit organized to assist division antitank forces would include the following: The division engineer battalion (or part of it); elements of the antitank battalion; one or more bicycle companies; one or more batteries or artillery; and some infantry elements.

All of these forces are supplied with large numbers of motor vehicles, giving them the increased mobility necessary for the rapid performance of their tasks.

TRAINING

When entering the German military service all soldiers take a basic training course of 6 weeks prior to being assigned to permanent units. For the men of antitank units, this period consists of: intensive training in basic infantry subjects; recognition of enemy and friendly armored vehicles; laying and firing antitank weapons and small arms; and handling antitank vehicles and guns. Along with their technical training, they learn something of the theory of the employment of antitank forces and get a course of physical toughening.

In addition to these basic training courses, there are courses designed to make soldiers antitank specialists. A document captured from a German prisoner in Libya gives a good idea of the content of such a course. A translation of

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his account follows:

"The course lasted from 8 to 10 weeks. During the mornings of the first 2 weeks, we learned the principles of gun laying and aiming, with considerable practice in aiming at the 'snake' target, which is 10 feet high and placed at a distance of 35 feet. The gun must be brought into position and correct aim taken in 60 seconds. The snake target can be given both vertical and horizontal movement.

"The afternoons were spent in manhandling the gun at double time. The 37-mm gun was drawn by two men with ropes, with two men pushing behind. Each gun had a commander. After every 20 minutes there was a 10-minute break. The whole distance to be covered was about 5 miles. The last stretch of more than 2 miles rose about 330 feet and included several hollows. This distance was crosscountry and had to be covered in an hour. On arrival at the top of the hill there was a further 10-minute break which was followed by training in judging distances to farmhouses, trees, etc. The distances were checked and corrected with a rangefinder.

"Aiming and firing with dummy cartridges were then practiced on moving targets of cars camouflaged as tanks. These cars moved at the same speed as tanks. They were at ranges of from 450 to 1,350 yards and in a field of vision 350 yards wide. During this practice the gun positions were moved as much as 100 yards.

"The return journey, mostly downhill, had to be covered in 70 minutes. For the last 10 minutes before arrival at barracks, the crews marched along, ropes over their shoulders, singing lustily. The whole exercise was carried out in full kit--steel helmet, rifle, gas mask, pack canteen, and cartridge belts filled with old iron.

"Fifteen minutes was allowed for changing into fatigue clothes; then followed a 30-minute period of instruction in gun cleaning, followed by theoretical instruction in gun parts.

"The third, fourth, and fifth weeks were spent mainly in theoretical instruction and firing practice with a detachable sub-caliber barrel liner. Ammunition fired was the same as used in the service rifle, and the range was about 10 yards. The size of the figures on the target was about 2 inches square. On the targets were four squares, each with five figures, which were fired upon in any order in accordance with the instructions of the gun leader. The time allowed for sighting, loading, and firing was 35 seconds, and the standard to be attained was four hits and one near miss. In addition, there was 45 minutes daily of double-time gun drill in which turning, stopping, crosscountry movement, and getting the weapon into firing position were practiced.

"The remainder of the course included further gun drill--laying, sighting, and loading with dummy cartridges. All of the exercises were aimed at inculcating speed. The first gun set the pace and the other three guns had to

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keep up with it. Toward the end of the course there was some field firing. For snap shooting, each gunner was allowed five rounds.

"Wooden practice tanks of the same size as normal tanks were pulled along at a speed of 6 miles per hour. These practice tanks were suspended from overhead ropes, and rollers were used to make them turn corners. The five rounds were to be fired at 1,350, 1,100, 880, 660, and 440 yards, respectively. The qualifying score was 80 percent. Afterwards, there was firing practice at cardboard figures representing machine-gun nests. These figures were life-sized, and represented the personnel as either prone or kneeling. The qualifying score in this exercise was 100 percent. Five rounds were fired on this range, one at 440 yards, one at 660, and the other three at 880. Gunners who made the best records were rewarded by being allowed to fire 10 extra rounds.

"Instruction both practical and theoretical, was also given in fighting British incendiary bombs and land mines. There were occasionally exercises with rubber boats, in which the antitank guns were to be transported across rivers. At the end of the period of training there were maneuvers for 3 days."

After his preliminary work, the German antitank soldier goes into unit-training. The primary objective of unit training in the German Army is teamwork. Since soldiers come to antitank companies and battalions with a good knowledge of their weapons, the first lesson that they learn is the employment of these weapons in a closely coordinated team. Most of this instruction is by platoons, as the platoon is the antitank unit most frequently used in actual combat.

A great deal of the instruction is in the movement and emplacement of the guns, and gun crews are taught rapid and effective means of selecting and camouflaging positions. Gunnery, however, is not neglected, for there is frequent practice in laying and firing weapons. As in the basic courses, great stress is laid on the manhandling of guns, and there are frequent company and platoon exercises in which guns are put into position, moved to new positions, and fired without the use of prime movers.

Officers of antitank units are trained to exercise a great amount of initiative in the disposition of their guns and in coping with unexpected conditions. Speed in making decisions is emphasized.

TACTICAL EMPLOYMENT OF ANTIMECHANIZED UNITS

As German pre-war military philosophy worked out a theory of combat emphasizing movement, armor, and air support, one fact became apparent: the development of the armored and air arms had swung the balance of power in battle heavily in favor of the offense. More specifically, the Germans calculated that each antitank gun attacked by compact tank units could hardly destroy more than three tanks before being submerged by the advance. On this basis, they decided that to reestablish the equality between attack and defense it would be necessary to protect antitank weapons effectively by camouflage, concealment,

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and armor, and to oppose tank attacks with a flexible and mobile mass of guns on self-propelled mounts, capable of strengthening defense in depth.

Another development in the theory of antimechanized tactics, the offensive attitude, has been equally important in the evolution of the present German system. With the development of a large number of mobile guns, giving antimechanized units more mobility than tanks, it was realized that guns need no longer lie in wait for the armored attack, but could seek combat with enemy armored vehicles. Every soldier was impressed with the ability of new weapons and methods to destroy tanks, and the names of units were changed from Panzerabwehr (antitank defense) to Panzerjäger (tank hunter). (It is interesting to compare this German change in attitude with a similar change in the U.S. Army, where "antitank" battalions have been changed to "tank destroyer" battalions and the offensive character of antimechanized operations emphasized.)

A captured German training manual emphasizes the offensive role of the division antitank battalion and the GHQ antitank units, saying:

"As a result of its speed, mobility, crosscountry performance, and protection against tanks, the antitank battalion can attack enemy armored vehicles. Its object is to engage and destroy enemy tanks by surprise attacks from unexpected directions with concentrated fire. In addition to engaging enemy tanks, the antitank unit has the task of neutralizing antitank defenses, thereby supporting its own tanks."

The only real protective missions which are now assigned to antimechanized units are those of the antitank companies of infantry regiments and the antitank platoons of heavy weapons companies. Division antitank battalions and GHQ antitank units are always considered as reserve forces or as offensive elements. The organic companies are used for local protection, but are not expected to repel tank attacks in force; for this purpose the more mobile battalions are committed at the point where the main force of the armored attack strikes.

The actual proportion of self-propelled guns in the German Army at present is not known, but it is believed that the objective is for all GHQ units to be self-propelled throughout, and for division antitank battalions and regimental antitank companies to be two-thirds self-propelled. This would provide a high degree of mobility, while retaining a few easily camouflaged towed guns, which could be used well forward to protect avenues of tank attack.

In battle, emphasis is placed on antitank units moving rapidly in and out of position. All of the personnel and installations of antitank units are required to be prepared for tank attack at all times. Careful and continuous reconnaissance is deemed a necessity, as each unit must be familiar with the most likely routes of tank approach and be prepared to defend these routes.

Special emphasis is laid on reports by all subordinate units on the approach of tanks. These reports, combined with the reports of reconnaissance

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agencies, permit the timely and coordinated organization of defensive measures.

The antitank battalion of an armored division goes into the attack with the tanks, following them from objective to objective, and engages all tanks threatening them from the flanks and rear. Some detachments of the antitank battalion may also be allotted to the infantry following the tanks if this is necessary for security.

If infantry is attacking without tanks, the antitank battalion accompanies it in the same manner as when accompanying the tank attack, except that the main body of the battalion is kept behind the infantry flanks to repulse enemy counterattacks or overcome unexpectedly strong enemy resistance. Units of the antitank battalion are not usually attached to larger units of the attacking force, but furnish independent support.

Platoon commanders are instructed to display a great amount of initiative in engaging targets. If there are no enemy armored vehicles encountered on one platoon sector, the platoon gives necessary assistance to the guns of neighboring sectors. Camouflage of guns in successive attack positions is not required, but platoon leaders are cautioned to use the greatest care in the proper selection of positions which command important terrain.

In a pursuit, antitank units are attached to the most advanced elements, usually by platoons. They have the mission of giving protection to the flanks of the most advanced elements and of destroying armored elements in the enemy rear-guard, thus breaking the backbone of the enemy delaying action.

In a withdrawal, regimental antitank units normally defend their regimental units along the line of advance of enemy tanks. Part of the division antitank battalion may be used to strengthen this defense. In the case of an exterior division or of a division operating alone, some of the antitank battalion may be employed for the protection of flanks.

The remainder of the division antitank battalion is divided into two parts. One reconnoiters and prepares positions for the next delaying action, while the other acts as a mobile reserve for the immediate use of the division commander.

In spite of the offensive emphasis given to the antitank units of the German Army, their primary mission remains defensive. In performing this defensive mission, however, these units may use some of their offensive tactics with great success.

The terrain plays an important part in plans for the defense of a sector against mechanized attack. After thorough reconnaissance of the defensive sector assigned to a division, the plan for antitank defense is perfected. The principles of this plan are, generally, to deny the best avenues of tank approach to the enemy by covering them with liberal antitank fire, while the less likely avenues of approach are denied to the enemy by obstacles. The antitank units organic in regiments are used well to the front and are emplaced in camouflaged

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positions; the division antitank battalion on its mobile mounts is kept in the rear, ready to lend support where needed and to give depth to the defense.

Typical German procedure* for the preparation of antitank defense in a defensive situation is as follows:

(a) Assume that the division is defending a sector 9,000 yards wide, regiments abreast. The terrain is diversified, offering some tank obstacles, such as canals, thick woods, and a stream, and also offering open, rolling corridors which are excellent avenues of approach for tanks.

(b) Reconnaissance and map study are made to determine two important locations along the front: one, the engineer center of resistance (Pionier Schwerpunkt) and the other, the antitank-gun center of resistance (Panzer Abwehrgeschütz Schwerpunkt).

(c) The engineer center of resistance is located in that section of the front where natural obstacles contribute defensive strength. Engineer troops improve and expand the natural defensive features found in this section.

(d) The antitank-gun center of resistance is located in that section of the front where the ground is open and rolling, ideal terrain for tank operations. The regimental antitank company's guns are emplaced in concealed positions 200 to 400 yards in rear of the main line of resistance, while the antitank battalion is farther to the rear, with gun positions echeloned in depth. The battalion gun positions are selected, and positions leading thereto carefully reconnoitered, but they are not usually occupied until the warning of a hostile attack is received. The guns remain under cover in positions of readiness, conveniently located to permit rapid movement to any threatened area.

Antitank defense on the march follows the same general principles as in a static situation--that is, the regimental antitank companies provide defense for their units, and the division antitank battalion acts as a general reserve to be used against a concentrated tank attack.

Within the regimental march column, the antitank company is employed in units of full platoons. The four platoons are usually disposed as follows: one platoon has one gun with the point and the remaining two guns at the rear of the advance party; one platoon is placed at the head and one at the rear of the reserve; and the last platoon marches with the combat trains. If, however, the regiment is marching in the division's main body, one platoon marches at the head of the regiment, one at the rear of the foot elements, and the other two platoons with the combat trains.

The location of the division on the march is the determining factor in the disposition of the division antitank battalion. When the division has both flanks covered, the battalion marches with the combat trains; when there is an exposed

* This account is based on a problem given at the Kriegsakademie, the German equivalent of the U.S. Command and General Staff School.

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flank and a strong tank attack is possible, the battalion protects the exposed flank, moving from position to position by bounds, the companies leap-frogging each other so that two companies are always in position to fire.

The division commander determines the tank-warning system prior to the start of the march, reconnaissance elements being marshalled to insure early intelligence of the approach of hostile armored elements.

OBSTACLES AND MINES

German engineers cooperate closely with antimechanized units in defense against tanks. As previously stated, engineers reinforce by obstacles and mines the terrain less favorable for tank attack, whereas the antitank guns are massed in those areas not easily defended by artificial barriers. Both obstacles and minefields are always covered by the fire of antitank weapons and small arms. As a matter of fact, the Germans often use these antimechanized obstacles to slow or halt tanks and make them good targets.

The Germans make every effort to slow or halt pursuing hostile forces by mining roads and bridges. Mines are buried under the earth or in snow, and may often be detected by the presence of small mounds.

The Germans employ antitank minefields extensively, finding them particularly valuable in the desert, where flat terrain and hard soil makes the construction of artificial obstacles quite difficult. These fields are often laid in complicated patterns. As a result their removal is difficult and hazardous, since the uncovering of a small portion of the field usually does not give the key to the remainder. The hazard of clearing these fields is increased by the liberal use of antipersonnel mines scattered among the antitank mines.

German minefields are usually very plainly marked, to warn friendly vehicles. The Germans consider safety in this respect more important than deception. In the rear areas they often string a low wire fence around the fields, or dig a shallow ditch. In some cases guards are placed at the gaps in the minefields to see friendly vehicles through safely.

Minefields are employed with great care, as the Germans appreciate that it is possible for them to be turned to the disadvantage of the unit that lays them. The object is to construct an obstacle that will block enemy vehicles without hampering the maneuver of German forces.

Antimechanized obstacles are built by special engineer task forces (Sperrabteilung) who must have great mobility. Their personnel is taught the necessity for the rapid performance of their jobs.

The cardinal principle of the location of antimechanized barriers is that they are placed in such a manner as to cause tanks and other vehicles to appear at practically point-blank range in fields of fire of the weapons covering them.

USE OF ANTI-AIRCRAFT AGAINST TANKS

In the German Army it is emphasized that anti-aircraft and anti-tank guns have the same general characteristics--high muzzle velocity, mobility, wide traverse, and rapid rate of fire--and therefore anti-aircraft guns should be used to assist in defense against tank attack. This role is generally regarded as secondary, but on occasion part of the German anti-aircraft weapons have been employed against armor during a simultaneous air and tank attack. In some cases anti-aircraft units have been assigned to higher units with the primary mission of furnishing additional anti-tank protection.

INFANTRY TANK HUNTING

German training and operations have both emphasized the importance of aggressive action against tanks by dismounted infantry personnel. All tanks, they teach, have certain vulnerable points which make them easy prey for close-combat weapons specially designed for the purpose and employed by aggressive, trained soldiers. The chief weaknesses of tanks are their relatively poor visibility, their inability to defend themselves within a close radius of the vehicle (dead space), and the time lag in shifting guns from target to target. They also need certain times, usually at night or in rear areas, to carry out maintenance and repairs. This is always a favorable time for the dismounted tank hunter.

Tank hunters, acting alone or in pairs, are also taught to use smoke candles, smoke grenades, and smudges to produce films on the vision slits of the tanks. By using these methods they can get within close enough range to employ hand weapons.

A German training instruction, issued to an infantry unit shortly after it had successfully repelled a British attack, sets forth the basic technique of infantry tank hunting. A translation of the document follows:

"The construction of our defensive areas has proved extremely effective, particularly the provision of anti-tank trenches. No casualties were sustained when British armored fighting vehicles penetrated our position. The troops were protected by anti-tank trenches and could employ their weapons on the infantry following the tanks, while the tanks were being engaged by anti-tank weapons.

"The lesson to be drawn is that the infantryman should allow the tank to pass overhead while he is in his anti-tank trench. If he attempts to jump clear, he draws fire on himself from the tank, whose field of fire is extremely limited. The infantryman's main task remains the repulsing of the assaulting infantry. In addition to this, however, enemy tanks can be knocked out by courageous action with close-combat weapons.

"The most important weapons for this purpose are the Molotov cocktail and the pole charge. The most convenient charge is the prepared charge (Pionier Sprengbuchse), which contains 2.2 pounds of explosive. Its strength is

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such that it can knock out a British infantry tank without unduly endangering its user by the explosion. The drag-mine is also highly successful.

"Molotov cocktails are most effective if they burst on the ribs of the engine cover. The flaming contents envelop the motor, which is usually set afire.

"The tank is particularly sensitive to the prepared charge in three places--on the tracks, the engine cover, and the horizontal armor near the turret. If a prepared charge bursts in close proximity to the tracks, the chain is damaged to such an extent that it breaks when the tank moves forward. A charge placed on the reinforcing ribs penetrates them and the engine cover, damaging the engine. The horizontal armor near the turret is weak in the English infantry tank, and the detonation of a charge there causes complete penetration and great blast effect within the tank. The drag mine can be effectively used by an infantryman in his antitank trench.

"In order to employ the close-combat weapons mentioned above, the infantryman must at least be within throwing range of the tank. He must, therefore, wait in his cover for the tank to approach. But this cover is useful only when it has been specifically constructed as an antitank ditch--that is, it must be level with the ground, well camouflaged, and not more than 40 inches wide, so that the tank can pass overhead without endangering the infantryman.

"The danger to the infantryman who finds himself close to a tank is slight. An infantryman in his antitank trench is always superior to an enemy tank that is within throwing range if he is properly equipped. The periscope of the British tanks is inadequate, allowing the driver to see straight ahead only, and the gunner can only see in the line of his gun. Because of the limited play of the weapons mountings, they cannot be depressed sufficiently to cover the immediate vicinity of the tank. An infantryman in this dead area must inevitably use his close-combat weapons effectively."

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	Tactical study of the German armored division
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