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CONTENTS

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SECTION I

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AIR

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1. ITALIAN SM-82

The Savoia-Marchetti-82 "Canguru", the largest of Italy's 3-engine aircraft, not only constitutes about 75 to 85 per cent of the Italian Air Force transport fleet but has been the only reported Italian plane in substantial use by the Germans. Recent reports indicate that some of these planes have been used by the Germans to evacuate troops from Corsica. A development of the SM-75, with deeper fuselage and a single fin and rudder of radically different design, it is a 4- or 5-place, 3-engine, low-wing cantilever monoplane with wings tapering moderately to rounded tips, and hydraulic landing gear. The fuselage is wide and deep, with 8 windows high up and 3 below along both sides. It has a wing span of 97 feet, 6 inches, a length of 73 feet, 6 inches, and a gross wing area of 1,290 square feet.

The aircraft is powered with 3 Alfa Romeo 128 RC 21 9-cylinder air-cooled radial engines, each capable of 860 hp at 6,900 feet altitude. The maximum speed is 205 mph at 7,000 feet, and 185 mph at sea level. Normal cruising speed is 172 mph at 10,000 feet, and economical speed, 155 mph. The service ceiling with a normal load is 17,000 feet, and the range is 1,160 miles or 6.8 hours.

Self-sealing tanks fitted into the wings have a total capacity of 928 U.S. gallons. Additional fuselage self-sealing tanks may be installed to hold 639 U.S. gallons, making a maximum fuel load of 1,567 U.S. gallons.

The armament consists of one 7.7-mm free machine gun in the forward fuselage with a 60° traverse, one 12.7-mm free machine gun in the hand operated dorsal position just aft of the cockpit, with a 360° field of fire, and two 7.7-mm free machine guns in the lateral positions, each capable of a 65° traverse. The airplane is not fitted with armor.

The "Canguru" is reported to be capable of carrying the following alternative loads:

(1) 75-mm gun with ammunition and/or one flame-throwing outfit with crew and equipment
(2) small tank
(3) 51 men with light automatic weapons
(4) a dismantled Fiat CR-42 fighter, which is carried with wings detached and stowed along the sides of the fuselage.

The SM-82 is well known for its four-day, 16,200-mile liaison flight from Rome to Tokyo and return in 1942. In 1939 it set a world's closed circuit distance record when it covered approximately 8,000 miles at an average speed of 143 mph remaining in the air for 56 1/2 hours. The aircraft has seen extensive service throughout all the various African campaigns.

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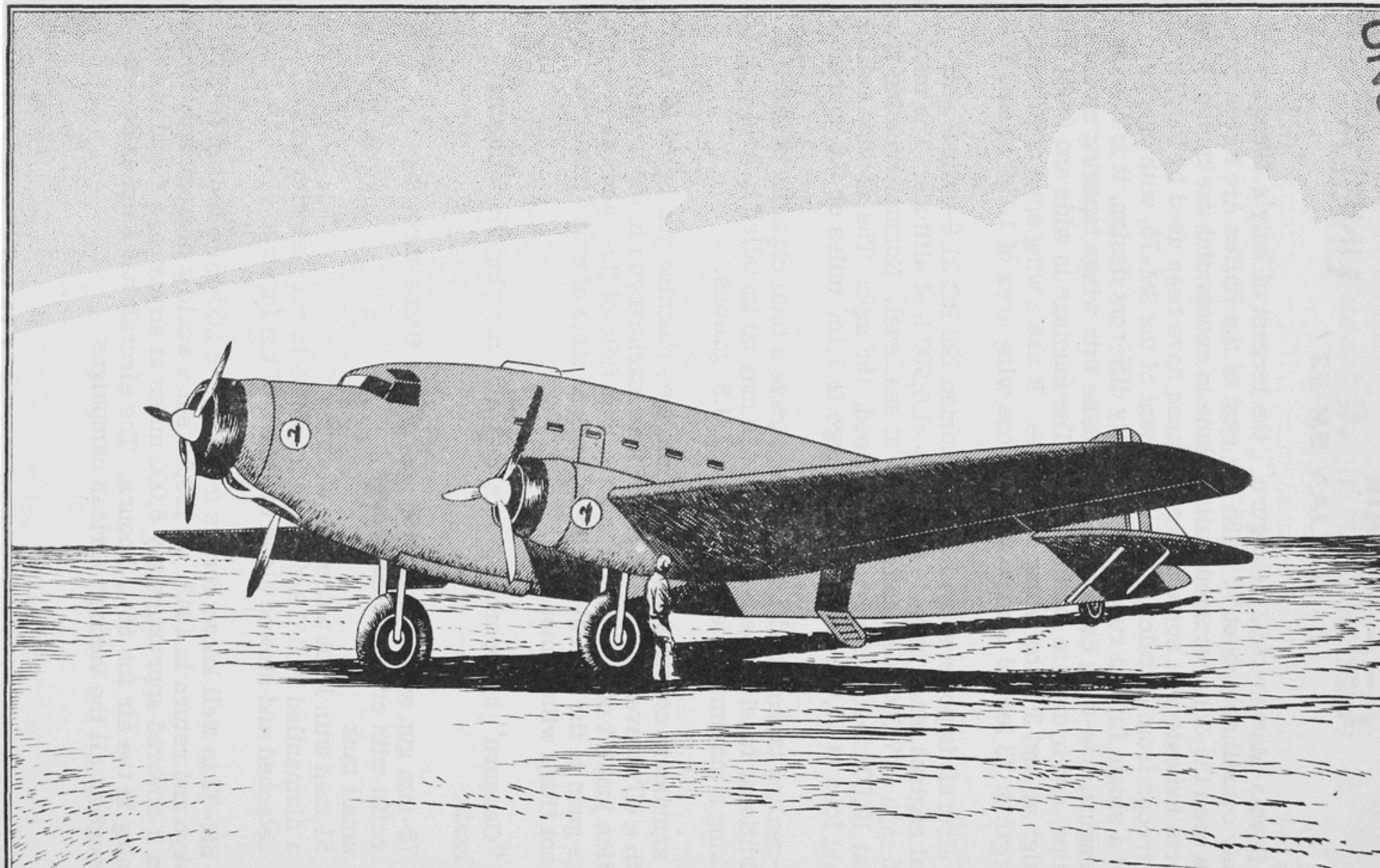


THE SAVOIA MARCHETTI S.M. 82 "CANGURU" BOMBER

2. EMPLOYMENT OF GERMAN AAA

The development of modern antiaircraft artillery as compared to all other types of artillery probably has resulted in the most advanced type of weapon in this category. Because of its ballistic qualities, automatic controls and the technical excellence of the instruments used, these weapons have been of great tactical use in the hands of the enemy.

The following article taken from AFGIB (Air Forces General Information Bulletin) September 1943, describes some general principles underlying the methods of operation of these guns and also takes up the question of the performance characteristics of the various German types.

* * *

The term "Flak," as related to German antiaircraft, is an abbreviation for "Fliegerabwehrkanone," which means antiaircraft gun. However, in common parlance of the British and our own forces, Flak generally means the fire from such guns rather than the guns themselves. This usage is exemplified in such statements as that "Flak was intense and accurate at X feet," etc.

Like fighter aircraft, which constitute the other major hazard to operation of our planes over enemy territory, antiaircraft guns and gunnery have been constantly improved in their capabilities and effectiveness during the present war. This article attempts to present a general picture of the present status of German equipment.

German guns in common use against aircraft may conveniently be considered under three main classifications, namely: (a) machine guns and small arms; (b) light antiaircraft, consisting of automatic weapons; and (c) heavy antiaircraft, firing high explosive projectiles equipped with variable time fuzes. Each of these categories has its own zone of employment and major effectiveness. Assuming that the target aircraft flies within the horizontal range of the weapon, the altitude of the target mainly determines the effectiveness of each category of weapons for the particular case.

Aircraft flying over German-held territory at very low altitudes are apt to encounter heavy machine gun fire; and when over troops, to be also the target for everything available in the way of small arms as well. (see Tactical and Technical Trends No. 30, p. 6) It is standard German practice to send up a hail of bullets from every sort of weapon that can be brought to bear, and the concentration of fire from troop columns has been described as very heavy indeed. The German machine gun most commonly used is the air-cooled 7.92-mm (0.31 inch) gun. It has a maximum vertical range of about 8,500 feet, but the slant range for tracer observation is only about 3,000 feet and fire is effective only to about 2,400 feet. The rate of fire for short bursts may be as high as 1,100 rounds per minute, and ammunition for the antiaircraft role is usually fed in the ratio of

one tracer, two armor piercing, and two incendiary bullets.

a. Safest Flying Procedure

For aircraft which must fly well within the effective range of machine guns, it is generally considered that the safest procedure is flight at the minimum possible altitude--preferably 50 feet or less--taking every possible advantage of cover in the shape of terrain features, including hills and valleys, trees, and buildings. Speed, surprise, and evasive action are highly important, as is also the direction of the aircraft's attack. For instance, straight, lengthwise flight over a troop column is likely to be very unhealthy. It is evident that the gunner's problem is most difficult when he has the target in view for the shortest time, and must traverse his gun rapidly to follow it, allowing for corkscrewing changes of course and altitude by the plane.

German light antiaircraft guns--automatic weapons--include a 20-mm cannon corresponding to the Oerlikon or Hispano-Suiza; a 37-mm, somewhat similar to our gun of that caliber; a 40-mm Bofors; and a dual purpose 50-mm. The latter two are less commonly encountered, as some 70 per cent of the automatic weapons are 20-mm and some 20 per cent are 37-mm. In the antiaircraft role, these weapons fire high explosive tracer shells equipped with percussion and self-destroying fuzes.

The 20-mm has a maximum horizontal range of 5,230 yards and a maximum vertical range of 12,500 feet. However, the shells normally do not reach this altitude, as with 6-second self-destroying tracer ammunition they explode at about 7,200 feet. The effective ceiling for accurate engagement is considered to be about 3,500 feet. The theoretical rate of fire for the Model 30 is 280 rounds per minute, and for the Model 38 is 450 rounds per minute. Practically, these rates reduce to about 120 rounds and 200 rounds, fired in bursts of up to 20 rounds.

The 37-mm has a maximum horizontal range of 8,750 yards, and would have a maximum vertical range of 15,600 feet, except that the 14-second tracer ammunition self-destroys at about 13,800 feet. With 7-second tracer, the shells self-destroy at about 9,200 feet. As with the 20-mm the effective ceiling for accurate engagement is less than these figures, being about 5,000 feet. The theoretical rate of fire of the 37-mm weapon is 150 rounds per minute, which reduces in practice to about 60 rounds per minute for cartridges loaded in clips of 6 rounds each. High explosive shells of both the 20-mm and the 37-mm have an instantaneous percussion fuze which functions on impact.

The usual fire control equipment for German light automatic weapons is a gunsight with a computer mechanism on the course and speed principle, together with a separate stereoscopic range finder. Other sights are used in which the necessary deflections in azimuth and elevation are automatically calculated by an electric control mechanism that operates when the traversing wheels are moved. Forward area sights are attached for firing at very close range when a high rate of traverse of the weapon is necessary.

The fire is corrected by visual observation of the paths of the tracers. The fact that such observation is correct only for the earlier and flatter portion of the trajectory accounts for the previously mentioned reduced figures for "effective" range. Beyond the "effective" ranges, the probability of a hit drops off rapidly.

German heavy antiaircraft guns, like our own, fire high explosive shells equipped with time fuzes. These explode after a chosen time interval for which the fuze can be set, and consequently at a definite range. The shell fragments are projected outward from the burst at high velocity, and this produces a certain "lethal area," larger or smaller according to the size of the shell.

The principal German heavy antiaircraft guns are as follows: (a) the 75-mm, corresponding to our 3-inch; the 88-mm, which somewhat corresponds to our 90-mm; the 105-mm, the 128-mm or 5 inch; and the 150-mm or 5.9 inch. About 65 per cent of the German heavies are 88-mm, and about 20 per cent are 105-mm. The 75's, 128's, and 150's are thus comparatively rare, and in planning high level air operations it is usually sufficient to make estimates on the basis of capabilities of the 88-mm and 105-mm guns.

In the same way that the self-destroying tracer reduces the theoretical maximum vertical range of light automatic weapon shells, so does the limitation of the time fuze used reduce the theoretical maximum vertical range of heavy antiaircraft shells. The maximum vertical range of the 88-mm, theoretically 35,700 feet, is thus reduced to a ceiling of 32,500 feet for maximum time setting of the fuze employed.

Corresponding figures for the 105-mm are 41,300 feet and 37,000 feet. The lethal radius of burst, for the 88-mm is considered to be about 30 feet, and the practical rate of fire 15 rounds per minute. For the 105-mm shell, lethal radius of burst is about 50 feet, and the practical rate of fire from 8 to 10 rounds per minute.

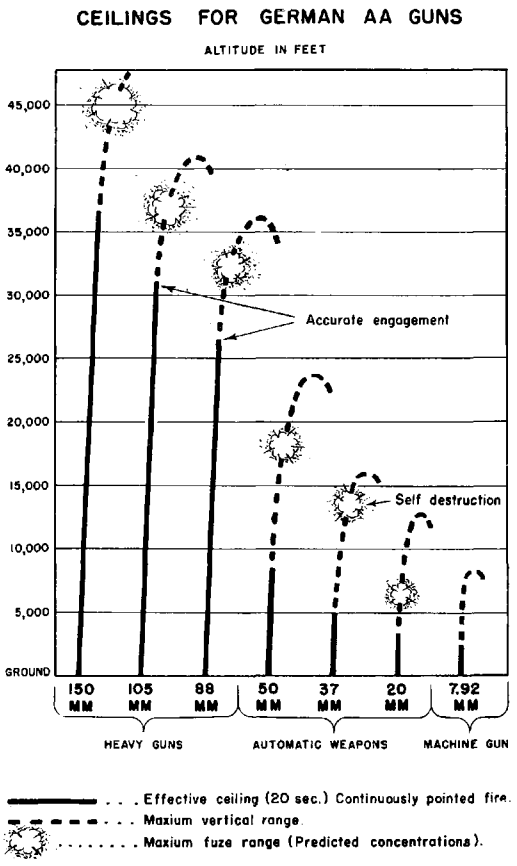
b. Capability of Heavy Antiaircraft

In order to get a picture of the general capability of a heavy antiaircraft gun, it is useful to consider the line traced by the shell bursts if we fire, with maximum fuze time setting, a series of shots aimed toward the same compass point but at successively greater angles of elevation above the horizontal. The first shell, fired at a low angle, will burst far out from the gun horizontally, but at low altitude. Each successive shell, fired at a higher angle, will burst less far out horizontally and at a greater altitude. It is evident that if we join the successive shell bursts by a continuous line, we get a rounding curve extending upward from the maximum horizontal (fuze) range to the maximum vertical (fuze) range.

If we picture this series of shots as being repeated with different compass-point aimings of the gun, it is evident that we get a series of exactly similar curves, which all together define for us a sort of rounded, umbrella-like envelope

in space, over the gun.

This imaginary "umbrella" is the "limiting envelope" for the particular gun. It is evident that an airplane flying anywhere under this umbrella is within range of the gun, and that an airplane outside it is not within range.



NOTE: For heavy guns, the effective ceiling for continuously pointed fire (20 second minimum period) is considerably below the maximum fuze range; and that for automatic weapons, the range for accurate engagement is considerably short of the point of tracer self-destruction. Guns of all types become rapidly less effective with near approach to their extreme ranges. (See Tactical and Technical Trends No. 25, p. 5.)

If we imagine this "limiting envelope" to be cut by horizontal slices at various altitudes -- 5,000 feet, 10,000 feet, etc. -- we obtain a series of circles, one for each height. These are the "effective gun circles," each applying to its particular altitude. An airplane flying at any particular altitude comes within gun range when it touches on or is inside the "effective gun circle" for that altitude.

c. Fire Control Methods

The Germans use three main methods of fire control, namely: (a) continuously pointed fire, with director control; (b) predicted concentrations by plotting; and (c) barrage fire.

In continuously pointed fire, operators for each battery independently follow the target through telescopes. Its altitude is inserted from a range finder, and the necessary calculations are made mechanically by the director, for aiming the gun at a point in space where the shell and the airplane will arrive simultaneously--provided the airplane does not change course, altitude, or speed on which the director bases its prediction. Appropriate evasive action therefore consists of changes in course and height, at intervals determined by the necessary time for prediction of aim and flight of the shell. Due to the longer time of flight of shells, and the shorter period during which the gun can engage, the effectiveness of this type of fire decreases rather rapidly at the higher altitudes. The effective ceiling for this type of fire is less by about 6,000 feet than the maximum fuze range of the shell, as indicated by the diagram.

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Predicted concentrations can be fired to the full height allowed by maximum fuze time setting. For this type of fire, a plot of the aircraft's course is made in a central control room; and as soon as its intended course on its bombing approach can be predicted, necessary data are calculated for a future point of its arrival in the sky. Each gun battery, utilizing the basic data, makes its own computation for this predicted point, and each battery fires a salvo so timed that salvos of all the batteries burst simultaneously at the predicted point. Sometimes second and third salvos are fired immediately on the same data.

This method requires that the aircraft be flying reasonably straight and level for about 90 seconds before reaching the predicted point. Evasive action is indicated up to the actual beginning of the bombing approach, which should be as short as consistent with accuracy of bombing. Subsequent concentrations against bomber formations passing through the same predicted point may be fired in a much shorter time since the initial plotting already has been done.

Barrage fire, as the name indicates, depends on the placing of a barrier across the probable course of the aircraft. A geographical or fixed barrage is fired by all guns within range into a certain sky volume or box, usually just outside the expected bomb release line of the aircraft. If the barrage is properly placed, the aircraft must fly through the bursts in order to bomb the objective. It is obvious that the gunners should be kept uncertain, up to the last possible moment, as to the intended objective and the direction of the bombing approach.

In a short article of this nature, only highlights can be touched upon. Detached studies of antiaircraft gunnery have been made, which go thoroughly into the effectiveness of each category of weapons over the appropriate zone of fire. Their findings are of great practical value to all who fly on combat missions. The recommendations made with respect to evasive action and protective measures during flight over enemy territory derive from the combined experience and best thought of competent authorities. Careful attention to such studies, and thorough understanding of their precepts, will pay dividends in added safety.

ANTITANK

3. COASTAL ANTITANK OBSTACLES

The following information concerns types of construction of concrete walls and other antitank obstacles in Holland, Belgium and France. Further details on this subject are contained in the publication, German Coastal Defences, issued as Special Series No. 15, 15 June 1943 by the Military Intelligence Division, War Department.

Walls are used to block streets and roads in coastal towns, as obstructions on approaches to key points, and on the outskirts of towns generally. Road blocks of this type, erected in line with the front elevation of existing buildings, will often form a continuous obstacle along the entire sea front of the town.

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Details of the steel reinforcement of such walls have not been learned but it is suspected that it is very light and in some cases does not exist at all. Hooked bars often project from the top of the wall and may be used to support wire. To increase the effectiveness of walls as obstacles, ditches are often excavated or pits are dug and covered with planks, road metal or netting.

In areas where large quantities of stone are readily available from quarries, road blocks are often constructed of stone and not concrete.

V-shaped walls may be found across beach exits, especially on open beaches outside of towns. Gun emplacements or small pill boxes may be found at the point of the V, which is to the front - towards the sea.

Concrete walls have a minimum thickness of 6 feet but probably average 8 to 11 feet in thickness. Height varies from 6 feet to 8 feet, 6 inches.

When walls are gapped, the gap is usually sufficient for one vehicle to pass at a time. In one type the walls are built opposite one another from each side of the road, the gap being closed at will by girders, rails or gates which fit into sockets precast in the wall ends.

Another obstacle that may be encountered in the coastal districts of north-west Europe is a staggered type of double road block consisting essentially of a pair of walls or barricades built one behind the other and projecting from opposite sides of the road for a distance of one-half to two-thirds of the width of the road.

These double road blocks may be constructed of masonry or concrete, or they may be earth-filled timber barricades. Horizontal and vertical members of timber barricades are described as 10-12-inch diameter pine logs, the vertical members driven deep into the ground. The walls are strengthened by diagonal bracing. Apart from the presence of a passage through them, these barricades would form an effective obstacle against a frontal assault by medium tanks, though a heavy tank may cross and probably demolish them. Where these barricades are constructed in concrete it is fairly certain that they are not less than 6 feet thick. The average height has not been reported.

Concrete obstacles known as "Dragon's Teeth" are also used to block streets, exits from quays, and well defined beach exits, particularly where the level of the beach approximates the level of any road or track. This type of obstacle often consists of three or four staggered rows, 6 to 8 feet apart, the distance between the teeth in each row being 6 to 8 feet. The "Dragon's Teeth" probably average 2 feet, 6 inches to 3 feet in height. It is possible that the teeth are connected at their bases, from front to rear, by concrete beams to prevent overturning. No information is available of any steel reinforcements in the teeth.

Concrete cubes are used in the same way as "Dragon's Teeth" and are also found across hollows in dunes which might provide exits for vehicles. Cubes are used in rows, not always staggered. In dune country they are generally on a forward slope, near a crest. Where the pillars are rectangular, they measure

about 3 feet on each side by 4 feet in height. Other obstacles of this type are about 4 by 4 feet in dimensions.

In addition to concrete and stone, steel is often used in the construction of beach and road obstacles.

Steel tetrahedra, pyramid-like, are made of steel rails or L-sections. They consist of 3 or 4 lengths of steel in the form of a cone, with the ends embedded in concrete and bolted at the top. When obstacles are made of L-sections, the upper ends appear to be specially cut and are welded together at the apex. There are two types, one which is 3 feet, 3 inches high with the ends bolted or welded, and the other type 4 feet, 6 inches high, bolted 3 feet, 3 inches above ground level with the ends projecting above the join.

Steel rails are occasionally placed vertically in 2 or 3 rows to form blocks across streets or well defined exits on open beaches. The rails project about 4 feet above ground level and are embedded in concrete.

4. RUSSIAN ANTITANK TACTICS

While the tank, which has received its greatest exploitation in the present war, has under certain circumstances proved to be a formidable weapon, important successes have been scored against it by artillery and tank-destroyer guns in North Africa.

The tank has, no doubt, accelerated the speed of battle, helped to overcome space, expanded the area of the battlefield, and increased the tempo of attack.

The experience of the Russians on the Eastern Front in combatting large concentrations of German armor can be read with interest and profit. The following article, a translation of Russian reports, deals principally with Russian defensive measures against large-scale German tank attacks in the Orel-Kursk sector.

* * *

a. Organization of the Defense

When beginning large offensive operations, the Germans lay the main stress on tanks. They concentrate them on narrow sectors in order to effect a breakthrough and then push through their motorized units and infantry. The problem of the air force and artillery is one of direct support of the tanks on the battlefield. Therefore, defense must be organized so as to repulse the combined blows of the enemy, and especially his tanks. Experience has shown that the best results are gained by the establishment of antitank defense areas.

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From reconnaissance data the Russian commander determines the sectors of primary and secondary importance in connection with possible tank attacks. Where the terrain is the more accessible (level or broken, but without deep ravines and swamps) there must be more antitank defense areas. During reconnaissance, the commander determines the most expedient way of using antitank guns and rifles; the location of the sector where they are to be used and the character and type of the most advantageous obstacles under the given conditions. It must be taken into consideration that not all seemingly impassable sectors are actually so. Therefore, it is advisable to organize a system that keeps the approaches to "impassable" tank areas within fire range.

In one case fifteen German tanks attacked the Russian advanced positions. The left flank bordered on a ravine difficult for tanks to pass. The Russian artillerymen easily repulsed three frontal attacks, but the Germans then blew up the steep sides of the ravine and made it passable for tanks. Since the approaches to the ravine were not covered by artillery fire, the enemy tanks broke through and attacked the Russian battery from the rear. It was possible to restore the position only by bringing in the antitank reserve.

The officer directly in command of the antitank defense areas must calculate the amount of fire power and dispositions. The amount of fire power depends upon the density of the tank attack on the given sector. If it happens that there are not enough antitank defenses, the commander requests more from the higher authority. If, however, the commander has only a limited number of antitank guns and rifles, he must not scatter them throughout the defensive positions but must use them on the main sectors.

Certain commanders, in determining the amount of antitank defense calculate on the basis of the theoretical possible density of a tank attack. In reality, however, the Germans have a very limited number of tanks on many sectors. Therefore, the expected and not the theoretical density of a tank attack must be considered. In case of enemy reinforcements, the antitank defense areas may have to be strengthened.

It is of great importance to have all approaches and intervals between defense areas within range of converging defense fire. In addition, the fire power is disposed so that any tanks, that may have broken into the defense area, may be hit.

b. Disposition of Antitank Guns and Rifles

Combat experience has shown the effectiveness of the following disposition of antitank guns and rifles. Guns are placed at intervals of from 100 to 150 yards and with distances in depth of from 200 to 300 yards. Antitank rifles are arranged in squads. They deliver flank and oblique fire simultaneously with the guns. The intervals between squads of armor-piercing weapons are from 50 to 100 yards and the distances from 100 to 150 yards. With flanking fire, the distance between the guns and rifles must not be over 100 to 150 yards.

[redacted]

c. Cooperation between Defense Areas

Constant communication is maintained between defense areas. There should be complete and detailed agreement as to the methods of cooperation. The distance between the guns on the flanks of the two defense areas should not be over 500 yards. For antitank rifles this distance is reduced to from 150 to 200 yards.

d. Cooperation between Artillery and Infantry Commanders

The artillery commander establishes close contact with the infantry commander of the unit in the region in which the antitank defense is formed. Practice has shown the advantage of sending to the combat outpost a special liaison officer, who, in case of a tank attack, determines the number and direction of action and immediately reports to the defense area.

e. Artillery Tactics Against Tank Attacks

For repulsing large tank attacks, artillery of all calibers and heavy mortars are brought into use. Batteries that fire from concealed positions adjust their fire toward the approaches and antitank obstacles. In case of a tank breakthrough there must be a very detailed agreement with the artillery commanders concerning signals. When conditions dictate, divisional and, at times, heavy artillery may be put out into open fire positions; these should be prepared in advance.

The antitank defense system as a whole is thoroughly camouflaged. Strict discipline in firing must also be observed. It is not necessary to fire from all guns at individual tanks or when they appear in small groups of three to four; it is more advisable to allow them to come within range of direct fire. When the enemy makes mass tank attacks the artillery opens fire at the greatest effective range. In addition, mobile artillery of all calibers and firing from concealed positions is used.

f. Antitank Reserves

Since the antitank defense cannot be equally strong throughout its whole system, antitank reserves are of special importance. The reserves are allocated to threatened sectors by army commanders. It is expedient to prepare in advance firing positions for the reserves on sectors that are more likely to be pierced.

It is well for the next higher headquarters to prepare a plan of maneuver for the antitank reserve. In this plan the composition, commander, line of possible deployment and detailed routes are indicated. It is also well to have a signal (known both to the army commander and the commander of the reserve group) for calling the reserve.

g. An Example of Defense Tactics

German tank attacks in the Orel-Kursk sector were characterized by large

concentrated blows of several hundred tanks at a time on narrow sectors of the front. Following the first echelons were the second and third, with the number of tanks increasing each time. There were several instances when the Germans brought over 200 tanks into battle at one time. The air force cleared the way for the tanks, and the tanks in turn cleared the way for the infantry. During the very first days the enemy suffered defeat in the battle for air supremacy. This left the tanks to break through the defense without air support while facing our artillery.

Preceding a concentrated tank attack the enemy conducted combat reconnaissance with small groups of infantry and tanks. This reconnaissance usually began 30 or 40 minutes before the attack. Enemy reconnaissance columns consisted of from 50 to 60 tanks and several self-propelled artillery guns on which infantry men were carried. These detachments were usually supported by 10 to 15 airplanes. As a rule the combat reconnaissance lasted not more than half an hour. In repulsing these groups the minimum of fire power was used in order to keep the main artillery positions concealed.

During the first battles the German tanks at times succeeded in piercing our front line as much as a mile. In one case seven German bombers appeared, escorted by fighters. While these planes began to bomb the front line, another group of bombers coming in to take the place of the first group raided deeper in the rear. Each group was followed by another as they worked their way deeper and deeper into our defense positions. Tanks appeared simultaneously with the third group of bombers. Forty of them deploying along the front and in depth, rushed out at our front line, firing as they came. Several were disabled but a part of them passed the trenches of our first line. Our infantry remained in its positions and exterminated automatic riflemen who were carried on the tanks, blew up two self-propelled guns and burned up one tank as it was crossing the trench.

At this moment Soviet fighters appeared over the battlefield. Several enemy bombers were shot down. The artillerymen made use of this and opened up intensive fire on the tanks but 20 enemy tanks succeeded in penetrating to the depth of half a mile, where they were met by self-propelled cannons. By this time a great air battle was under way and 150 more German tanks came out against our positions.

The lessons learned in the Orel-Kursk sector were that in fighting reconnaissance and first echelon groups it is necessary to: (1) not only repulse tanks but destroy them; (2) do this as quickly as possible since hundreds of tanks follow; (3) solve this problem with the minimum amount of fire in order to keep the disposition of all guns concealed.

The main object of our infantry is to isolate the German infantry from their tanks, annihilate them, and protect our artillerymen from attacks. Our infantry has always remained intact when they do not leave the trenches as enemy tanks cross them. By remaining in the trenches they are able to separate enemy infantry from the tanks and also destroy infantry when it is tank borne.

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Battle experience shows that we must strike tanks with concentrated artillery fire and from the air on their initial positions and at the approaches to the battlefield. During the attack it is necessary to allow the tanks to approach to be sure of hitting them. The Orel-Kursk battles show that even tank break-throughs are not dangerous if the enemy infantry has been separated from the tanks.

5. USE OF HAWKINS GRENADES

Tests conducted by the 50th Division engineers have shown that it is necessary to use two of the British No. 75 Hawkins grenades, one on top of the other with one right side up, to sever the track of the Mark III German tank.

During the tests, many of these grenades failed to explode when safety fuze detonators were used.

ARMORED

6. GERMAN COMMENT ON ENEMY TANKS

A critical study of French, British, Russian and American tanks was published on 27 June 1943 in the German weekly newspaper Das Reich. It is interesting to note that the author does not attempt to minimize the merits of American tanks, particularly the General Sherman, and that he concedes that German soldiers "know the dangers represented by these tanks when they appear in large numbers." A translation of the Das Reich article follows:

* * *

The German High Command maintains a museum of captured tanks -- or one might say a kind of technical school where some of our most highly skilled engineers and a number of officers specially chosen for the purpose are testing those monsters of the enemy's battle cavalry, testing their adaptability to the terrain, their power of resistance to attack, and their special qualities suiting them for employment in attack. These tests are carried out in a forest region of central Germany where the terrain up-hill and down-hill is intersected by ravines and all manner of depressions of the ground. The results are embodied in long tabulations not unlike those prepared by scientific laboratories, and in recommendat to the designers of German counter-weapons, who pass them on to the tank factories and armament shops. The type of combat actually carried on at the front is reenacted here in make-believe encounters worked out to the last point of refinemen

The officer in charge of these experiments has developed a thesis which is extremely interesting, even though higher headquarters are not, without exception,

[redacted]

in agreement with him. He contends that the various types of tanks reflect psychological traits of the nations that produced them.

The French have produced a number of unmaneuverable but thickly armored "chars" embodying the French doctrine of defense. They are conceived as solid blocks of iron to assist the troops in rendering the solidified defensive front even more rigid. The Renault and Hotchkiss types of tanks have indirectly contributed toward stagnation of the military situation. It was out of the question for these French tanks to swarm forth in conquest into the plains of enemy territory, dashing madly ahead for distances of hundreds of kilometers. Their crews normally consisted of only two men each. It was impossible for these tanks to cooperate as members of a complex formation. Communication from one tank to another was limited to the primitive method of looking through peepholes in these cells of steel.

The French still have, from the period shortly after the first World War, a 72-ton dreadnaught, the weight of which is distributed over the length of three to four railroad undertrucks; it carries a crew of thirteen; but its armor is of a type that simply falls apart like so much tin under fire from a modern cannon. As late as 1940 there were those in France who demanded increasing numbers of these rolling dry-land ships and wanted them to be of stronger construction than ever before. But German troops encountered these 72-ton tanks only in the form of immobile freight shipments not yet unloaded in the combat zones.

In the opinion of experts, English tanks of the cruiser class come much nearer to satisfying requirements of a proper tank for practical use in the present war. The name in itself indicates that the basic idea was carried over from naval construction. These tanks are equipped with a good motor and are capable of navigating through large areas. The amount of armor was reduced for the sake of higher speed and greater cruising radius. Tactically these tanks are more or less a counterpart of torpedo destroyer formations, out on the endless spaces of ocean. They are best adapted -- and this is quite a significant factor -- to the hot and sparsely settled areas of the English colonial empire. The English tank is an Africa tank. It has a narrow tread chain. It did not come much into the foreground on the European continent. A tank for use in Europe, apparently, is something for which the English don't show so much talent.

On Soviet territory the English tank was a failure; and it shares this fate with the North American tanks, which were not appreciated very much by the Soviet ally. These North American tanks include, for instance, the "General Stuart," a reconnaissance and rear-guard tank, bristling with machine-guns, as well as the "General Lee." Although the latter possesses commendable motor qualities, its contours are not well balanced, and its silhouette is bizarre and too tall.

This criticism does not apply, however, to the most recent North American development, the "General Sherman." The latter represents one of the special accomplishments of the North American laboratories. With its turtle-shaped crown rising in one piece above the "tub" and turret it must be regarded as quite

[redacted]

a praiseworthy product of the North American steel industry. The first things to attract attention are serial construction and fulfillment of the almost arrogant requirements of the North American automobile industry as regards speed, smooth riding, and streamlined contour of the ensemble. It is equipped with soft rubber boots, that is with rubber padding on the individual treads of the caterpillar mechanism. It seems largely intended for a civilized landscape or, to put the matter in terms of strategy, for thoroughly cultivated areas in Tunisian Africa and for the invasion of Europe. It represents the climax of the enemy's accomplishments in this line of production. But we cannot gain quite the proper perspective until we examine also the tank production of the Soviets.

The T-34 used by the Russians at the opening of hostilities in 1941 was at that time the best tank produced anywhere -- with its 76-mm long-barrelled gun; its tightfitting tortoise-shaped cap, the slanting sides of its "tub," the broad cat's-paw tread of its forged caterpillar chains capable of carrying this 26-ton tank across swamps and morasses no less than through the grinding sands of the steppes. In this matter the Soviet Union does not appear in the role of the exploited proletarian but rather as an exploiter of all the varied branches of capitalistic industry and invention. Some of the apparatus was so closely copied after German inventions that the German Bosch Company was able to build its own spare parts unmodified into the Soviet-constructed apparatus.

The Soviet Union was the only nation in the world to possess, even prior to the approach of the present war, completely perfected and tried-out series of tanks. The Soviets had such tanks, for instance, in the autumn of 1932. Basing their procedure on experience gained in maneuvers, the Russians then developed independently additional new series, building to some extent on advances abroad, like those embodied in the fast Christie tank (speed 90 to 110 km.) of the North Americans.

Like Germany and England, the Soviet Union thereupon hit upon a tank constructed for employment in separate operational units. Groups of these tanks operate in isolation in advanced zones of combat, at increasing distances from the infantry. Only a minor tank force is thrown into action for tactical cooperation with infantry forces. Such, at least, was the idea. And in fact, the T-34 was found suited for this type of action -- though in many instances only by way of covering a retreat. But even for this type of tank, positional warfare has in many instances had the result of narrowing the designer's and the strategist's operational conception to the narrower range of tactical employment.

The Soviet Union also has constructed an imitation -- in fact two imitations -- of an amphibian tank built by Vickers-Armstrong. Another variant of Soviet thought on the subject came to the fore when the Russians constructed a 52-ton land battleship with 3 turrets, a vehicle of quite impressive appearance but provided with walls that were not stout enough to serve the purpose. The first of these monsters broke down in the mud a short distance behind Lemberg, in 1941. After that they were found more and more rarely; and at last they dropped out altogether.

[redacted]

In order properly to evaluate the most recent tank creations, such as the North American "General Sherman" or the German "Tiger", one must learn to view a tank as embodying a combination of firing power, speed, and resistance or, to express the same idea more concretely, as a combination of cannon, motor, and armor. In this type of construction, the paradoxes involved in the ordinary problems of automobile body building are raised to their highest potential. A mere addition to one of the above-indicated dimensions, let us say the motor by itself or the armor by itself, is not apt to be of value.

A fast-moving tank must not weigh much, and heavy armor does not ride well. The caliber of the cannon affects the size and weight of its ammunition; and a difference in the latter is usually multiplied about a hundredfold, since tanks usually carry about 100 rounds as reserve ammunition. Taking all these things into consideration, we look upon the "General Sherman" as embodying a type of strategy that is conceived in terms of movement: it is a "running" tank, all the more since the Americans most likely expected to use it on readily passable terrain, that is on European soil. The caliber of its principal weapon is slightly in excess of the maximum so far attained by the foreign countries. It is spacious inside. Its aeroplane motor is of light weight. It is a series product, the same as its cast-steel coat, the latter being modeled into an almost artistic-looking contour, in such manner as to offer invariably a curved, that is a deflecting surface to an approaching bullet.

In Tunis, German soldiers have demonstrated their ability to deal with this tank; but they know the danger represented by these tanks when they appear in large herds. An imposing innovation is the stabilization equipment of the cannon. This equipment is connected with a system of gyros and permits even and smooth laying of the gun. This system was taken over from naval artillery and applied to the shocks incident to swaying over uneven terrain, where stabilization, of course, represents a far more difficult problem. This is the first attempt of its kind ever to be made anywhere.

7. THE GERMAN GUN "FERDINAND"

Characteristics of the "Ferdinand," a German self-propelled gun which first appeared in July, on the Russian front, are:

a. General

Weight	70-72 tons
Length	22 feet, 11 3/4 in
Height	9 feet, 10 in
Width	11 feet, 5 3/4 in
Track width	2 feet, 5 1/2 in
Clearance	1 foot, 7 1/2 in

[redacted]

b. Armor

(1) Hull

Front	7.87 in
Sides (vertical)	6.29 in
Rear	4.33 in
Belly	1.57 in

(2) Fighting Compartment

Front (vertical)	7.87 in
Sides (sloping)	3.74 in
Rear (sloping)	3.34 in
Roof	1.57 in
Mantlet plate	4.33 in

c. Armament

(1) One 88-mm super-long gun fitted with muzzle brake.
(2) One MG 42.

d. Ammunition carried

70-90 rounds for gun, 2,000 rounds for MG.

e. Suspension

Six independently sprung bogies, diameter 2 feet, 7 1/2 inches; evenly spaced and not overlapping.

f. Performance

Maximum speed	12 1/2 mph
Cruising speed	6-9 mph
Maximum gradient	30^{o}

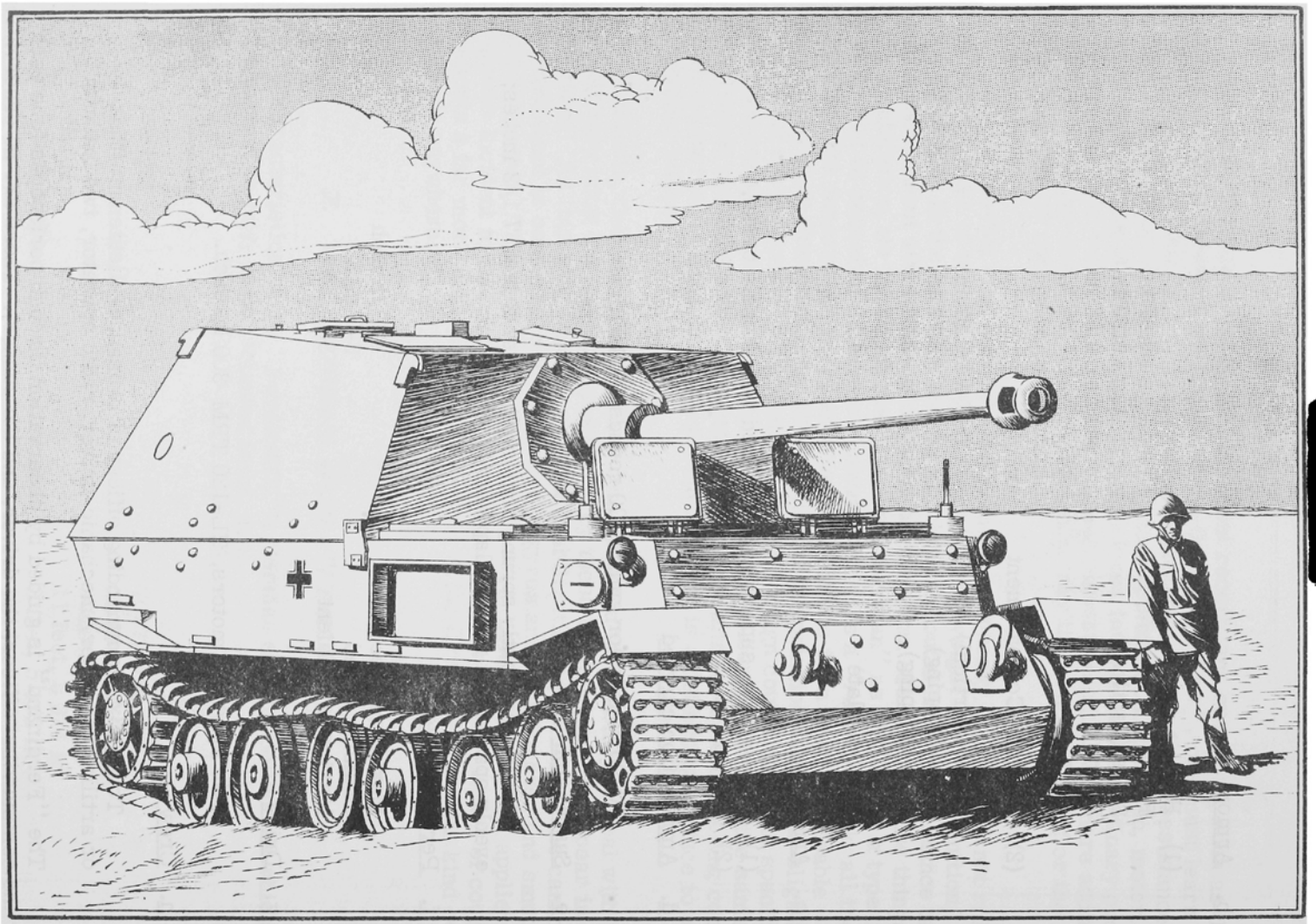
g. Drive

Two Mayback motors, HL-120 TRM 300 hp each.

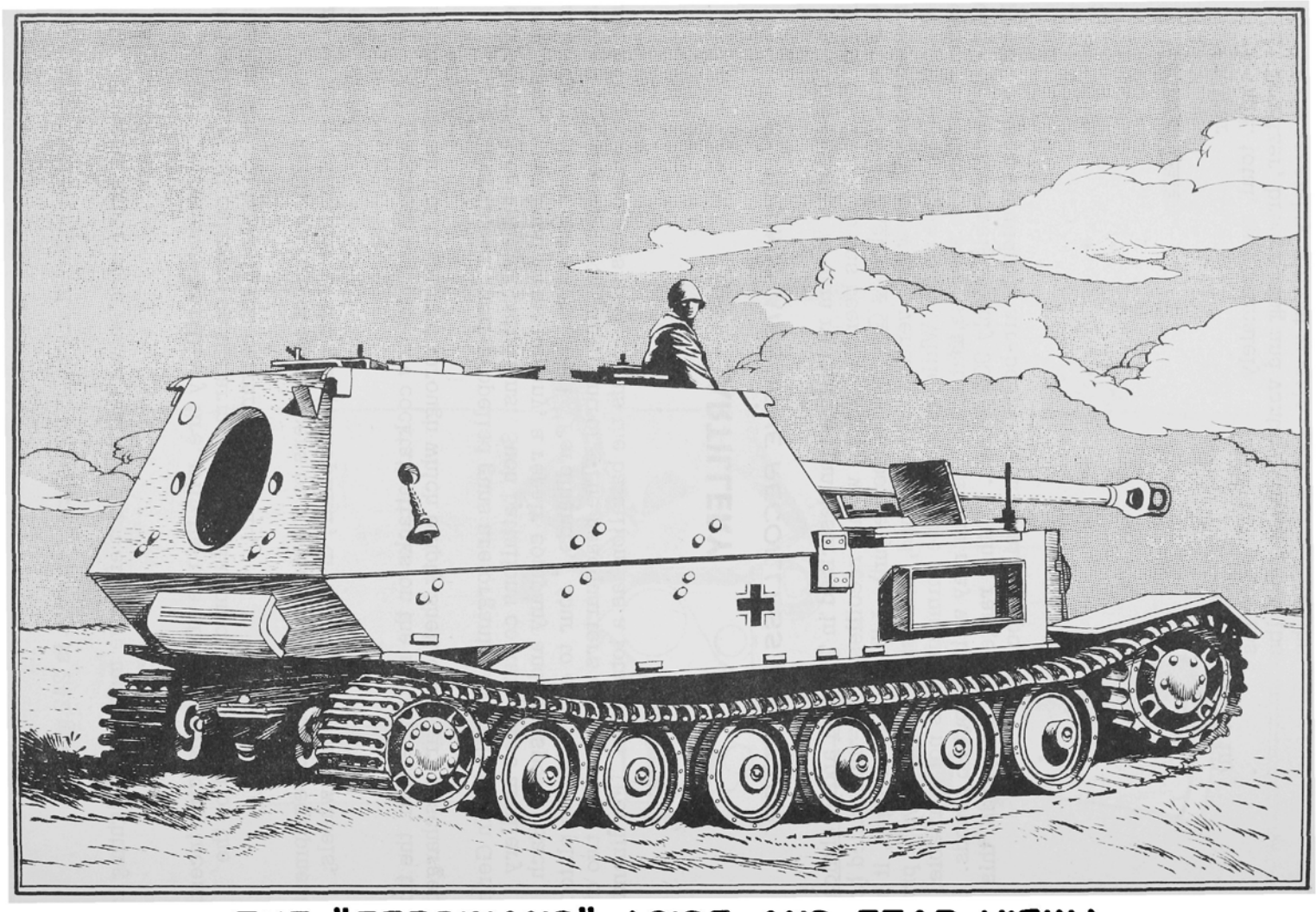
h. Crew

Total, six: commanding officer of ordnance--lieutenant (tank or artillery), gunner, mechanic-driver, radio operator, two loaders.

The "Ferdinand" is guided by observation through periscopes (one each for the commanding officer, the driver, and the gunner). There are no observation slots. Radio transmitter and receiver are provided for external communication; there is a radio-microphone for internal communication. The motor is situated



THE "FERDINAND" (FRONT AND SIDE VIEW)



THE "FERDINAND" (SIDE AND REAR VIEW)

practically in the center of the hull. Gasoline capacity is 242 gallons.

Russian experience shows that the most effective methods of fighting the "Ferdinand" are:

(a) Concentrated artillery fire, with the use of armor-piercing incendiary projectiles of all calibers on the armored installation of the gun and on the gasoline storage tanks in the center of the hull.

(b) Artillery fire of all calibers on the cannon, observation equipment and on the mobile parts of the gun (caterpillar, driving and steering wheels, bogie wheels).

(c) Grenade and Molotov cocktail attacks on the motor section, the turret lid, the rear slot of the turret through which empty shell cases are discharged.

The "Ferdinand" self-propelled guns are organically included in German heavy demolition antitank battalions. Such battalions contain three artillery companies, a headquarters company, a repair company and transport. Each artillery company has a total of 14 "Ferdinands," four to each of three platoons and two to immediate company control. The headquarters company has two of these new self-propelled guns also. Thus the battalion has a total of 44 "Ferdinands."

ARTILLERY

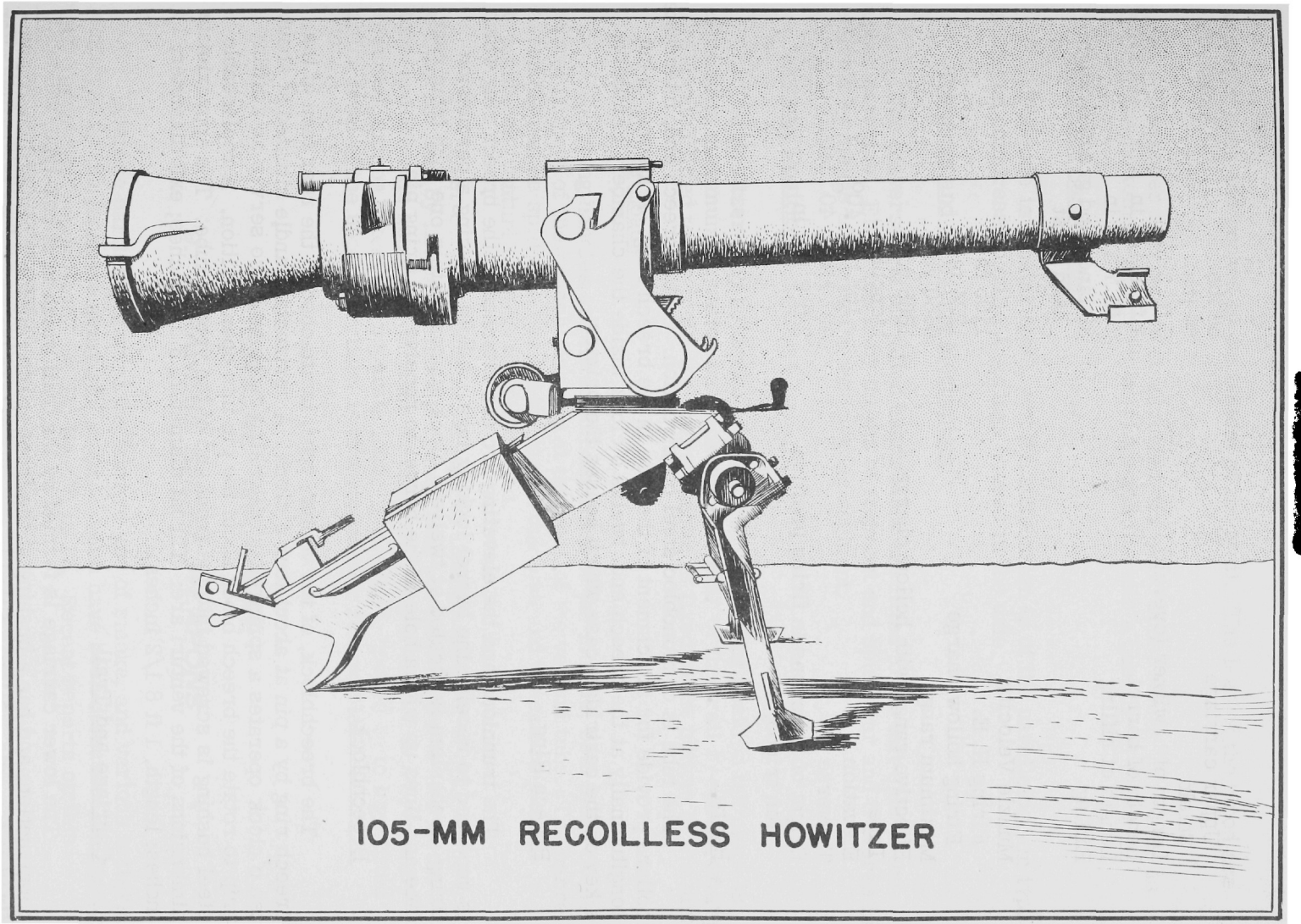
8. 105-MM AIRBORNE RECOILLESS HOWITZER

The German 75-mm recoilless gun described in Tactical and Technical Trends No. 26, p. 15 has been reinforced with a recoilless, 105-mm, rifled howitzer, 10.5-cm L. G. 40 (Leichtes Geschutz airborne gun). Like the 75-mm gun, it has an open breechblock with a venturi tube attached, and "shoots both ways", producing a terrific blast to the rear. While data as to the ammunition is not available, it seems reasonable to suppose that the projectile may weigh about 25 pounds. The complete howitzer weighs only 900 pounds. With a range of 6,660 yards, this gun appears to be a formidable air-borne or mountain weapon.

* * *

General Data.

Caliber	105-mm (4.13 in)
Weight, total, approximately	900 lbs
Howitzer, breech ring and venturi tube	500 lbs
Axle assembly without wheels	160 lbs
Trail	86 lbs



105-MM RECOILLESS HOWITZER

[redacted]

Upper carriage	58 lbs.
Shield	86 lbs
Length of howitzer (overall)	6 ft 3 in
Length of barrel	4 ft 6 1/4 in
Length of rifling	2 ft 7 1/4 in
Rifling	32 lands and grooves, right-hand twist
Muzzle Velocity:	
Firing H. E.	1105 fs
Firing hollow charge	1224 fs
Maximum range	6660 yds
Effective range with hollow charge	1665 yds
Tube	Monobloc
Elevation	- 15° to + 40°
Traverse	40° right, 40° left
Height of trunnions in firing position (on tripod)	2 ft 8 1/2 in

Barrel.

The tube is of monobloc steel construction. On the breech end, interrupted collars provide for attachment of the tube in the breech ring. A keyway is cut longitudinally at the breech end, twelve o'clock inside the chamber, to receive a key on the cartridge-case which houses the primer.

Breech Ring.

The trunnions and the elevating arc are attached to the breech ring which is recessed to receive the barrel locking lugs. A hole, housing a percussion firing mechanism is located at twelve o'clock approximately one inch from rear face and lines up with a hole in the barrel to receive the firing pin.

Breechblock

The breechblock, of the venturi type, is attached to the rear face of the breech ring by a pin at about four o'clock. A horizontal handle situated at about ten o'clock operates a spring-loaded locking catch and also serves as a lifting grip to rotate the breech block about the pin into open position. A replaceable steel bushing is screwed into the front end of the venturi tube. The approximate dimensions of the venturi are: Throat diameter, 3 5/8 inches; exit diameter, 11 inches; length, 1 ft 8 1/2 inches.

Carriage and Trail

The lower carriage is formed by the trail which is of box-type, welded construction, and has a bushing at the front end to receive a perpendicular pin fixed to the axle. A lever fitted to the axle raises the wheels off the ground after a tubular steel bipod has been swung down to firing position. In travel this bipod

[redacted]

is swung back and hooked to the bottom of the trail. The legs of the bipod are detachable.

The upper carriage is constructed of welded sheet steel. The pintle is fixed to the bottom of the upper carriage and fits into a bushing in the trail.

Axle and Suspension

The axle is tubular steel, and the suspension is of the parallelogram type acting on compression helical springs housed in the axle.

Traverse and Elevation Mechanism

The traverse and elevation handwheels are fitted to the left side of the upper carriage. Elevation is by means of segment and spur gear and traverse is effected by means of worm and worm-gear segment.

Travel Position

The howitzer may be drawn by a vehicle. In towing position the piece is elevated to maximum elevation and locked to the rear of the trail by means of a spring-loaded catch fitted to the trail; the towing lunette is fixed to the bottom of the muzzle.

Parachute Loads

Carrying handles are fitted to both sides of the muzzle, both sides of the barrel in front of the breech ring and at the rear of the venturi tube. The barrel assembly can be split into two loads, barrel one load and breech ring and breechblock (venturi tube) as the other load.

The upper carriage becomes a load by lifting pintle out of trail. The trail, a separate load by lifting off from perpendicular pin fixed to the center of the axle, and the axle assembly is taken as one load. The wheels which are easily removed, can be taken as a separate load. The shield, hooked on to lugs fitted at the front of the upper carriage, is likewise easily removable.

CHEMICAL WARFARE

9. JAPANESE SMOKE WEAPONS

Japanese partiality toward the tactical use of smoke, and various materiels employed by the Japanese army's* "smoke" units have been discussed in Tactical and Technical Trends No. 21, p. 11; No. 27, p. 12. Recent reports on this

*To allay suspicion, all chemical units in the Japanese army are referred to as "smoke" units.

[redacted]

materiel provides additional information in the form of descriptions of the Japanese frangible smoke grenade and the Japanese Type "99" self-projecting smoke candle.

The Japanese frangible smoke grenade is an iron-capped, spherical glass flask with a short neck and flat bottom. Measurements of the flask are:

Overall height	85 mm
Diameter (o.d.)	65 mm
Circumference	237 mm
Weight (empty)	161.2 grams
Thickness of wall	2 mm
Volume (to base of neck)	150 ml
Opening	16 mm

The closure consists of a red rubber stopper held under a red rubber washer within an inner iron crown cap, this being enclosed by a heavier iron outer crown cap.

Filling: The liquid filling of the grenade has the following properties:

Height of filling	31 mm
Volume	69.6 ml
Weight	118.0 grams
Specific gravity (calculated)	1.69

Composition:

Titanium tetrachloride	51.5%
Silicon tetrachloride	46.7%
Titanium and silicon oxides, by difference	1.8%

Functional Characteristics

The grenade is so shaped as to be easily thrown by hand. Titanium and silicon tetrachlorides are readily hydrolyzed by the moisture of the air, with the formation of the respective hydroxides and hydrochloric acid. The smoke produced is formed from the fumes of hydrochloric acid and the particles of hydrated titanium and silicon oxides.

Tactical Use

The smoke grenade is intended for screening operations. Though both titanium and silicon tetrachlorides are irritating to the skin as liquids, in ordinary field concentrations the smoke is hardly irritating enough to the respiratory system to cause coughing. Because of its size, the grenade used singly is ineffective for a continuous screen, but is intended for use at short-range such as screening the gun port of a pill-box or tank.

[redacted]

Comparison with Comparable U.S. Equipment

Titanium tetrachloride-silicon tetrachloride mixtures are not used by the U.S. Titanium tetrachloride alone, designated FM, is classed as limited standard for filling CWS smoke munitions but is not used as filling for frangible grenades.

The Japanese Type "99" self-projecting smoke candle has an outer cylinder, 8 inches in length, olive drab in color. The weight of the candle is 1283 grams (2.82 pounds) including a filling weighing 643 grams (1.41 pounds)

The starter mixture in a candle which has been examined was:

Potassium Nitrate	53.9%
Sulfur	19.6%
Aluminum powder	16.0%
Antimony Sulfide	10.5%

The smoke mixture in the candle examined analysed as follows:

Hexachlorethane	46.5%
Zinc (metallic)	20.4%
Zinc Chloride	18.3%
Zinc Oxide	14.8%

Evidently this self-projecting candle can be used for setting up an advance smoke screen in much the same manner as is accomplished by mortar or artillery shells, except that the range is shorter. There is a delay train in front of the starter mixture. This delays ignition of the candle for a definite time after it has been propelled from the outer case. The delay time has not been determined.

There is no U.S. munition comparable to the Japanese Type "99" self-projecting smoke candle. In tactical use it can be compared to the M-8 H C smoke grenade for very short range and to the small HC filled rockets, mortar shells and the 75-mm base ejection shell.

ENGINEERS

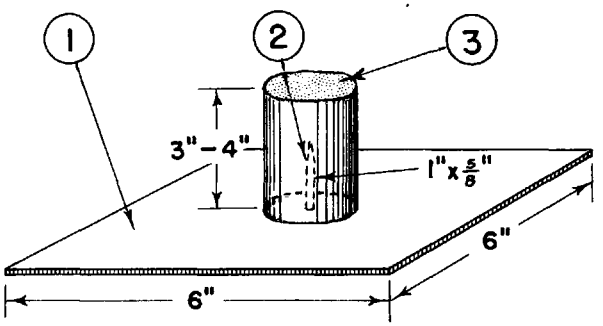
10. IMPROVISED ANTIPERSONNEL MINE

From sources believed to be reliable information has been received concerning an Italian improvised antipersonnel (grenade) mine which is said to have been constructed in large numbers at Tobruk.

The mine is reported to be fashioned from British gasoline tins, flattened through a hand roller. The design of the mine is shown in accompanying sketch.

The base (1) is a sheet, 6 inches square, in the center of which is a circular impression, slightly larger than the diameter of a hand grenade. A hole is punched in the base at the center of the circle and into this hole is soldered a piece of iron (2) which is 1 1/8 inches long and 5/8 inch wide. This piece of iron serves as a striker.

A strip of tin 4 to 5 inches high is curved to form a cylinder, or cup (3). This is soldered on to the outside edge of the circular impression in the base.



ITALIAN
IMPROVISED ANTIPERSONNEL MINE

The striker, detonator and fuze are removed from an ordinary hand grenade and a special instantaneous fuze inserted in their place. The grenade is then placed in the "cup" in such a way that the piece of iron (2) becomes the striker of the grenade.

The complete assembly is placed in the ground with the base uppermost. The weight of a person on the base is said to be sufficient to explode the grenade.

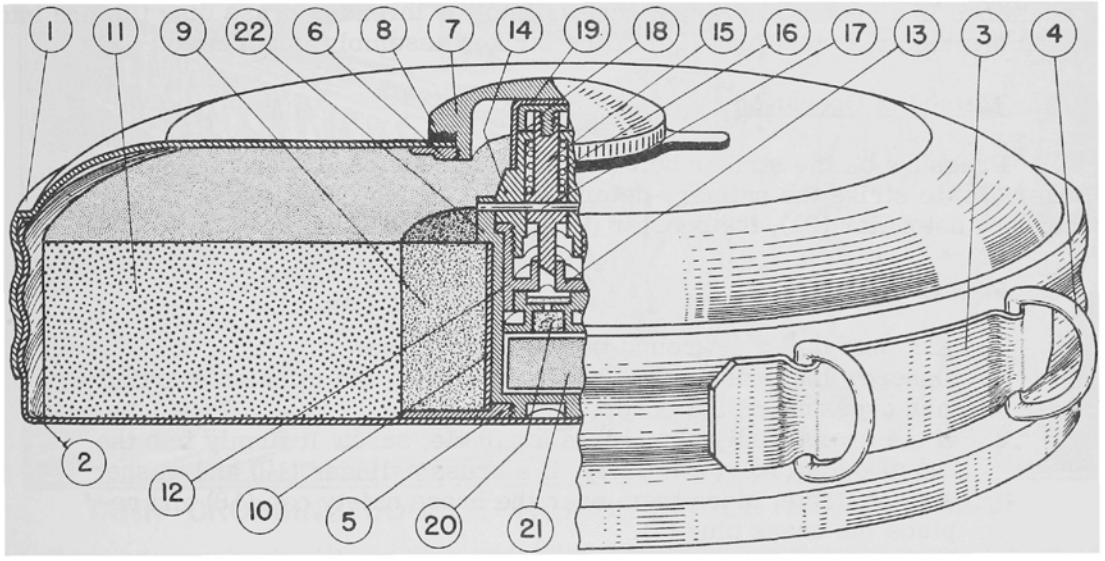
11. JAPANESE AT MINE, MODEL 93

The Model 93 mine is dull brown in color, with a red band, 3/8 inch wide, around the central plug. The mine is 6 3/4 inches in diameter, approximately 1 3/4 inches in height; it weighs 3 pounds and the weight of filling is approximately 2 pounds. It bursts at about 260 pounds, but with a lighter shear-wire, will detonate at 70. Details of construction follow, illustrated in the accompanying sketch.

a. Container

The slightly domed upper half of the container (1) is secured to the lower half (2) by four corrugations. Two brass strips (3) are soldered to the upper portion of the container on opposite sides. Each strip has two brass D-rings (4), which are used for anchoring or carrying the mine. An internally-threaded brass disk (5),

9/16 inch in diameter, to which the detonator assembly is screwed, is soldered to the center of the bottom of the mine. A hole in the center of the upper portion is reinforced with a brass collar (6), threaded to receive a milled brass plug (7), which is fitted with a thin leather washer (8) to give a tight fit. The overlap of the two portions of the container is sealed by bituminous paint; the interior of the container is painted with black enamel.



JAPANESE ANTITANK MINE MODEL 93

b. Filling

The filling is in two portions. A booster (9) surrounding the detonator cavity, consists of an annular pellet of pressed picric acid, wrapped in paper and weighing approximately 0.1 pound. The central perforation is 5/8 inch in diameter and is lined with a cardboard tube (10). The main filling (11) consists of a slab of cast picric acid with a central perforation for the igniter assembly and booster. This slab is completely covered with a layer of paper cemented to the explosive by shellac and waxed externally.

c. Igniter Assembly

This comprises a brass cylinder (12) which is provided with a centrally-perforated transverse piece (13) to act as a striker guide. A plated steel plug (14) screws into the top of this cylinder and is drilled to take the plated steel striker (15) and spring (16). A shear wire (17) passes through a hole, 3/32 inch in diameter in the striker and steel plug. The upper end of the striker is drilled and threaded to take a brass safety cap (18) which, when screwed home, takes the pressure of the spring-loaded striker off the shear wire. A brass cylinder (19) with attached washer fits over this safety cap, forming an additional safety device

[redacted]

d. Detonator Assembly

This is in two parts. The primary detonator (20) consists of 0.06 gm. of mercury fulminate, potassium chlorate and antimony sulphide, pressed into a centrally-perforated copper cup and covered with a tinfoil disk. In the lower end of this detonator is a perforated gunpowder pellet. The secondary detonator (21) probably consists of a lead azide pellet surmounting a main filling of tetryl. It is contained in a casing (22) which screws into the threaded brass disk (5), and into the top of which the steel plug (14) of the striker assembly is screwed.

e. Method of Operation

Pressure on the striker bolt (15) shears the wire (17) and causes the striker (15) to strike the primary detonator (20), which fires in succession the secondary detonator (21), the booster (9) and the main filling (11).

f. Method of Neutralising

1. Examine the area around the mine for traps.
2. Unscrew the brass plug (7) without moving the mine or exerting any pressure on the cover.
3. If the brass safety cap (18) is available, screw it firmly into the top of the striker; similarly, if a brass cylinder (19) and washer are available, place them over the brass safety cap (18) and replace the brass plug (7).

g. Method of Disarming

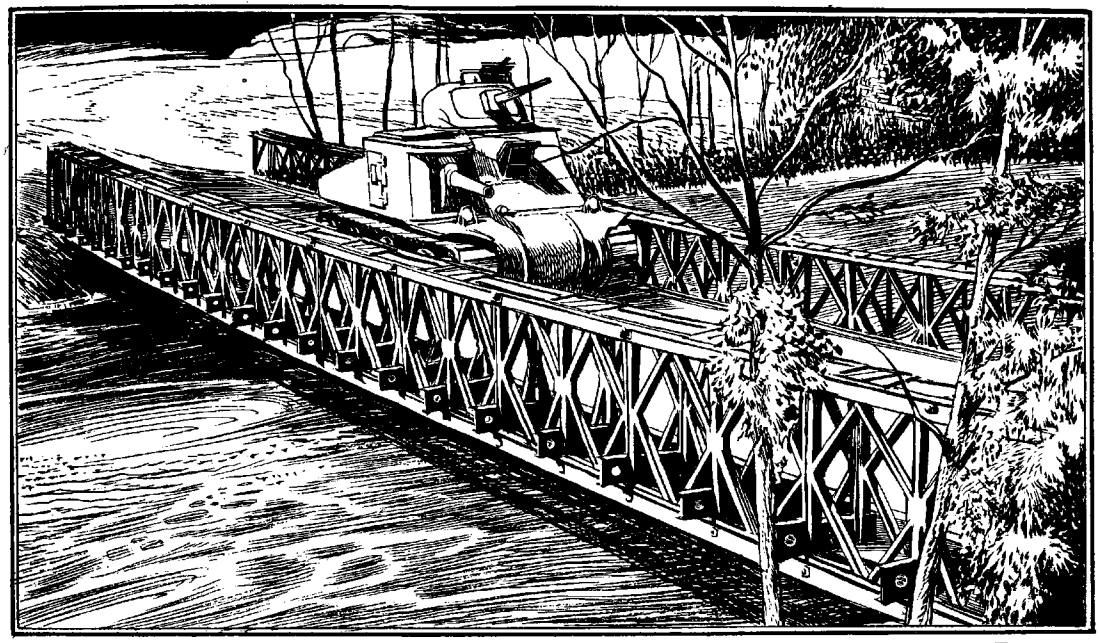
1. Unscrew the plug (7).
2. Unscrew the whole igniter and detonator assembly.

This mine is sometimes called "the tape measure mine" because of its resemblance to a large tape measure case. It is often coupled with other concealed explosive charges to make a formidable booby trap.

12. LAUNCHING THE BAILEY BRIDGE

The British "Bailey bridge" is a knock-down steel bridge, which can be transported in a truck train and erected where needed. With the change of some bolt-head sizes only, it has been adopted by the U.S. Army. The bridge is a "through" type with the roadway carried between the main girders. These girders are formed of panels pinned together to make 10-foot bays. The strength of the girder of 60-foot span can be increased from 20 tons up to better than 80 tons by making it a double-truss, double-story type. The basic unit is a welded, flat-lattice girder 10 feet long, 5 feet 1 inch high, and 7 inches wide, made of high-tensile structural steel, weighing 570 pounds, which can be carried by six men.

The "launching"--or actual placing of the bridge out across a stream--is usually done by pulling the completed structure out and across the stream over



TANK CROSSING DOUBLE-TRUSS. SINGLE-STORY BRIDGE

rollers by means of a "launching nose" or extension, made by pinning on to the end of the bridge the necessary number of 10-foot bays, which extend out ahead of the bridge. The pulling is done by means of suitable cables made fast on the opposite side of the stream. If necessary, of course, the free end of the bridge can be floated, derricked, or cantilevered out across the gap.

The following account from British sources of a method of launching a bridge without the use of the nose extension is of practical value to engineers.

* * *

To reduce the problem of jacking down to one end of the bridge only, it has been found possible to launch a "DS"--double truss, single story--counter-weight instead of the launching nose.

In preparing to launch by this method careful attention to the height of the rollers must be given as there is no nose into which a link can be placed. Launching should be done on a level plane, allowance being made in the calculation for the sag of the bridge and for the base of the end posts projecting 6 inches below the bottom chord as well as for any difference in bank height. A normal layout of stores with stringers placed further back from the rocking rollers than is usual, is satisfactory.

[redacted]

In construction, a normal double-story bridge, less decking, is built to the requisite length. A single-story skeleton tail is added, the bridge being kept as near the point of balance as possible by frequent booming out. The last bay is decked and counter-weight is added according to the table: -

Length of bridge	Length of tail	Counter-weight
60 D. S.	50 feet	2.5 tons - 3 bays of decking
70 D. S.	60 feet	5.1 tons - 6 -do-
80 D. S.	70 feet	5.55 tons - 7 -do-

Counter-weights are calculated with the center line of rollers on center line of base-plate.

On completion, four men are sent to the far bank to position the bearing under the end posts; remainder of the party launch the bridge, pushing downward and outward.

When the bridge has reached the far bank, and the head has been lowered to rest on the base plates, two jacks are placed on the end of the tail and two jacks one bay back from the bridge. Jacking proceeds until the panel pins connecting all but the last bay of the tail can be driven out with a sledge hammer. The tail is jacked down on to the plain rollers and pushed back out of the way. The bridge is now jacked up on the near bank, the rollers are removed and the base plates are positioned. Packing is placed under the remaining bay of the tail. By jacking down on to the packing, the remainder of the tail can be removed. End posts are fitted and the jacking down is completed.

Decking can be fitted and the far ramps placed while the jacking is in hand. The advantages gained from this method of construction are:

(1) A shorter span of bridge than would normally be necessary, can frequently be used.

(2) Jacking down one side only and dismantling the tail after the bridge has been opened to traffic, speeds the time of completion.

(3) Construction is possible with reduced working numbers and equipment.

Note

An American official source suggests that the losses of small tools, which are difficult to replace, will be considerably reduced if bridge erectors, when working over water, will carry them slung around their necks with string. The hide-faced hammers may be adapted for stringing by drilling a hole, or cutting a groove in the handle, near the hand end.

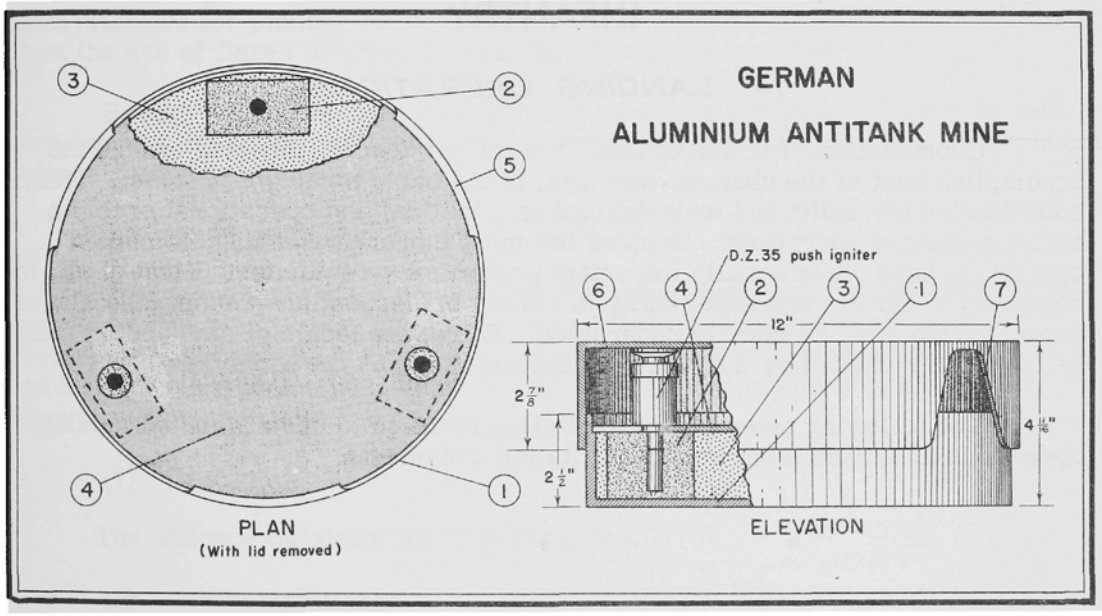
[redacted]

13. GERMAN ALUMINUM AT MINE

In mid-July, officers returning from Tunisia reported the destruction of American equipment in the Mateur area by aluminum antitank mines similar to Tellermines. A question which was raised as to the accuracy of this report has been cleared by a complete description of this mine from official Allied sources. The mine, which is reliably reported to be improvised from scrap aluminum at workshops in the field, based on the design of a German, Major Thomas, may well be encountered in Europe. It is simple in design, but effective. Considerable variation in size may be met with due to local manufacture; Two have been reported.

a. Description

	Example I	Example II
Diameter, body	11 1/2 in	11 1/2 in
Diameter, lid	12 in	12 in
Depth, with lid and igniters	3 3/4 in	5 1/2 in
Weight of filling	7 lbs	9 lbs
Total weight	14 lbs	16 lbs
Igniters--either DZ35 or T.M.Z42		



The mine consists of a circular, flat-bottomed body (1) of 5/36-inch thick aluminum, with 2 1/2-inch high walls. The explosive is made up of three blocks of tolite (TNT), (2) weighing about 6.4 ounces each, containing a hole for the reception of the igniter, the blocks set in cheddite, or a dark-gray, moist, explosive resembling ammonal (3). This charge is covered by an aluminum disk (4), drilled with 3/4-inch holes to correspond with the igniter holes in the tolite blocks and held in place by three burrs (5) on the rim of the body. Like the body, the flat-topped lid (6) is of 5/32-inch aluminum. In three places (7) the sides are cut away

[redacted]

to permit access to the igniters. There is no handle, or any provision for other igniters in the side or bottom.

b. Use

When prepared for laying, the three igniters are screwed into place and the lid put on, resting on the top of the igniters. (If the T.M. Z 42 igniter is used, the lid sits well down over the mine.) The safety-pins of the igniters are then extracted through the openings in the side of the lid. A pressure of about 130 pounds on the side or 390 pounds in the center will explode the mine.

c. To Neutralize

The mine should be examined for the attachment of booby-trap wires. If the booby traps are found, the igniters should be identified and neutralized. In case the D.Z. 35 igniter is found, a short length of wire should be inserted in the safety-pin holes, prior to unscrewing them. Then lift off the cover. The T.M. Z 42 igniter may be lifted out complete with its detonator.

INFANTRY

14. LANDING OPERATIONS

Coordination of action of land, sea and air forces, directed toward the accomplishment of the ultimate war aim, is the basic strategic problem. Their coordination for individual undertakings is a tactical and operational problem called combined operations. Besides the most thorough planning, combined operations have other equally important preliminary requisites. First of all, the command of the sea and superiority in the air are essential. Second, the aim of the operation must be clearly understood. Third, the locale of any landing must be thoroughly studied by the army, by the navy, and by the air arm.

The following notes giving the Italian reaction to certain Allied landing operations are taken from translated Italian documents.

* * *

a. Lessons of Tobruk Landing - 14 September 1942

(1) Surprise

The success of a small-scale landing depends on the attainment of complete surprise. Daily air reconnaissance before twilight of possible convoy routes is therefore of prime importance in a night or dawn attack. Coast watchers must be prepared to function even under air and naval bombardment and should

work in pairs, and if possible under cover.

(2) Organization of Defenses

Command should be unified. Defense plans should be prepared to the last detail but all arms must be prepared to adapt themselves to unforeseen situations.

(3) Air

Air action is particularly effective against ships at anchor and special landing craft.

(4) Naval

It is of greatest importance that ships in harbor should be able to cover the waters of the harbor with fire, particularly the entrance.

(5) Artillery

It should be trained to fire over open sights at targets covered by a smoke screen. Barrages should be laid only when there is no alternative. Artillery is most effective for pinning down attackers at the moment of disembarkation. At night the use of flares dropped from aircraft is recommended.

Battery positions must be organized as all-round defense positions with wire, mines and antitank ditches. They should be covered by the fire of neighboring defense positions.

(6) Counter Attack

To ensure immediate counter attack, reserves should be split up into the smallest units practicable. They should be mechanized, have exact terrain knowledge and if possible, light artillery support. All troops, including services and headquarters personnel should be prepared to join in at the critical moment when the enemy has just landed.

(7) Obstacles

The efficacy of beach mines is stressed.

(8) Communications

Necessity for a maximum number of alternative means of communication, with independent headquarters net work.

Very signals should be kept down to the minimum and only a few unmistakeable signals employed. Color signals should be avoided as likely to cause confusion.

[redacted]

b. Lessons of Dieppe Landing - 19 August 1942

(1) The enemy can land tanks with the first wave but success is likely only if assault troops have first prepared the way for penetration of tanks inland.

(2) Shingle* is a considerable obstacle to movement of tanks.

(3) No area of coast line should be considered as impracticable for landing.

(4) Air superiority, at least in disembarkation areas, is essential for the success of a landing.

(5) When the forces of the defense are limited, in addition to uniform defense of the whole coast, certain points should be selected for "block defense".

(6) Antitank defense in all areas where tanks can be landed or operated should be disposed in depth, particularly along roads and trails.

(7) Artillery positions must be defended by close-defense weapons.

(8) Infantry and artillery must be fully coordinated.

(9) Reserves for counter attack must be mechanized.

(10) Use of smoke by the attackers is liable to disorganize their troops and to make their air support difficult.

(11) Command of the defense must be unified.

c. Defense Against Parachutists in Africa

(1) All mobile elements must regard themselves as "antiparatroops" as well as operating in their normal role.

(2) All battery positions and all headquarters will have attached a permanent group for defense against paratroops.

15. NOTES FROM GUADALCANAL

a. Variations in Japanese Infantry Organization

From time to time changes are noticed in the enemy's infantry organization. Some of these, such as the reduction of L M G and grenade-discharger fire-power within the platoon, have obviously been due to casualties, and in view of their

*Ground covered with loose pebbles and small rocks.

[redacted]

temporary nature, it is not proposed to discuss them here. Others however, indicate planned reorganization, and examples of these are given below. They should be compared with organizations given in Japanese tables of organization.

(1) A four-gun (37-mm) regimental AT gun company (quick fire gun) was identified at Guadalcanal, and there are various other proofs of its existence in the South West Pacific area. In Burma, however, no regimental 37-mm AT gun company has been identified, and antitank guns have been allotted to units from independent antitank gun companies.

(2) Both the four-, and three-rifle-company battalion organizations have been met with in the South West Pacific area, and a battalion organization of three companies has been used extensively in the Arakan campaign in Western Burma, thus reducing a battalion at full strength to about 750. Frequently, the 4th, 8th and 12th companies are lacking.

(3) Another point of interest is the appearance in Burma of two machine cannon in the infantry battalion. This machine cannon is reported to be similar to the 20-mm "Oerlikon" gun, a dual purpose AA/AT gun, with a short barrel. A similar organization has not so far been reported from the South West Pacific.

(4) **Finally,** it should be noted that 37-mm AT guns have not been identified in the battalion gun platoon either in the South West Pacific area or in Burma.

b. Equipment Carried by a Japanese Soldier During Pacific Operations

One Japanese soldier in the Pacific area had the following equipment which he, and most of the men of his unit, carried during operations.

> Rifle and 150 rounds, two hand grenades, haversack containing five days' supply of rice, two tins of beef, three packets of biscuits, medicine for a stomach trouble, small white tablets for malaria, a water purifier - - one between three men, a bandage, a water bottle, tunic, long trousers, puttees, boots, socks. The soldier stated that originally the men of his unit carried respirators but that most of these had been used as fuel when boiling rice.

c. Front-Line Letters from Guadalcanal

Referring to the letters quoted below, General Marshall, United States Chief of Staff wrote, "Soldiers and officers alike should read these notes and seek to apply their lessons. We must cash in on the experience which these and other brave men have paid for in blood."

These letters were written by the men who, at that time, were fighting the Japanese on Guadalcanal.

[redacted]

(1) A Japanese Trick

"I have been charged twice by the Japs in bayonet charges", wrote a Marine colonel. "Our Marines can out-bayonet-fight them and I know our Army men will do the same. In the last push we executed three bayonet charges.

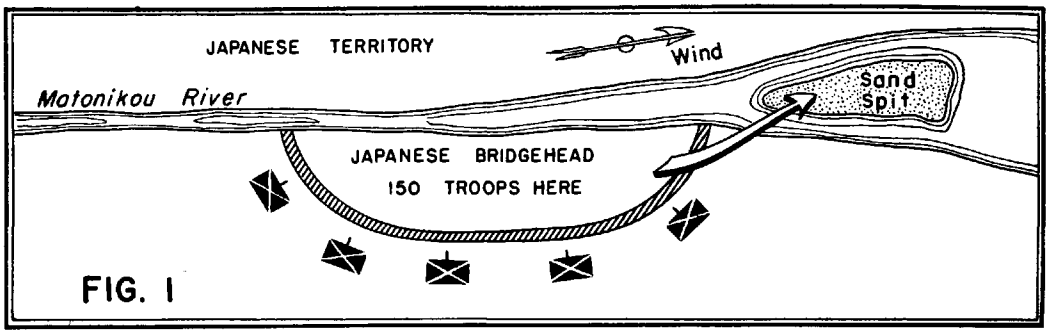


FIG. 1

"A Japanese trick to draw our fire was for the hidden Jap to work his bolt back and forth. Men who got sucked in on this and fired without seeing what they were firing at, generally drew automatic fire from another direction."

(2) Nicknames

"In the Raiders we adopted the custom of dropping all ranks and titles. We used nicknames for the officers. All ranks use these nicknames for us.* We did this because the Nips caught on to the names of the officers and would yell or speak in the night: 'This is Captain Joe Smith talking. 'A' Company withdraw to the next hill'. So we adopted nicknames as code words. Captain Walt becomes 'Silent Lou'. My nickname was 'Red Mike'. An example of the use of these nicknames as code words is: One night the Japs put down smoke and they yelled 'gas'. We were green at that time and two of our companies withdrew leaving 'A' Company exposed on its two flanks. In this instance, I was a battalion commander. Captain Walt called me on the voice radio to inform me of the situation. He was cautious and used nicknames as follows: He said, 'Who is speaking?' and I said,'Red'. He said, 'What name do you identify with 'Silent' ? I said 'Lou'. He said, 'That is correct'. So we both knew that we were talking to each other and were not talking to the enemy. He explained the situation to me. At the end of his conversation, a voice broke in and said in perfect English, 'Our situation here, Colonel Edson, is excellent. Thank you, sir. This is the enemy speaking.' This should be taken as an example of how quick the Japanese are at interception, rather than a hard-and-fast suggestion as to how to outwit them. Any code names or nicknames such as these will have to be changed very frequently, if possible, daily.

*(In one regiment serving in France in 1918, not only were the officers nicknamed but the companies as well. The first battalion consisted of the Quail Company, the Partridge, the Pheasant and the Grouse. A private was a "pack animal" an NCO, a "workman" and an officer a "boob." This last caused telephonic difficulties with visiting officers.)

[redacted]

(3) They Attack in Bunches

"I can report officially to you that we had nine men killed in one company in the last assault; four of these men were killed by a wounded sniper who had three holes in him. He was lying in thick brush 15 yards from my CP, camouflaged, and had been passed over for dead. You have to KILL to put them out. They attack in bunches, shoulder to shoulder. An example; We were on the Matanikau River (see figure 1.) Our companies were at half strength. This was a Raider battalion plus two companies of the 3rd battalion, Fifth Marines. The Japanese beach-head was a thick jungle with camouflaged standing-type fox holes. They had with them in their beach-head six heavy machine guns and eight light machine guns which we captured in this action.

"At 1830 they smoked our two right companies, and when the smoke had enveloped these two companies, the Japs broke out. They came in a mass formation, 20 abreast, yelling, bayonets fixed, automatic weapons working, rear ranks throwing hand grenades, (white arrow in the sketch, Fig. 1, shows the Japanese route). They were trying to escape to the sand spit at the mouth of the river in order to cross the river to get back. Our right front company had just completed a double-apron barbed-wire fence. When the Japanese hit the left flank of the right company, they killed nine out of the first eleven men they met. Then they hit the barbed-wire. Two of our heavy machine guns opened up, shooting down along this barbed-wire fence and dispersed their attack. It got dark quickly as it does here. There was smoke, Japs and Marines all mixed up. Three Jap officers were swinging their two-handed swords. There was hand-to-hand fighting all night long. We mopped them up at daybreak. We killed 78 Japs. They killed 12 Marines and wounded 26 of us."

(4) Keep Them Moving

"Try to get the Japs on the move; keep bouncing them around; don't let them get set. When you let them get set, they are hard to get out. We have had a great deal of success with the 81-mm mortar and with artillery fire. Here is an example:

"We had the Japs surrounded with their backs to the river, (see Fig. 2). The three battalions were in close contact with the enemy. It was obvious that we had a large number of Japs surrounded and that the best way to get them out was to place field artillery and 81-mm fire on them. However, the problem was to put this fire on the enemy and not on our own troops. The movement which we executed was carefully coordinated with the artillery and with the mortars. Each battalion, at a certain time, was to withdraw just before the firing was due to start. We were very careful to explain to the men what we were doing so that they would not get a mistaken idea of the order for withdrawing. The maneuver was successful. Over 500 Japs were killed in this action. We had 44 Marines killed and 63 wounded. Our men were not hurt by the artillery and mortar fire, of course, but were killed and wounded in the fighting which took place before the withdrawal. After the firing ceased, we went in and mopped up in hand-to-hand fighting."

[redacted]

(5) The Jap Attacks on a Narrow Front

"Most of the fighting here has been at extremely close range, and there has been as much throwing of hand grenades as firing of weapons. No previous report, or even comment, on our enemy and our fighting has been made. For one thing, we do not want to appear boastful, for another, we have been literally so busy we have not had time, really, to think things out.

"Concerning our enemy, several things are apparent. All of his efforts have been in the form of attacks on a narrow front at rather widely separated points. These were mass attacks, and although orders and operation maps captured have shown that they were to be simultaneous attacks, this was never the case. Our feeling is that his failure to estimate the terrain difficulties caused the lack of coordination. The result has been favorable to us, as it has permitted the shifting of our all-too-small reserves from one area to another.

"We believe that the enemy has dispersed his efforts and has therefore failed to make any gain at any one point. When given his choice, he operates exclusively at night. As I said before, he attacks on a very narrow front, practically en masse. This leads to many 'purple nights' when we watch longingly for sunrise. The result for him has been almost complete annihilation in every case. As far as we can determine, these various attacking groups are ordered out, and there are indications that they then pass out of real control of their higher leaders. We have never seen anything to indicate that any effort has been reinforced after the initial push has been made.

The Japanese soldiers fight with a sort of fanaticism and never surrender. We have taken practically no prisoners. Officers about to be taken prisoner sometimes commit suicide. Our translators on the spot were able to get from captured orders, information on which we have successfully operated at once. It causes me to want never to write another order".

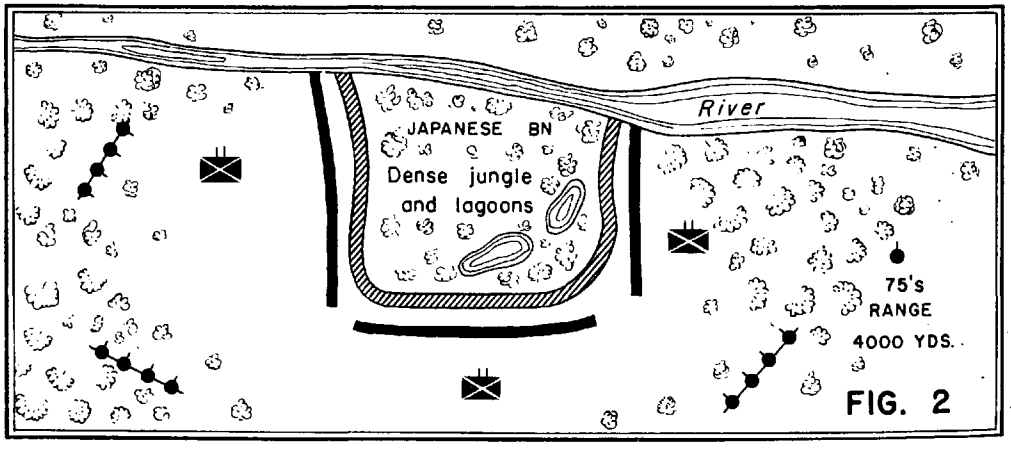


FIG. 2

c. Equipment Carried by the Sniper

Japanese snipers in the Pacific have been reported to carry the following

[redacted]

items of personal equipment: -

Respirator
Green combination mosquito net-camouflage hood (this covers the helmet, head and shoulders.)
Green net to camouflage body
Green eye screen
Coil of rope
Small sack of rice (5 in long)
Small bag of hard biscuits
One-half pound of hard candy
Package of concentrated food
Tin of field rations
Small tin of coffee and vitamin pills
Tin of chlorine (to purify water)
Mess tin
Water bottle
Antidote for mustard gas
Quinine
Stomach pills
Gauze pads
Roll and triangular bandages
Spare socks
Tooth brush
Electric torch
One-half dozen spare lenses for eye holes of respirator
Medical supplies packed in nest of wicker baskets.

It is considered that these items would make the sniper independent for two weeks to one month, requiring only a minimum of food and water from the countryside. It is obvious, of course, that not all snipers are so equipped, but only those required to remain out "on their own" for considerable periods.

d. Identification of Leaders at Night

The following method was used for the identification of Japanese leaders in night operations in the Southwest Pacific.

Company commander--White sashes criss-crossed between the shoulders.
Platoon commander--One white sash across the shoulder.
Section leader--White band around the left arm.

16. GERMAN MEDICAL SERVICES

The efficiency of the medical services of an army is reflected in the morale and combat effectiveness of that army.

The following details concerning the organization, equipment, and supply system of the German army medical services are taken from an Allied source.

* * *

a. Organization

(1) Infantry Division

2 medical companies, motorized or partly motorized.
2 ambulance platoons, motorized.
1 field hospital, motorized or partly motorized.

(2) Mountain Division

2 medical companies, partly motorized.
2 ambulance platoons, motorized.
1 field hospital, partly motorized.

(3) Motorized Division

2 medical companies, motorized.
3 ambulance platoons, motorized.
1 field hospital, motorized.

(4) Armored Division.

2 medical companies, motorized and armored.
3 ambulance platoons, motorized and armored.

(5) Airborne Division.

3 paratroop medical companies.
1 field hospital (airlanding).

b. Equipment

(1) Of the individual.

(a) The combatant.

One large and one small packet first field dressing wrapped separately in black,

[redacted]

rubberized fabric
1 box anti-vesicant tablets

(b) The stretcher bearer.

1. In the combatant units.

2 stretcher-bearer's haversacks containing:

1 pair of scissors
1 pair of dissecting forceps
6 packets dressing
3 triangular bandages
3 strips of gauze 16 ft x 2 3/4 in
6 squares of gauze
1 roll of adhesive tape
1 waterproof bandage 18 x 20 in
1 tourniquet
20 safety pins.

In the medical units - in this case, the stretcher bearers are not all equipped with the haversack as above, but each group of four has a haversack (Verbandtasche) containing:

1 pair of cloth-cutting scissors (Kleiderschere)
1 tourniquet
12 strips of gauze
10 squares of absorbent cotton
6 triangular bandages
2 "Brandbinden" (absorbent gauze treated with bismuth for burns)
1 waterproof bandage 36 x 40 in
4 rolls rubberized adhesive tape
35 safety pins
4 small splints with cradle
2 slings, 12 x 5 in
Each stretcher bearer also carries a mug and a bottle with about a pint of cordial.

(c) The Medical Service N.C.Os. and Medical Orderlies.

Each carries a bottle of cordial, a case of dressing material and two medical haversacks, the first containing medicines such as salicylic acid (2%), formaldehyde, ticture of iodine, cardiazol and opium; the second containing much the same dressing material as the stretcher bearers' haversack on a smaller scale.

(d) Officers of the Medical Services.

Each carries the officer's haversack, the contents of which are extensive, including a number of surgical instruments such as probes, lancets,

[redacted]

ligature forceps, cannulae, vaccinostyles and the like; a certain quantity of dressings; a tin plate case for tablets containing among others, pyramidone, veronal, acetylsalicylic acid, codein phosphate, tannalbin, opium, cocain chloride, atropine-mannite and calomel; and also a box containing ampoules of, for example, caffein sodium salicylate, superarenine chloride and morphin hydrochloride.

(2) Of a Combatant Unit.

The medical equipment of battalions and regiments is identical. It comprises:

(a) Box No. 1. This is the "Battlebox" (Gefechtskasten) and is marked with two white strokes in the form of a cross. The contents are miscellaneous but include much dressing material, anti-tetanus serum, medicaments and two 6-in atomizers containing ethyl chloride.

(b) Box No. 2. Medicaments of all types (Arzneimittelkasten).

(c) Box No. 3. Dressing Equipment. (Verbandmittel).

(d) Box No. 4. Supplementary box. This is like No. 1, but on a smaller scale.

(e) Box No. 5. Contains 280 flasks of tetanus anti-toxin 3000 units per c.c.

(f) Two medical haversacks containing medicaments and dressings rather on the scale of the M.O's haversack. Two empty rucksacks are also included, with blocks of labels for wounded and for sick.

(g) One set of equipment for fractures, including cardboard splints, metal wire splints and aluminum splints.

(h) One unit medical outfit - like an M.O's haversack.

(i) One set of oxygen apparatus - the flask contains 275 quarts of oxygen.

(j) Four stretchers.

(k) Twelve woolen blankets.

(l) One filter apparatus.

(m) Anti-vesicant, and gas protection caps for those with head wounds.

c. The Evacuation of Casualties

(1) Units under Divisional control. There are no medical units allotted

[redacted]

to corps normally.

(a) Battalion aid station (Verwundetennetz) as close to the fighting line as possible. The station may or may not be under cover. Treatment is restricted to first aid. Occasional blood transfusions may be done. Evacuation is by stretcher bearer section of medical company.

(b) Ambulance Station (Wagenhalteplatz). This is established only if the ambulances cannot go forward to the battalion aid station.

(c) Field Clearing Station (Hauptverbandplatz) is established by the Medical company. It is intended for serious casualties requiring resuscitation, adjustment of dressings, splints etc, arrest of hemorrhage or blood transfusion before further evacuation. Emergency operations may be done here.

(d) Lightly Wounded Collecting Station (Leichtverwundetensammelplatz) for walking wounded and sitting or reclining cases requiring only minor treatment before evacuation. There is a skeleton staff from medical company. The remainder of the medical company is normally in reserve - - available to assist in handling a sudden rush of cases or assist in bombed areas, etc.

(e) Division Field Hospital (Feldlazarett). Capacity 200 beds. It is intended for the reception and retention of casualties who require urgent operation or resuscitation and a few days rest before further evacuation. It has a surgical team and is fully equipped to handle any casualty.

Hospitals at Home or in Occupied Countries. (Reservelazaretten)

(a) Casualty Collecting Station (Krankensammelstelle). It is established by an Army ambulance unit at a railhead or other traffic center, normally and is for the retention of casualties awaiting evacuation. Only minor treatment is possible.

(b) Army Field Hospital (Kriegslazarett). For more serious casualties. Capacity 500 beds. Fully equipped hospital with all specialist departments.

(c) Army Field Hospital for lightly wounded cases. (Leichtkranken-kriegslazarett) Takes casualties who will be fit for duty in 3 or 4 weeks. Capacity 1,000 beds; fully equipped. Normally located in back areas of Army zone and away from all large towns.

Capacity and time of erecting or dismantling of various units.

(a) Army Field Hospital. Capacity 500 beds, 24 hours to set up or dismantle. Set up by Army medical detachments.

[redacted]

(b) Army Field Hospital for slightly wounded cases. Capacity 1,000 beds. 24 hours to set up or dismantle. Set up by Army Field Hospital detachments.

(c) Field Hospital. Capacity 200 beds. 3 hours to set up or dismantle. Set up by Army Medical detachments.

(d) Casualty Collecting Station medical railhead. Capacity limited only by the available accommodation. 3 hours to set up or dismantle. Set up by motor transport ambulance company.

(e) Field Dressing Station. Unlimited capacity. 1/2 to 1 hour to set up or dismantle. Set up by Divisional medical company.

(f) Slightly Wounded Collection Station. Unlimited capacity. A few minutes to set up or dismantle.

(g) Motor Ambulance. Capacity of 4 lying and 10 sitting. Has four driving wheels and double differential for cross country performance.

(h) Hospital Train. The 2- or 3-axled coach train with heating coach has 358 lying capacity, and 386 sitting capacity without heating coach. The 4-axled corridor coach train with or without heating coach has a 364 lying capacity. 2 to 6 hours to set up or dismantle.

(i) Hospital Train for Slightly Wounded. 920 sitting capacity. 1 to 2 hours to set up or dismantle.

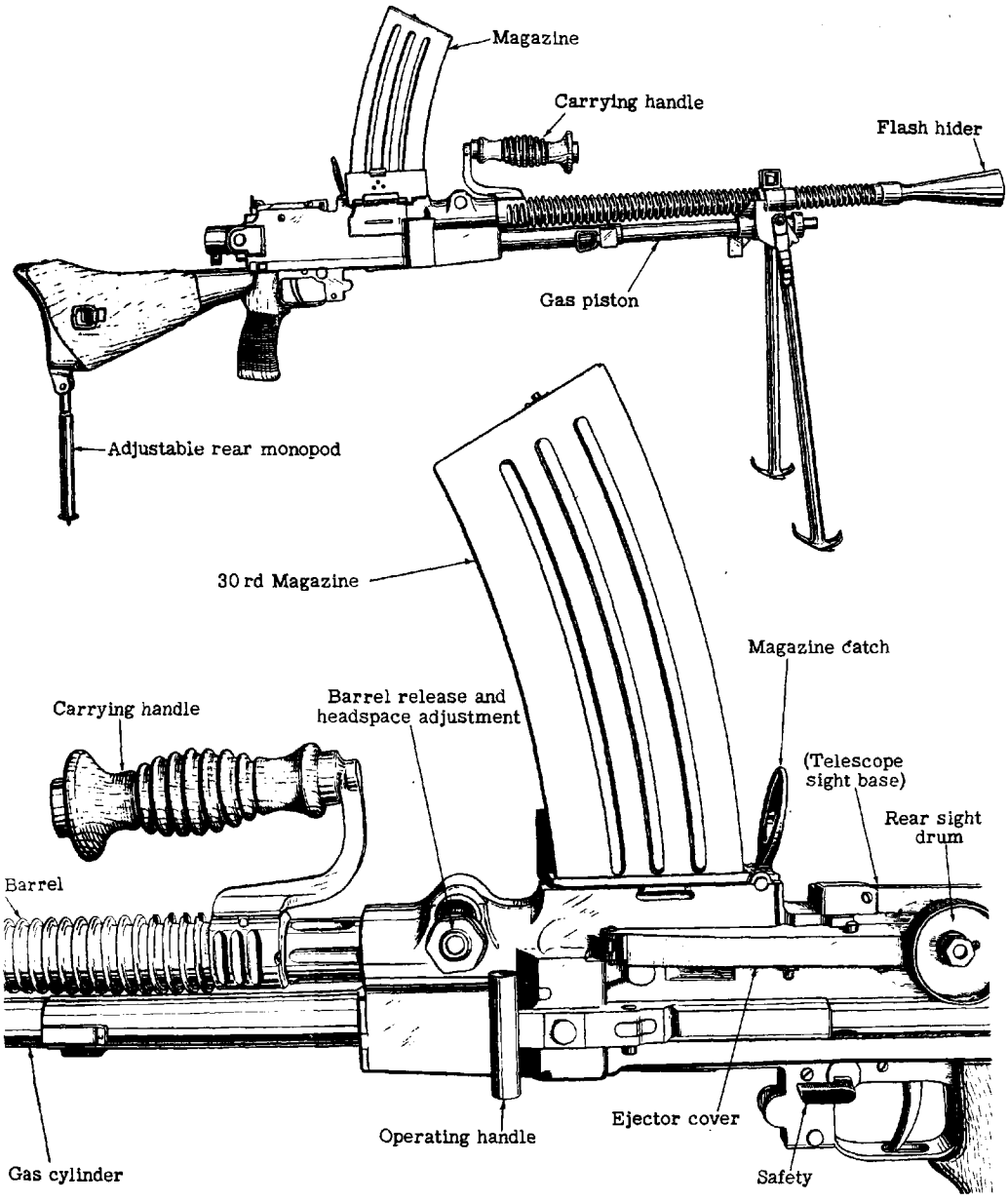
ORDNANCE

17. JAPANESE MODEL 99 MG

The Japanese Model 99 (1939) 7.7-mm caliber light machine gun, a weapon of relatively recent development, (see accompanying sketch) is very similar to the Model 96 (1936) 6.5-mm gun. Nearly all variations result from the change to the larger caliber. The general characteristics as reported by the Aberdeen Proving Grounds, follow:

Weight w/o magazine	20 lb
Overall length	42 in
Weight of barrel	6 lb
Length of barrel	21 3/4 in
Rifling	4 lands and grooves (left hand uniform twist)
*Rate of fire	800 r p m (automatic fire only)

*Not checked by Proving Ground Test.



JAPANESE 7.7-MM MG, MODEL 99

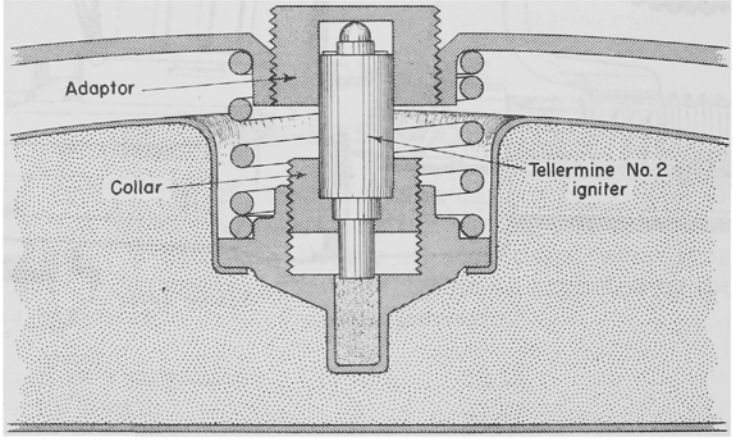
[redacted]

*Muzzle velocity	2,300 f p s
Front sight	Flat post
Rear sight	Drum type with click adjustment for windage and elevation.

An adjustment for headspace is incorporated in the barrel retaining bolt. A tapered groove is cut into the barrel near the breech and a corresponding tapered surface is milled into one side of the locking bolt. As the locking bolt is drawn from left to right by means of a large hexagonal nut which pivots on the outer end of the bolt lock and screws on to a fixed collar, the barrel is forced to the rear, thereby decreasing headspace. The bolt lock nut is marked from 1 to 8. On the forward face of the receiver, to which the barrel is held in close contact, a washer is provided so that the replacement can be made as excessive wear occurs. The washer is about 1/16 inch in thickness.

An adjustable rear monopod is provided which is mounted in a recess in an extension of the butt plate. A flash hider is screwed onto the barrel in the conventional manner rather than attached by a bayonet-type lock as is found on the Model 96. The staggered box-type magazine is longer and slightly less curved than the one used for the Model 96. The safety lever on the Model 99 is located on the left side while on the Model 96 it is on the right. Ammunition for the Model 99 light machine gun is rimless.

18. MINE IGNITER ADAPTATION



When the igniter assembly of the German Tellermine No. 2 is used with Tellermine No. 3, two additional parts are required, as shown in accompanying diagram. The additional parts are, a collar to receive the igniter in the central well and an adaptor screwed into the hole to transmit the pressure to the striker head. Tellermines No. 2 and 3 were described in Tactical and Technical Trends, No. 28, pp. 17, 18, and 19.

*Not checked by Proving Ground Test.

[redacted]

19. 380-MM SPIGOT MORTAR BOMB

Some details of the ammunition for the 380-mm (15-in) Spigot Mortar (Schwerer Ladungswerfer) are now available. Both smoke and HE bombs are fired by this weapon, but the following data refers to the HE bomb.

German name	38-cm Wurfgranate 40
Total weight	331 lb
Bursting charge	110 lb
Maximum diameter	15 in
Length overall	4 ft 11 in
Length of bomb	2 ft 3/4 in
Fuze	Wgr. Z 36, a standard percussion nose fuze as used in German mortar bombs.
Gaine*	Zdlg. C/98 Np., a standard gaine containing Penthrite.
Propellant	There are two charges contained in cloth bags in an adaptor fitted with an electric primer. The propellant is known as Gudol, (see Tactical and Technical Trends, No. 31, p. 37) and is a flashless double-base propellant containing nitroguanidine. Weights are as follows: Charge 1, 385 grams (13.56 oz); Charge 11,175 grams (6.19 oz).

SIGNAL CORPS

20. GERMAN FIELD TELEPHONE BATTERIES

It has been reported from a German source considered to be well informed, that the batteries used for field telephones in Africa contained acid of which the specific gravity was 24°, Baume.** For service in extreme heat, this figure is reduced, while in Europe it would be 27° or 28°. The batteries were made of wood, lined with an acid-proof matrix described as "pitch - tar mould". The voltage for telephone use was stated as 1.5. After six months, the batteries became exhausted. They resembled a single cell from a pocket flashlight battery, of the type which usually has 4.5 volts. In this particular case, the cell was enlarged for greater amperage.

The German signal corps is reported to be furnished with a field live-testing set, battery operated, which can measure voltages as high as 300 amps, also resistance. It can be used to test lines and elements, with or without load.

From the same source as the previous item comes an account of a special cable covered with synthetic rubber, over which a tank can pass without injuring it. Such cable is supplied in drums of 273 yards length. To lay, a truck would drive the length of the cable on the drum, unreeling the cable, which is then

*The metal casing of a shell holding the explosive.
**Equivalent to 1.199 specific gravity.

[redacted]

connected with the second drum, and the truck proceeds. It was stated that in this way 2 or 3 km (1.22 to 1.86 miles) of cable could be laid in from 20 minutes to half an hour.

The cable is reported to carry two pairs, which, it was stated, could be used for multi-channel traffic for both teletype and telephone.

[redacted]

SECTION II

RECRUITMENT OF THE WAFFEN-SS

STURMBANNFÜHRER (MAJOR) **WAFFEN-SS OFFICERS** HAUPTSTURMFÜHRER (CAPTAIN)

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RECRUITMENT OF THE WAFFEN-SS*

Despite a general relaxation of requirements in the acceptance and induction of men for the German armed forces, rigid standards are reported to be maintained in the recruitment, within Germany, of that elite organization known as the Waffen-SS. Outside the German borders, however, standards are reported to have been lowered in the recruiting of Volksdeutsche (German-speaking persons domiciled outside Germany) and of non-Germans.

Because of this difference it is deemed advisable to consider Waffen-SS recruiting activities inside and outside Germany under separate headings:

a. Inside Germany

The basic conditions of recruitment are:

(1) .A standard of physical fitness at least equal to that required by the Army.

(2) "Aryan ancestry" and National-Socialist beliefs. Standards of height vary for different units. For the Adolf Hitler Bodyguard (Leibstandarte) the minimum is 5 feet, 10 inches. For the ordinary SS divisions it is 5 feet, 7 inches, or for men under 21 years of age, 5 feet, 6 inches. For mountain troops, the minimum is 5 feet, 5 3/4 inches.

Recruits are accepted in four categories, as follows:

(a) Volunteers for the duration
(b) Volunteers for 4 1/2 years) With the prospect of becoming non-commissioned officers
(c) Volunteers for 12 years)
(d) Officer candidates.

Age limits for volunteers for the duration are 17 to 45 years excepting that recruits for infantry, armored, and signal units must not be more than 25 years old. Enlistment for the 4 1/2 year period is restricted to men between 17 and 35 years of age and, for the 12 year period, to men between 17 and 23.

Officer candidates are classed either as "technical" or "active." Age limits for the latter are 17 to 23 years. Preference is given to Hitler Youth leaders, Party functionaries, and officials in organizations affiliated with the Party.

An "active" officer candidate must serve a qualifying period of 12 months--six in a replacement training unit, six in a field unit--before going to one of the two SS officer training schools (SS-Junkerschulen). If he passes his preliminary tests there, he becomes an SS-Junker. When he is graduated, he becomes an SS-Standartenober-junker and is assigned to a unit. Promotion to Untersturmführer

*Military branch of the Nazi Party "Elite Guard."

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(2d lieutenant) follows upon the recommendation of his commanding officer to the head of the SS.

Technical officers undergo much the same kind of training except that after six months of general military training they are attached for three months to the arm of service they have chosen, to learn the practical side, following which there is a three-months theoretical course.

While the Hitler Youth organization is the main source of recruits for the Waffen-SS it must be remembered that the Youth group is equally the main recruiting source for the Wehrmacht. As the HJ (Hitler Youth) has been actually as well as legally compulsory since 1940, the number of boys leaving that organization each year is now practically equivalent to a whole annual age class. Of these a small proportion, probably between fifteen per cent and twenty per cent are accepted as Party members and not all of these have in the past joined the Waffen-SS.

Since the beginning of 1943 strenuous efforts have been made to induce boys of 16 and 17 to join the Waffen-SS. Propaganda stories concerning SS troops in action frequently appear in HJ publications; SS men are detailed, together with representatives of the Wehrmacht, as instructors in the boys' military camps. There is reason to believe that in many cases the pressure exerted on the youths to "volunteer" is tantamount to compulsory enlistment.

The Waffen-SS is not empowered to recruit from the Wehrmacht itself. Recruits already mustered for the Wehrmacht but not yet called up may volunteer for the Waffen-SS, but men who have been called to service or who are serving or who have served in the Wehrmacht, are, as a class, placed outside the range of SS recruiting. Also, men with technical training or qualifications fitting them for service in the Air Force or in the Navy are barred from applying to join the Waffen-SS as officer candidates. There is one modification to these general prohibitions. Officers, and presumably enlisted men also, may be permitted to transfer from the Wehrmacht to the Waffen-SS in exceptional cases and at the discretion of the High Command. But there is no reason to believe that such transfers occur frequently or have any vital bearing on the recruiting problem of the Waffen-SS.

It is evident that the Waffen-SS is finding increasing difficulty in getting enough recruits by the voluntary method to replace heavy battle casualties as well as to maintain the present rate of expansion.

b. Outside Germany

Methods of recruiting have varied in the different countries, but a broad difference is discernible in the appeals made to the Volksdeutsche, to whom the German government can speak with a show of national authority even when they are citizens of another state, and the other nationalities who must be induced to enter the Waffen-SS on grounds of local or European patriotism.

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The main groups of Volksdeutsche outside the Greater Reich are in Hungary, Rumania, Croatia, and Slovakia. A report of January 1943 on the German minority in Hungary stated that 3,500 were serving in the Wehrmacht, 10,000 in the Hungarian militia, and 20,000 in the Waffen-SS. Of the 70,000 Volksdeutsche from Rumania in the German fighting services, a majority are said to be in the Waffen-SS. In Croatia complete conscription has been introduced and all physically fit German males from 17 to 35 years of age, not already serving or otherwise exempt, are being called up for service in the Waffen-SS. Similar action has been taken in Slovakia. These are the first clear cases of wholesale conscription for the SS, though it can scarcely be doubted that there has been much pressure, if not actual compulsion, among the other Volksdeutsche groups. Several thousand Volksdeutsche from Russia have also been absorbed into the Waffen-SS.

The original decision to raise non-German forces to serve with the Waffen-SS was based on the propaganda rather than on the fighting value of the "Germanic" volunteers. For this reason, apparently, the men were mostly organized in small national legions.

In Scandinavia and the occupied countries of the West, recruiting was done mostly by the local Nazi and Quisling parties; in the Baltic states it was done by the German-controlled governments; in the Balkans by German authorities in agreement with the governments concerned. In all these territories the Waffen-SS has obtained a virtual monopoly on recruiting for the German armed forces.

During the last six months, interesting changes have been noticed. With manpower becoming more important than propaganda, a larger element of compulsion has entered the recruiting campaigns, and at the same time the small, uneconomic legions are being reorganized into regiments and battalions, clearly intended to be incorporated into regular SS divisions.

In the occupied countries of Scandinavia and the West, the demand for recruits has been particularly noticeable since the early spring of 1943. The various Quisling leaders have addressed themselves especially to their followers, and demanded from them an offer of their services at the front as a test of their political integrity. The position has been most bluntly defined by the Senior SS and Police Leader, Rauter, in Holland. "It is quite obvious," he said in a speech in March, 1943, "that every SS man in his turn will have to experience battle on the East front. An SS man who thinks he cannot face this is not a true SS man and cannot become a leader. In principle, every SS man should apply for service at the front."

In Estonia, Latvia, and Lithuania the recruiting campaign is more intense. Considerable governmental influence has been exerted to make young men, members of the Civil Defense Corps, and ex-soldiers join the Waffen-SS, or at least one of the auxiliary organizations of the Wehrmacht.

The head of the civil administration in Estonia recently told a gathering of Estonian SS legionaries that he was ordering all commissioned and noncommissioned officers of the former Estonian army, in conformity with their oath to defend the

country, to join the SS legion, and that he was also contemplating the calling up of younger age-groups to bring the organization up to full strength. According to reports from various sources this was done and approximately 16,000 men were mobilized, the majority of whom seem destined either for the Estonian SS legion or for auxiliary service with the Wehrmacht.

The intensified drive for recruits in the occupied countries has been accompanied by a lowering of the physical and ideological standards demanded of them. The difference is best illustrated in Norway. In the original recruitment (1940-41) for SS-Regiment Nordland, men between 17 and 23, unmarried, Aryan, and of good physique, were invited to volunteer for one, two, or four years. In 1941 the upper age limit was raised to 40 years. In the present recruiting campaign for SS-Panzer-Grenadier-Regiment Norge (replacing the Legion Norwegen), enlistment is open to all Norwegians between 17 and 45 years of age, whether married or single, with a minimum height of 5 feet, 5 inches.

In Latvia and Lithuania the recruiting notices ask for men between 17 and 45 years of age, Aryan, with no criminal records, and mentally and physically fit. This is probably now the general standard for the foreign SS recruits.

At the same time, less attention is being paid to the political and racial qualifications of recruits. Apart from the mass conscription of Croats and Estonians, there have been other indications that Nazi ideology is no longer regarded as an indispensable qualification. In Norway the advertisements for what are described as "peaceful Waffen-SS duties" inside the country assure prospective recruits that enlistment carries with it no political ties. An even greater tolerance has been shown in the Balkans, where a Croatian SS division has been formed of Catholic and Moslem Croats. The acceptance by the Waffen-SS of recruits who are neither Germans, "Aryans" nor Nazis and who are of a race and religion essentially alien to Europe, suggests that the original conception of "SS-Tauglichkeit" ("Aryan" ancestry and National-Socialist beliefs) has been abandoned.

It is clear that recruiting of Volksdeutsche and non-German elements for the Waffen-SS is mainly determined by the political situation in the countries concerned. Where the population is considered reliable the SS are prepared to do mass recruiting; where it is unreliable, a measure of selection is still deemed necessary. Hence with Volksdeutsche and the Baltic populations, among whom a considerable degree of pro-German or anti-Russian feeling may be reasonably expected, an amount of pressure has been used which is hardly distinguishable from general conscription. In Scandinavia and the Low Countries, where the population is in general anti-German and the Quisling governments are not firmly established, recruiting is voluntary and appeals mainly to those who have already taken sides with Germany. Finally, the Croatian division is purely an opportunist measure, exploiting the existing political and racial divisions in Yugoslavia.

The outstanding feature, however, is the difference between the SS recruiting inside and outside Germany and the consequent differences in kind between the various SS Divisions. That the SS will endeavor to guard against this dangerous

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dilution by providing the impressed or mercenary troops with German officers is almost certain. But even this cannot alter the fact that a potential source of disintegration has been introduced into the elite corps of National Socialism.