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TACTICAL AND TECHNICAL TRENDS

No. 26
June 3, 1943

DISTRIBUTED BY
INTELLIGENCE SECTION, G-2
FROM INTELLIGENCE SECTION, G-2

Prepared for
ARMY GROUND, AIR, AND SERVICE FORCES
by
MILITARY INTELLIGENCE SERVICE,
WAR DEPARTMENT



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CONTENTS

SECTION I

Page

Air

- 1. Aerial Bombing Attacks on Aircraft. 1
- 2. Low-Level Fighter-Bomber Raids. 3

Antiaircraft

- 3. German 128-mm AA Gun. 4

Antitank

- 4. Development of German Tank and Antitank Guns 4
- 5. Italian 90/53 Self-Propelled Gun. 11

Armored Force

- 6. New Model PzKw 2. 12
- 7. Combat Tactics of German Medium Tank Companies 12

Artillery

- 8. German 75-mm Recoilless Gun, LG 40 15

Engineers

- 9. Enemy Engineer Delaying Tactics. 18
- 10. German Construction Troops 19
- 11. German Safety-Fuze Igniters 21
- 12. Land-Mine Laying for Road Obstruction. 23
- 13. Russian Defenses Before Moscow 24

Infantry

- 14. German Combat Experiences in Russian Wooded Country . . 27
- 15. Some British Observations of Japanese Tactics 31
- 16. Japanese Tactics--Milne Bay Operations 34

Medical

- 17. Atabrine for Malaria. 39

Ordnance

- 18. Italian 75/18 HE Fragmentation Shell. 40
- 19. Italian 8-mm Breda Machine Gun, Model 38 40

Signal Corps

- 20. German Radio Communication for 105-mm Gun Battery . . . 43

General

- 21. Prisoners of War Used for Propaganda 44
- 22. Notes on Italian Organization 45
- 23. Experience in Russia Modifies German Training Methods . . 46

SECTION II

- Tactics of Street Fighting on the Russian Front 53

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SECTION I

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AIR

1. AERIAL BOMBING ATTACKS ON AIRCRAFT

For some time past isolated reports have been received of aircraft, usually Japanese Zekes and German FW-190s, dropping bombs in the path of our bombers. Recent information indicates increasing use of these aerial bombs.

The Japanese bombs appear to weigh from 50 to 100 pounds, and can be clearly seen from the time they leave the enemy plane. They explode about 5 to 10 seconds after leaving the plane, producing a vivid color, followed by white smoke streamers (which might indicate phosphorus) in a waterfall effect. One officer is of the opinion that if one of the larger bombs exploded inside of a five-plane Vee it might set most of the planes on fire, because of its intense heat. The bomb-fuzing system used may be either mechanical, functioning after a pre-determined time or after a pre-determined distance of fall; photo-electrical, functioning when a photo-electric unit in the bomb "sees" the target aircraft; or acoustic, functioning when the acoustic unit "hears" the target.

In some cases that have been observed in the Southwest Pacific Theater, the Japanese pilots have approached the American formation from head on, but at higher level, and have tried to time their release so as to have the bombs explode near the leading ship. After dropping the bombs, they pull up in a climbing turn. The force of the explosion, estimated from the blast effect on our planes, was stated to be about the same as that of a heavy antiaircraft shell, the blast giving nearby aircraft a severe tossing around.

The aerial use of bombs was first reported in May, 1942, in the Solomons area. A Zeke flew about 1,000 feet above and ahead of a formation of B-25s and dropped an object which exploded in front of the leader in a burst of bluish smoke and fragments. The bomber turned sharply and avoided it. The Zeke then turned and delivered a frontal attack on the B-25s. A few days later a B-17 was attacked by Zeke fighters. About the middle of June, our bomber formations in the Aleutian area were bombed by Zeke fighters.

Recently, during an attack by seven Type "O" single-engine fighters on a single Fortress, it was reported that the first formation of four Zekes climbed to a position directly above the B-17, when all four planes made a simultaneous release of small objects which exploded on a level with the B-17 but about 75 to 100 feet astern. The three other fighters, which had been flying on a parallel course, attacked the Fortress immediately after the explosions, opening fire at a range of 400 to 500 yards, and pressing the attack to within 150 yards. Having made their attack, they changed positions with the first four fighters and the entire procedure was repeated.

In a more recent report from the Solomons area, it is stated that a formation of 9 B-17s, while attacking Japanese destroyers, was intercepted by 8 to 10 Zekes which carried 2 aerial bombs apiece. Starting from an altitude of 15,000 feet, they dived and released the bombs above the B-17s after the pull-out. The bombs burst in front of the formation at a range of 20 to 150 yards.

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Another B-17 formation was returning from a raid in the South Pacific when two or three float biplanes were observed flying approximately 2,500 to 3,000 feet above them. A bomb-shaped object was seen to drop from one of the planes. It exploded a very short distance above and to the right of the formation. A similar occurrence was reported with Zero's flying approximately 2,000 feet above the formation, while a float-biplane off at the side gave data to the fighters as to the altitude and the speed of the B-17s.

In spite of these attacks, to date there has been no report of substantial damage to our planes by Japanese bombs.

The Germans have likewise been experimenting with bombs of a similar nature. Reports from two Fortresses returning from a raid on the French coast are to the effect that, when they were proceeding at about 9,000 feet, two FW-190s dived to a position about 150 feet above them, and each released a cluster of bombs. The bombs burst about 20 yards behind the Fortresses, level with them or slightly above, without doing any damage.

FW-190s have bombed Fortresses from 1,000 feet while 3,000 feet ahead on a left right-angle course. The explosions occurred 600 feet ahead but level with the bombers, and appeared to be from bombs 6 to 10 inches in diameter dropped from wing racks. Altitude information was apparently supplied by Ju-88s flying level with our planes. In another raid, some damage to our planes was sustained by fragments from aerial bombs which appeared to be time bombs, 18 inches long and dropped singly. Information received from North Africa indicates that German and Italian fighters are apparently dropping bombs on our B-24s, and that one may have been destroyed in this manner. Apparently without sighting, 20- to 30-pound bombs are released by the fighters at 1,500 to 3,000 feet above the bombers, after the latter's altitude has been measured by level observation. Fuzes appear to be set for detonation in a vertical line 50 feet apart. One observer reported that a formation of B-17s flying over the French coast at 23,000 feet was attacked by dive-bombers, and the right elevator of one plane was severed by a bomb explosion forcing it down out of control. Other crews have described aerial bombing by FW-190s, which approached at 6 o'clock 4,000 to 5,000 feet above and released one 100-to-500-pound bomb each. Both white-and-gray and red-and-black bursts 30 feet in diameter have been seen. However, no definite pattern to these attacks has so far been indicated.

Although the Axis powers have not up to date had any particular success with the dropping of time bombs, such tactics may be encountered on an increasing scale, for it seems probable that they are making definite attempts to develop this form of attack.

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2. LOW-LEVEL FIGHTER-BOMBER RAIDS

Bomb-carrying FW-190 fighters were reported in action for the first time in July, 1942. During the last few months, the enemy has been employing certain specially trained units called "Jabos" for daylight fighter-bomber operations over the south coast of England. Analysis of these attacks reveals a certain uniformity of method and execution.

The aircraft, usually FW-190s alone but sometimes including Me-109s, approach from the sea at low altitudes varying from sea level to 500 feet, but generally between 50 to 100 feet. They fly in echelon or loose line astern, making landfall at some distance to the side of the target near an easily recognizable landmark, such as a headland. They proceed inland until on the flank or in the rear of the objective and then turn to attack, rising to 100 to 200 feet for a single indiscriminate bombing and machine-gun run at full speed across the target area (each aircraft carrying one 1,100-pound bomb). The time spent over the target is about 5 seconds in the normal hit-and-run raid involving 1 to 4 fighter-bombers. The flight home is then made in loose formation.

The attacks have usually been pressed home with a reasonable amount of determination, and in general reveal signs of coordinated attack, although recent reports have indicated some deterioration of effort in this respect. However, the raids are often carried out under conditions of poor visibility and by scattered aircraft at irregular intervals.

Because of the low altitude at which the planes approach, radio detection equipment is seriously limited, with the result that antiaircraft defenses are frequently unable to come into action before the attack has been delivered. The planes have, in fact, been over their targets before warning could be given. The enemy uses the configuration of the coast or of the ground in the vicinity of the target to provide cover during the approach, and often the aircraft are seen only momentarily between obstacles such as trees and houses.

Targets vary considerably and may include shipping in harbors, port installations, a coastal radio direction-finder station or airdrome, railway stations, electric or gas plants, or simply general raids against a coastal town, irrespective of military importance. The general preference appears to be for purely civilian targets as opposed to those of military value.

A later development in Jabo raids was to provide cover for the homeward flight. Since a low-altitude approach makes visual or radio detection very difficult, danger from British fighters arises chiefly only during the first part of the homeward flight. The protecting fighters therefore fly over the Channel at altitudes as high as 10,000 feet to await the return of the Jabos, thus being in a position to attack from above any British fighters which may be chasing the Jabos home.

The number of FW-190s and Me-109s used in these raids seems to be increasing, and recently daylight attacks appear to have been largely abandoned in favor of night sorties. No appreciable damage has been inflicted on military objectives, but civilian targets and personnel have suffered to a certain extent.

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The raids appear to be for the purpose of affecting civilian morale and keeping defenses on a continuous alert. In general, however, they have had merely a nuisance value.

ANTIAIRCRAFT

3. GERMAN 128-MM AA GUN

The 128-mm (Flak 40) antiaircraft gun, which exists in both mobile and static versions, is also mounted on railroad cars. The predictor used is Kommandogerät 40 (Üg 37), which is also used to control the 88-mm (3.46-in) and 105-mm (4.14-in) AA guns. The performance of the 128-mm (Flak 40) is at present unknown, but details may be similar to those previously published* for the 127-mm AA gun.

These figures, which remain unconfirmed, are:

Length of bore	50 cals
Muzzle velocity	2,500 f/s
Max. horizontal range	19,600 yds
Max. vertical range	42,600 ft
Weight of projectile	55 lbs
Rate of fire	8 rpm
Elevation	0° to 90°
Traverse	360°

ANTITANK

4. DEVELOPMENT OF GERMAN TANK AND ANTITANK GUNS

A detailed analysis of the chronological development of German tank and antitank guns is presented in the following report, which is preceded by an examination into the basic requirements for tank and antitank guns. All of the information contained in this article comes from British sources.

* * *

a. Theory

In order to bring into proper perspective the various lines of German antitank and tank gun development, it may be useful first to consider various

*See TM 30-450, p. 333 (Handbook on German Military Forces) and MIS, Special Series, No. 10, p. 45 (German Antiaircraft Artillery).

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factors which influence design, and to consider also the effect of design on both actual performance and lethal or destructive effect.

(1) The Problems of the AT Gun

The principal requirements for an antitank gun are the following:

(a) Ability to perforate the enemy's tank armor at the maximum range at which accurate engagement can take place;

(b) A projectile which will not only penetrate the armor but cause sufficient mechanical damage inside the tank, or personnel casualties, to disable the tank as a fighting vehicle;

(c) Ease of maneuver and concealment, requiring a carriage and a total weight which will permit speed into and out of action, and a low silhouette;

(d) A high rate of fire, a flat trajectory, and an accurate sight to enable it to engage relatively small and moving targets;

(e) Protection for the gun crew against machine-gun fire as a minimum, and against AP and HE projectiles and bomb near-misses as an optimum;

(f) An HE projectile which will enable the gun effectively to engage soft-skinned targets, when the opportunity offers and does not conflict with the gun's primary task.

(2) The Problems of the Tank Gun

Insofar as a tank gun under modern conditions is expected to be able to deal with enemy armor, most of these same conditions will apply, with an additional condition imposed by the need for economy of space in a tank.

(3) The Problems of Projectiles

(a) General

The ability of a projectile to penetrate armor depends to a great extent on the velocity at which it strikes the target, and to a lesser extent on its weight and on the angle at which it strikes. It follows, therefore, that given equality of projectile design, material, weight, and angle of strike, the higher the muzzle velocity at which the projectile is fired, the greater the thickness of armor which will be penetrated at a given range.

It also follows that given equal muzzle velocity and quality of projectile design and material, the heavier the projectile the less the penetration performance will decrease as range increases, since the heavier projectile maintains its speed through the air better and the descending curve of remaining velocity is flatter.

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The heavier the projectile, the more difficult it becomes to achieve in practice a high muzzle velocity without being forced by mechanical considerations to heavy guns and bulky ammunition. Hence the antitank gun-designer is immediately faced with several problems. Is he prepared to accept a light projectile with a high muzzle velocity, relatively rapid deceleration, loss of striking power at longer ranges, and relatively slight lethal effect, in order to be sure of penetrating thick armor at the shorter ranges? If he is, he will have to take a chance on securing a direct hit on a vital spot to get results.

Is he prepared to accept a lower scale of penetration at the shorter ranges with a heavier projectile, which will, however, keep up its performance better, and do more damage at extreme ranges wherever he gets a hit? And if he decides to take as his target a thickness of armor of X inches, which no normal antitank gun of manageable proportions will defeat, how is he going to get the extra velocity to drive his projectile through it?

(b) A German Solution: The Tapered-Bore Gun

In general, increased velocity can be obtained in three ways: by increasing the pressure in the gun behind the projectile, by lengthening within limits the bore of the gun (and consequently the travel of the projectile under pressure), or by increasing the area of projectile upon which a given pressure acts. The first method increases the weight of the gun; the second also gives an unmanageable barrel for field purposes (for instance, a 3-inch high-velocity gun, using suitable propellant, might require a barrel length of about 100 calibers, or 25 feet); the third tends to give a projectile of bad ballistic shape. The tapered-bore or Guerlich design adopted by the Germans for certain of their weapons employs the third method, but gets over the disadvantage mentioned by gradually reducing the base area of the projectile as it travels through the bore, thus bringing it to a proper ballistic shape by the time it leaves the muzzle.

With the Guerlich design they have managed to produce guns of light weight capable of penetrating exceptional thicknesses of armor at the shorter ranges of engagement. For this performance they have had to sacrifice a great part of the destructive effect inside the tank. A projectile from a straight-bore weapon of, for instance, 3-inch caliber weighs about 15 pounds, and in penetrating the armor not only throws into the tank large pieces of disrupted armor from a 3-inch hole, but follows through either intact, or in fairly large fragments, to cause widespread damage. On the other hand, the projectile from a tapered-bore gun of the same entrant caliber weighs only about 6 pounds and will emerge as slightly less than 2 1/4-inch caliber. Owing to its design it will only force a hole of about 1 1/4-inch diameter in the armor, and owing to the material of the core, internal damage will be restricted to that done by small fragments within a fairly narrow cone opening out from the point of impact.

It must also be borne in mind that with high velocity (i.e., greater than about 3,500 f/s muzzle velocity), it is necessary to employ a tungsten carbide core to enable the projectile to give full penetrative value for its high velocity. The necessary raw material (wolframite) is not in such generous supply that the

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wholesale arming of every antitank gun with such a projectile could be contemplated.

In the event of a hit failing to penetrate, damage done by the light high-velocity projectile will be negligible compared with that caused by the equivalent normal projectile. However, taking everything into consideration, the tapered-bore gun is potentially a very serious threat to the heavier armor, particularly if a succession of hits can be obtained; but if only one hit is obtained, the probabilities of causing immediately disabling damage are relatively low. It is not a weapon which can, with advantage, engage in long-range duels with any adequately armed tank. It would not for instance prove profitable in the open African desert, where duels at ranges of up to 2,500 yards are common, but in the close conditions of some European countrysides it might find all the conditions for its profitable employment satisfied. In more open conditions, the normal straight-bore weapon with its heavy projectile will have every advantage.

With a tapered bore, effective engagement of soft-skinned targets is difficult of fulfillment. High performances with both AP and HE projectiles from the same gun are incompatible, and while it is possible to compromise with a normal straight-bore weapon, losing a bit each way, there can be no compromise with a tapered-bore antitank gun, and HE performance must be sacrificed.

b. Developments

The rapidity with which the German forces have expanded and developed their tank and antitank armament is among the outstanding technical performances of this war. New weapons have appeared in quick succession, in turn to be superseded or improved, and throughout there has been a parallel development and improvement of ammunition.

At the end of 1939, the German Army had one standard antitank gun, the 37-mm Pak. To supplement this, they had to call on the heavy anti-aircraft equipment, the 88-mm Flak. They had tank guns of 1934 vintage, the 20-mm Kw.K 30, the 37-mm Kw.K, and the 75-mm Kw.K. The antiarmor performance of tank guns was low.

Early in 1941, the German Army had, in addition to the 37-mm Pak, a new 28-mm tapered-bore,* light antitank gun, the Pz.B** 41, primarily for airborne troops and infantry, and a new 50-mm antitank gun, the 50-mm Pak 38. As a stop-gap, the Czech 47-mm antitank gun was also being used. The 37-mm Kw.K had been dropped from their tank armament, and in its place came a moderately effective 50-mm tank gun, the 50-mm Kw.K.

In addition, early in 1942 the German Army had put to use as an antitank gun the Russian 76.2-mm field gun, of which considerable numbers must have been captured. This was the first heavy antitank gun under the control of German

* Tapers to 20 mm at the muzzle.

** Abbreviation for "Panzerbüchse" literally "antitank rifle."

ground forces.* The antitank armament of airborne troops had been considerably strengthened by the introduction of a new tapered-bore gun, the 42-mm Pak 41, which tapers to 28 mm at the muzzle. The 50-mm tank gun used in 1941 was replaced by the long-barrelled 50-mm Kw.K 39 based on the very successful 50-mm Pak 38. An improved 20-mm gun, the Kw.K 38, had been provided for light tanks and armored cars, though later models of some of these have the 50-mm Kw.K 39.

The tables below show the remarkable change in the hitting power of their armament. The guns listed under 1939 were those then in use; those under 1941 and 1942 first appeared in these respective years.

(a) Antitank Guns

1939	37-mm Pak (2,500 f/s)
1941	37-mm Pak (obsolescent) 28-mm Pz.B 41 (4,580 f/s) 47-mm Pak (t) (2,540 f/s) (Czech) 50-mm Pak 38 (2,700 f/s)
1942	37-mm Pak (obsolete) 42-mm Pak 41 (4,500 f/s) 50-mm Pak 38 (2,700 f/s) 76.2-mm Pak 36 (r) (2,200 f/s) (Russian) 75-mm Pak 97/38 (2,100 f/s) (French) 75-mm Pak 40 (2,800 f/s) 75-mm Pak 41 (4,000 f/s)

(b) Tank Guns

1939	20-mm Kw.K 30 (2,600 f/s) 37-mm Kw.K (2,500 f/s) 75-mm Kw.K (1,350 f/s)
1941	20-mm Kw.K 30 (2,600 f/s) 50-mm Kw.K (2,500 f/s)
1942	20-mm Kw.K 38 (2,600 f/s) 50-mm Kw.K 39 (2,700 f/s) 75-mm Kw.K 40 (2,400 f/s) 88-mm Kw.K 36 (2,600 f/s) 75-mm Kw.K 41 (4,000 f/s)

*Practically all German antiaircraft units belong to the GAF.

(c) Ammunition

<u>1939</u>	<u>1941</u>	<u>1942</u>
AP shell	AP shell	A.P.C.** shell
HE shell	A.P.C.B.C.* shell (1.25% HE)	A.P.C.B.C. shell (.31% HE)
	AP 40 shot	AP 40 shot
	HE shell	HE hollow charge shell
		HE shell

c. Comment on Latest Developments

(1) Antitank Guns

It is quite clear that since 1939 a very great effort has been made to bring into service an efficient antitank gun for every type of combat unit. Even the airborne and parachute troops have had special provision made for them in two light tapered-bore weapons. Most important of all, the Army is now no longer dependent on the GAF for its heavy antitank weapon.

The Army had to obtain from the GAF, on loan, Flak units armed with the 88-mm gun, because it was the only gun in the German service with the requisite performance. The gun crews were GAF personnel, the equipment was not designed to an Army specification, and whether they were made available or not depended in some cases on the personality of the two commanders involved. The GAF for their part has had undoubtedly to suffer pressure from time to time with a view to their releasing Flak units to the Army, and to the employment of these units in a purely AT role to the detriment of AA defense, mainly a GAF responsibility. However, the multi-purpose AA/AT weapons were retained.

The Army must have insisted on having its main antitank weapons produced to its own specification and organized as an integral part of the Army. They now have the 75-mm Pak 40, which weighs about 1 3/4 tons in action as against almost 5 tons for the 88-mm, has the same performance against armor up to 2,500 yards as the 88-mm, can be produced with greater ease, and will be manned by Army crews. In the 75-mm Pak 41, which also weighs about 1 3/4 tons, they have a weapon which will give them performance adequate to defeat, under European fighting conditions (i.e., up to 1,500 yards), any homogeneous armor not thicker than 100 mm, and correspondingly greater thickness at shorter range.

As originally produced, the 75-mm Pak 40 only had a muzzle velocity of 2,400 to 2,500 f/s, and it seemed as if a still more powerful weapon must be developed. Now, however, this gun has been modified; a muzzle velocity of about

*Armor-piercing capped with ballistic cap (British abbreviation).

**Armor-piercing capped (British abbreviation).

2,800 f/s is obtained, and armor-piercing performance is up to that of the 88-mm Flak 36. Therefore, this weapon, along with the 75-mm Pak 41, provides a very powerful combination for all ranges up to 2,500 yards. The Germans may well decide to leave occasional super-heavy tasks to the divisional 105-mm guns and the 105-mm Flak of the GAF. This should not be taken as meaning that they will not proceed with the development of a still heavier antitank gun, but rather that production will probably, for the present year, be concentrated on the 75-mm equipment. Any heavier antitank gun may well take the form of an improved 88-mm multi-purpose gun with higher muzzle velocity and a suitable field mounting. (Sketchy reports of an 88-mm Flak 41 much more powerful than the Flak 36 are now starting to come in.)

(2) Tank Guns

Since 1939 a radical change of policy is evident. The 1939 tanks, insofar as gun-power was concerned, could barely fight against the French tanks. The short-barreled 75-mm gun in the PzKw 4 was intended primarily as a close-support gun. Even today it is being used in that role, and has recently been mounted in some PzKw 3 tanks and 8-wheeled armored cars. It should be noted that German tanks have always carried a considerable amount of HE. The killing of soft-skinned targets and antitank guns is always a consideration in their policy.

In 1942 the PzKw 3 and PzKw 4 were rearmed with high-performance long-barreled guns, the 50-mm Kw.K 39 and the 75-mm Kw.K 40, respectively.

These two new guns, together with the 75-mm Kw.K 41 (tapered bore), and the 88-mm Kw.K 36, suggest an interesting line of policy. The demand from the German Army in Africa was undoubtedly for a gun throwing a heavy projectile and keeping its penetration performance up over 2,000 to 2,500 yards. This appears to have been met by the provision of the 88-mm Kw.K 36 mounted on the PzKw 6.

It is doubtful whether the Germans would accept desert conditions, in which so small a proportion of their forces were engaged, as a basis for their major weapon-production program. They are more likely to base this on Russian and European conditions. This seems to have led them to the 75-mm Kw.K 41, a lighter gun with a shorter and lighter (16 1/2-lb) round, but with an armor-piercing performance markedly superior to the 88-mm at any range below 1,500 yards.

The performance of the 75-mm Kw.K 40 is not as good as that of the 88-mm Kw.K 36 at any range, but it is probable that having here a good gun, they will aim at improving its performance.

(3) Ammunition

There has been a marked tendency in the past year to improve the anti-armor performance of AP projectiles, first by reducing the HE capacity of the heavier AP shell, and second by the continued development of high-velocity shot with tungsten carbide core. This suggests that a compromise armor-piercing

explosive projectile is not acceptable now that substantial thickness of armor has to be dealt with. The latest design of the 75-mm A.P.C.B.C. projectiles has so low an HE capacity as to suggest that this projectile has been included because their troops have become used to a shell that will burst inside the tank, and sudden elimination of the base fuze and explosive feature might worry them. In other words, the Germans are for practical purposes using shot for the attack of thick armor, and retain for every weapon HE for the attack of soft-skinned targets.

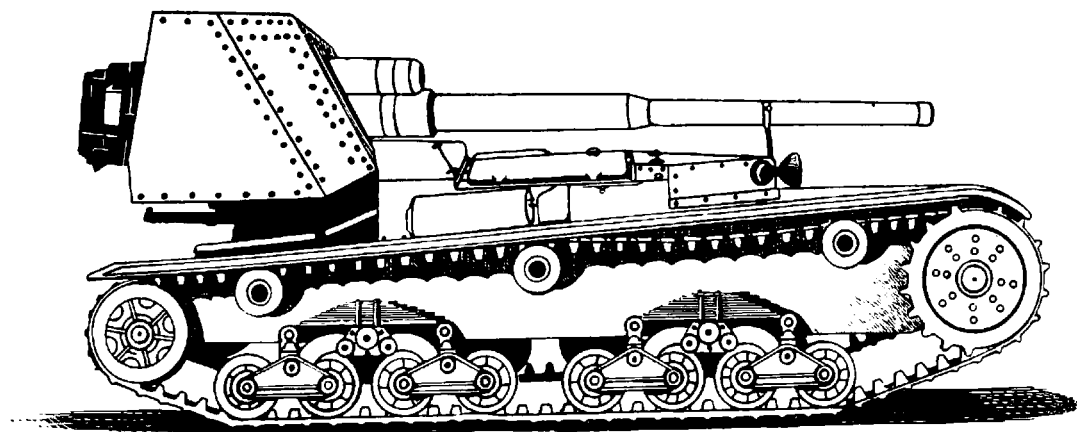
It also seems clear that they have been expecting the Allies to go to face-hardened armor, or else they decided some time ago that a piercing cap so improves the performance against any type of armor that the extra production time is justified, since there are now no uncapped AP projectiles in production for anything above 20-mm caliber.

It is a fact that both the 75-mm Pak 40 and Kw.K 40 are provided with hollow-charge in addition to the A.P.C.B.C. and HE, with the expressed intention that the former should not be used for extreme ranges for the reason that it is a low-velocity projectile.

There is every reason to believe that these shells would be of great use against heavily armored pillboxes, armored vehicles, and tanks, because of the "cavity charge" effect.

5. ITALIAN 90/53 SELF-PROPELLED GUN

There has been a previous reference in Tactical and Technical Trends (No. 25, p. 48) to the Semovente (self-propelled) 90/53* gun. Further information on



this Semovente 90/53 (3.54-inch) self-propelled AA/AT gun has been received.

*Caliber 90 mm, length of bore 53 calibers.

On the basis of the present report, it appears that this gun is mounted on the rear of a turretless 14-ton, Model 14/41 tank chassis. In order to accommodate the gun, it would appear that the normal positions of the engine and transmission in the hull have been rearranged. The engine, normally in the rear, seems to have been moved forward to the center of the hull, access being provided by two doors in the superstructure roof. There is probably room for one member of the crew besides the driver in front of the engine. It would seem that the engine is overloaded, so that the vehicle is slower and less maneuverable than the M 14/41 tank. The speed probably does not exceed 12 mph. Presumably the 125-hp Diesel engine of the M 14/41 tank is retained.

ARMORED FORCE

6. NEW MODEL PzKw 2

A damaged PzKw 2 tank has been captured in Tunisia by the British, with 6 bogie wheels instead of the usual 5 on each side. The front vertical plate is in one piece and extends straight across the full width of the superstructure, instead of being in two sections with the right side inclined at an angle of about 45 degrees to the rear.

7. COMBAT TACTICS OF GERMAN MEDIUM TANK COMPANIES

a. General

The following combat instructions for PzKw 4 units have been condensed from a German document. They give an excellent idea of recent enemy tank tactics.

b. Individual Tactics

(1) In view of the small amount of ammunition carried, the gun is normally fired at the halt in order to avoid waste. The machine guns mounted in turret and hull may be effectively fired up to 800 yards against mass targets, such as columns, reserves, limbered guns, etc.

(2) As soon as each target has been put out of action, or as soon as the attacking German infantry are too near the target for tanks to fire with safety, the tanks move forward by bounds of at least 200 to 300 yards. When changing position, drivers must take care to keep correct position in the tactical formation.

(3) Single tanks may be used for supporting action against prepared positions. The tank will normally move from a flank under cover of smoke. Embrasures will be engaged with AP shell. During action, it will be necessary to blind neighboring defenses by smoke. Tanks will normally fire at prepared defenses

from at most 400 yards' range. Assault detachments work their way forward, and once lanes have been cleared through the antitank defenses, the tank will follow and engage the next target. Close cooperation between tank and assault detachment commanders is essential. Light and other signals must be prearranged. Single tanks can also be used in fighting in woods and for protection of rest and assembly areas.

c. Platoon Tactics

(1) During the attack, medium platoons move forward in support of the first wave; one half of the platoon gives covering fire while the other half advances. The whole platoon seldom moves as a body.

(2) The platoon commander directs by radio, and he can control fire by radio or by firing guiding-rounds on particular targets.

(3) Antitank weapons will normally be engaged from the halt. If the nearest antitank weapon can be dealt with by the light platoon, the medium platoon will engage more distant antitank weapons or blind them. Artillery will be attacked in the same manner as antitank weapons. Enfilading fire is particularly recommended.

(4) If friendly light tanks encounter enemy tanks in the open, the medium platoon should immediately engage them with smoke-shell in order to allow the lights to disengage and to attack the enemy from a flank.

(5) Moving targets and light weapons should be engaged with machine guns or by crushing; mass targets with HE.

(6) Against prepared defenses, the procedure is as mentioned in Paragraph b (3). When the whole platoon is employed, the advance can be made by mutual fire and smoke support. When the position is taken, the platoon covers the consolidation by smoke and fire. The platoon only moves forward again after the enemy weapons in the prepared position have been knocked out.

(7) In street fighting a medium platoon may be employed in the second echelon to give support. Nests of resistance in houses may be cleaned up with the help of the tanks' guns, and lightly built houses can be crushed.

(8) If a front-line tank formation is ordered to hold an objective until the arrival of infantry, protection will be given by the medium platoon, which will take up position on high ground with a large field of fire.

d. Company Tactics

(1) When medium platoons are attached to light companies, they work on the latter's radio frequency, and not on that of their own medium company.

(2) Reserve crews follow immediately behind the combat echelon and move back to join the unit trains only after the beginning of an engagement. They come forward again as soon as the battle is over. Reliefs must be so arranged that drivers take over refreshed before each action, that is, on leaving the assembly area.

(3) The repair section, commanded by an NCO, travels with the combat echelon until the beginning of the battle.

(4) The company commander moves at the head of his company until the leading platoons have gone into action, when he operates from a temporary command post with unimpeded observation of the battle area. Keeping direction and contact are the responsibility of company headquarters personnel while the commander is at the head of his company.

(5) In the attack, the normal formations are a broad wedge (Breitkeil)* or line with extended interval (geoffnete Linie). Effective fire of the whole company may be obtained if the rear elements give overhead fire, or if they fill up or extend the front of their company to form line.

(6) For tank-versus-tank actions, the company, where possible, should be employed as a whole. When enemy tanks appear, they must be engaged at once and other missions dropped. If time allows, the battalion commander will detach the medium platoons that have been attached to light companies and send them back to the medium company. In all situations, medium tanks should endeavor to have the sun behind them.

(7) During the pursuit, the medium company will be employed well forward in order to take full advantage of the longer range of its HE shell.

e. Miscellaneous

(1) The light tank platoon of battalion headquarters company guides the medium company on the march, and when going in to rest or assembly positions. If the medium company is moving on its own, one section of a light tank platoon may be attached to it.

(2) Parts of the antiaircraft platoon of the headquarters company may be allotted to the medium company.

(3) Tank repairmen move directly behind the combat echelons. The recovery platoon is responsible for towing away those tanks which cannot be attended to by the repair section. The recovery platoon is under the orders of the technical officer, who has under his control all equipment and spare-parts trucks of the tank companies, which may follow by separate routes as prescribed by him.

*One platoon echeloned to the right, one to the left, and one in line to form the base of the triangle, with apex forward.

ARTILLERY

8. GERMAN 75-MM RECOILLESS GUN, LG 40*

This weapon is a short-rifled howitzer without a recoil or counter-recoil system, mounted on a light aluminum alloy carriage. A funneled (Venturi) tube is attached to the rear of the bored breechblock; its function is to allow the gases to disperse to the rear, thus eliminating a recoil mechanism. The firing mechanism is seated in a cone-shaped receptacle and centered in the breechblock by vertical struts. The weight of the complete gun is reduced to a minimum by using hollow machined parts, plastic washers, tubular carriage, and aluminum alloy body. Because of the weight of the complete piece, it lends itself to use by airborne troops.

The general characteristics of the gun are:

Date of manufacture	1942
Caliber	75 mm
Weight	
Complete	325 lbs
Barrel	98 lbs
Carriage	63 lbs
Wheels and axles	36 lbs
Breechblock and Venturi tube	66 lbs
Breech ring	62 lbs
Length of gun (over-all)	45 in
Length of barrel	29 1/2 in
Rifling	28 lands and grooves - uniform right-hand twist; one turn in 19 calibers
Maximum range**	3-4,000 yds
Rate of fire**	12-15 rpm
Muzzle velocity	?
Sights**	Cross-leveling gear, and straight tube tele- scope
Ammunition**	HE and hollow charge
Tube	Monobloc
Elevation	42°-20°
Traverse	60°-360°
Carriage	Platform or tripod type; detachable wheels for transport
Tactical use	AT and antipersonnel

a. Barrel

The tube is of monobloc steel construction. On the breech end, interrupted collars provide for attachment of the tube to the breech rings. It is also machined

*Extracted from a recent Aberdeen Proving Ground report.

**From a British report.

to seat the extractor and the barrel lock. Externally and midway on the barrel, a steel band is clamped. Its purpose is to lock the barrel and the front leg of the tripod in transport.

b. Breech Ring

This part of the gun is recessed to receive the barrel and breechblock. It contains borings for the extractor pin, breech-lever mechanism, "safe and fire" lever as well as the barrel lock. The trunnions for mounting it to the carriage and the elevating rack are also attached to the breech ring.

c. Breechblock

The breech is of the horizontal sliding block type. It is bored to receive the firing housing and firing lever. The firing housing, which acts as a diffuser for gases escaping to the rear, is screwed at the rear to secure the funnel-shaped "Venturi" tube. The breech mechanism lever performs a double function. It operates the breechblock and also cocks the piece when the lever is depressed.

d. Venturi Tube

This funnel-shaped tube is screwed on to the rear of the breechblock. Its purpose is to disperse the gases to the rear, eliminating recoil.

e. Carriage

The top carriage or body is constructed of an aluminum alloy, formed with a circular base. It contains borings for the elevating and traversing mechanisms and lock, as well as the trunnion caps for seating the trunnions. The gun can be traversed 360° by locking the elevating mechanism, but its ordinary traverse is 60° . Elevation is limited to 42° by stops, but the rack can be locked at 20° . At the right side is a bracket for attaching a small spare-parts box.

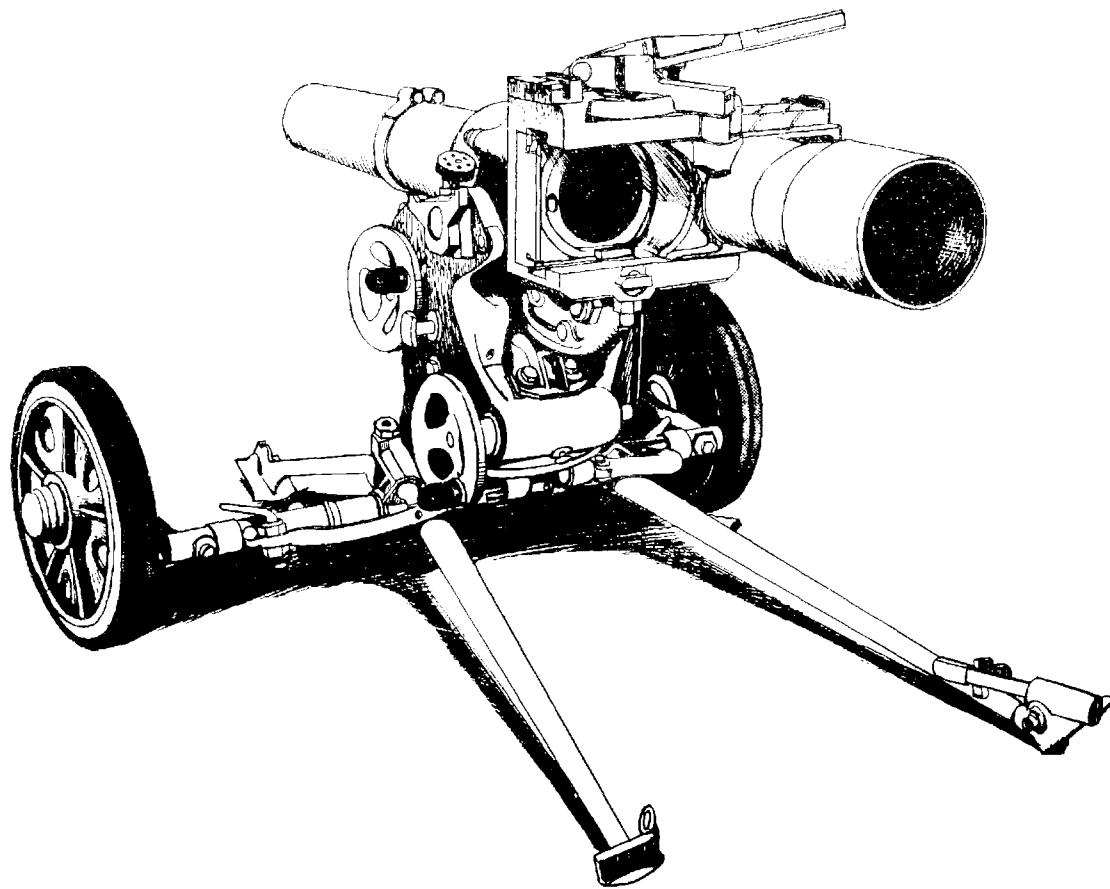
f. Lower Carriage or Platform

The lower carriage consists of the wheels, platform, three tubular legs, tubular guide rails, tubular axletree, base ring traversing rack, and stub axles.

The wheels are light-weight metal disks fitted with solid rubber tires and can be quickly detached from the axletree.

The three tripod legs are pivoted in lugs on the base ring. The front leg can be placed in one of two positions for firing by engaging it in a slot in the center of the axletree. The left and right legs can be placed in two positions by locking them in slots of the guide rail. The three tripod legs have small spades for steadying the gun while firing.

Remarks The method of firing the piece and the types of cartridges, propellants, and projectiles are, and will be, unknown until they are secured. Many



GERMAN 75-MM RECOILLESS GUN

theories have been suggested by observers, but until the projectile is received and fired it remains pure conjecture. No detailed information is available at present concerning the sighting equipment, because the captured weapon arrived in the U.S. without sights of any kind. There is a sight bracket attached to the left side of the carriage.

ENGINEERS

9. ENEMY ENGINEER DELAYING TACTICS

A recent report gives a brief summary of some engineer lessons that were learned during the advance of the British Eighth Army from Benghazi to Tripoli. The operations during the advance demonstrated very clearly the effectiveness of skillfully placed mines and booby traps in delaying an advancing enemy, even though in most cases the obstacles were not covered by fire.

The enemy delaying tactics included demolition of bridges and culverts and the systematic cratering of causeways and roads, wherever defiles occurred through sand dunes, steep rock, or sabakha.* The delaying effect of demolitions was greatly increased by mines and booby traps. The clearing of the latter imposed a heavy task and a very great strain on the engineer units, which were already heavily committed in overcoming the demolitions.

All physical obstacles were liable to be associated either with heavy charges or antipersonnel mines. Barbed wire on stakes was in one case dragged across the road, and to each stake there was attached a pull-igniter in a prepared charge. A barrel obstacle over a culvert was heavily charged and wired, so that removal of the barrels destroyed the culvert and produced another obstacle. The sowing of craters with "S" mines (antipersonnel), and the concurrent mining with antitank mines of diversion on either side, was a profitable enterprise of the enemy sappers. It resulted in very considerably extending the time taken to clear a passage. The "S" mines were placed in the spoil on the lip of the crater. Tellermines were carefully placed in a radius of 50 yards on either side of the road on the line of likely diversions, and in many cases this minefield was again protected by "S" mines.

Enemy minelaying showed every evidence of free improvisation, and little evidence of well-rehearsed drills or consistent policy. Spacings, patterns, wiring-in, and booby-trapping all varied widely, and many minefields were laid at less than the minimum safe spacing to avoid blast or sympathetic detonations.

Concealment of buried mines proved a major factor in determining the delay imposed. Many hundreds of mines were detected by eye and lifted without resort to detectors, recently disturbed earth providing the necessary clues.

*A smooth, flat, often saline, plain, sometimes covered after a rain by a shallow lake.

Enemy demolition work in ports, while elaborate and fairly effective, was misdirected.

The destruction of side-cut roads on steep hillsides was not fully effective when large charges were placed by shafts sunk on the uphill side of the road. It has been shown that the addition of a smaller charge on the downhill side destroys any "shoulder" on which a repair road could be built. The Germans omitted to do this in one instance, and no retaining walls were required for immediate repairs.

Enemy failure to destroy certain water reservoirs was of great assistance to the advance. In view of the excellent results obtained from boring rigs, mere demolition of sources cannot impose much delay.

10. GERMAN CONSTRUCTION TROOPS

Since the German Army engineers perform almost exclusively combat missions, such as crossing streams, reducing fortifications, and removing obstacles under fire, the Army includes special construction units for non-combat functions usually performed by engineers in other armies. These construction troops (Bautruppen) form a separate arm of the service, which is divided into specialized groups, such as road, bridge, railway, and fortress construction. Recently the German personnel has been largely confined to the older age groups, and increasing numbers of foreign laborers have been used for the heavy manual work; the construction troops are nevertheless fully capable of giving a good account of themselves if attacked. The Bautruppen are the subject of an article which appeared in an authoritative German military magazine in October 1940.

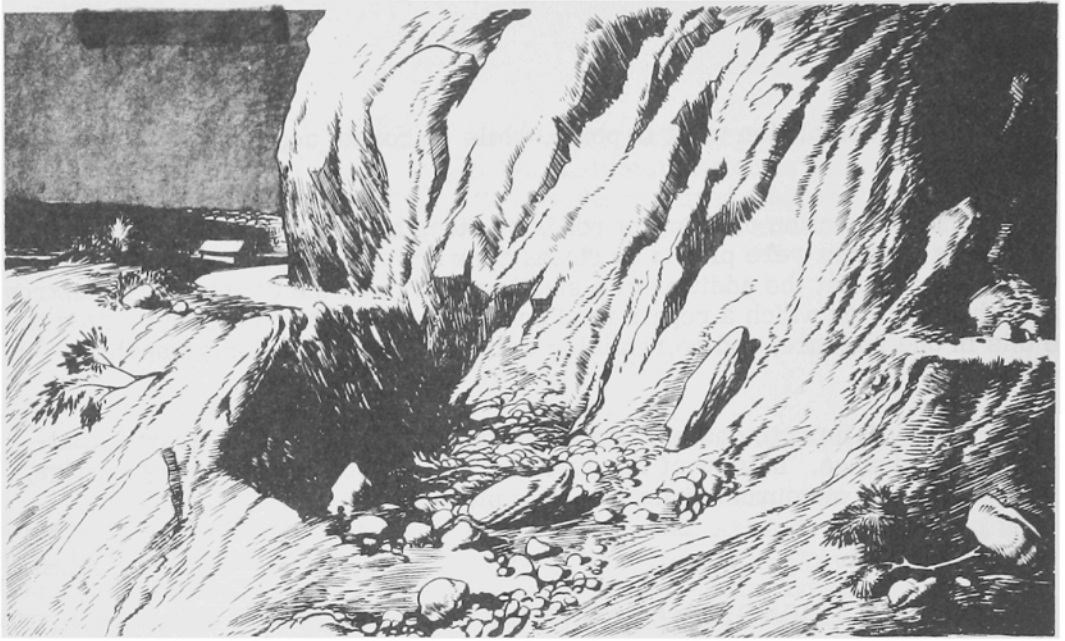
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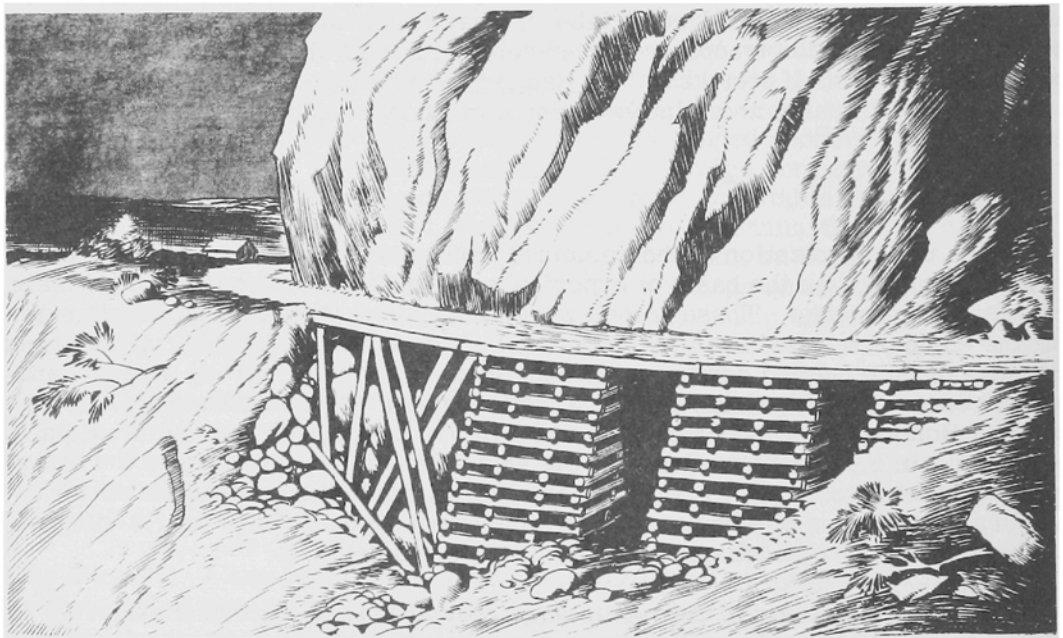
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In the organization of the combined arms, the German construction troops, newly established on the basis of experiences in the Polish campaign, have their clearly marked tasks. These troops were created for relieving and supplementing the engineers, who have great responsibilities in the modern war of movement. Because of their varied combat missions, such as attacking across streams and against enemy fortifications, the construction troops are trained to perform the construction work that becomes necessary in overcoming natural and artificial obstacles. In close cooperation with the engineers, this work includes the clearing of obstacles (concrete, rail, post, and tree obstacles), the filling of shell craters on the lines of advance, the opening of passages through debris-littered communities and, if necessary, the building of road detours.

Another mission is the repair and constant maintenance of the heavily taxed advance and supply roads. To take the place of highway bridges demolished by the enemy, the construction troops must build heavy bridges of from 16 to 24 tons capacity for accommodating all army loads. Thus, in the war of movement



BEFORE "The German advance through the Vosges led from Colmar to Gerardmer by way of the road along the ravine pass. The French tried to hold up the German advance. With tremendous dynamite charges they blasted the rocky road before their withdrawal. Where previously a normal automobile traffic prevailed, after the blasting there yawned a tremendous crater in the rock."



AFTER. "After six days of work the wooden bridge with a capacity of 16 tons was finished. Even the Fuhrer has taken note of the outstanding work of the army construction troops, as typified by this job, stating that their capabilities of use are practically unlimited in spite of the lack of years of experience."

they create the prerequisites for the forward push of the modern, far-ranging, motorized army. The rail construction troops assigned to the railway engineers attend to the reestablishment and resumption of operation on demolished stretches of track. The fortification construction troops are utilized under the local fortress engineer service-posts in the building of permanent fortified zones.

Not only in building the West Wall, but also especially in execution of our attack operations against our western enemies, the construction troops have been thoroughly tested. By their readiness for service and their technical efficiency, they have contributed to the operations of the German military forces. Even in the reestablishment of utilities service in demolished installations (water, electric power, and gas works) and in the case of canals blocked by sunken ships in enemy territory, the construction troops have given valuable aid. Adequately equipped even for infantry missions, exceptionally efficient because of their training as skilled workers, these troops have shown themselves to be an indispensable auxiliary arm of great versatility in the general organization of the German Army.

11. GERMAN SAFETY-FUZE IGNITERS

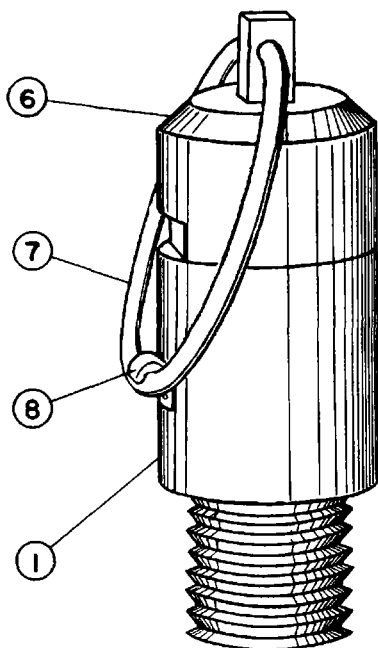
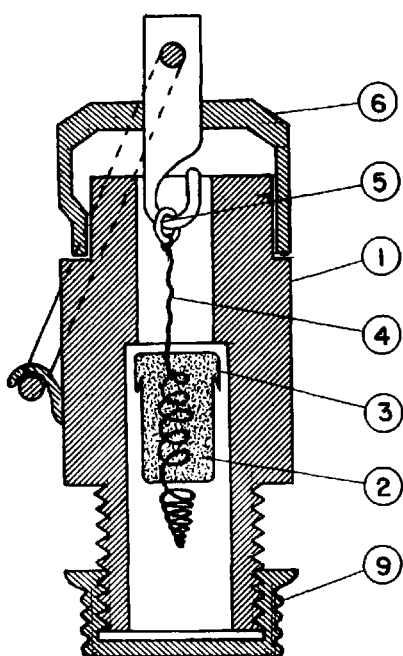
The development of mines as an offensive-defensive weapon has been one of the outstanding features of this war. The importance to all arms of a working knowledge of enemy mines and mine devices cannot be over-emphasized. In a report from the Middle East, the appearance of the Zdschn. Anz. 39 (abbreviation for Zündschnuranzunder--safety-fuze igniter) is noted. It appears that this igniter is to replace the Zdschn. Anz. 29 for normal demolitions. Both of these igniters are illustrated in the accompanying sketches.

a. The Zdschn. Anz. 29

The friction igniter Zdschn. Anz. 29 is normally used for the ignition of safety fuze. When prepared for use, the safety fuze is pressed into one end of a brass tube, and the igniter is screwed to the opposite end of this tube. This igniter has been used with smoke candles, with Tellermines as an initiator to booby traps, and as an initiator when prepared charges were used in hasty demolition. The Tellermine booby trap consists of a detonator which screws into the side or base of the mine. The detonator is attached to the igniter by a short (2 1/2-inch) length of safety fuze. The ring of the igniter is pegged to the ground below the mine.

The body (1--see sketch) of the Zdschn. Anz. 29 is made of brass and contains the copper tube (2) closed by the cap (3). The friction wire (4) passes through the tube which contains the friction composition. The wire is tightly coiled at its lower end to form the resistance to the pull. The other end of the wire (4) is attached to a hook (5) which is soldered into a slot in the cover (6). In order to prevent any rotation of the friction wire, the cover is deeply indented into a corresponding recess in the body of the igniter. A split ring (7) is secured to the body by a curved brass clip (8). When not in use, a protecting cap (9) is

usually screwed on the base of the igniter. This igniter is placed in operation by removing the ring (7) from the brass clip and pulling it. The friction wire (4)



ZDSCHN. ANZ. 29

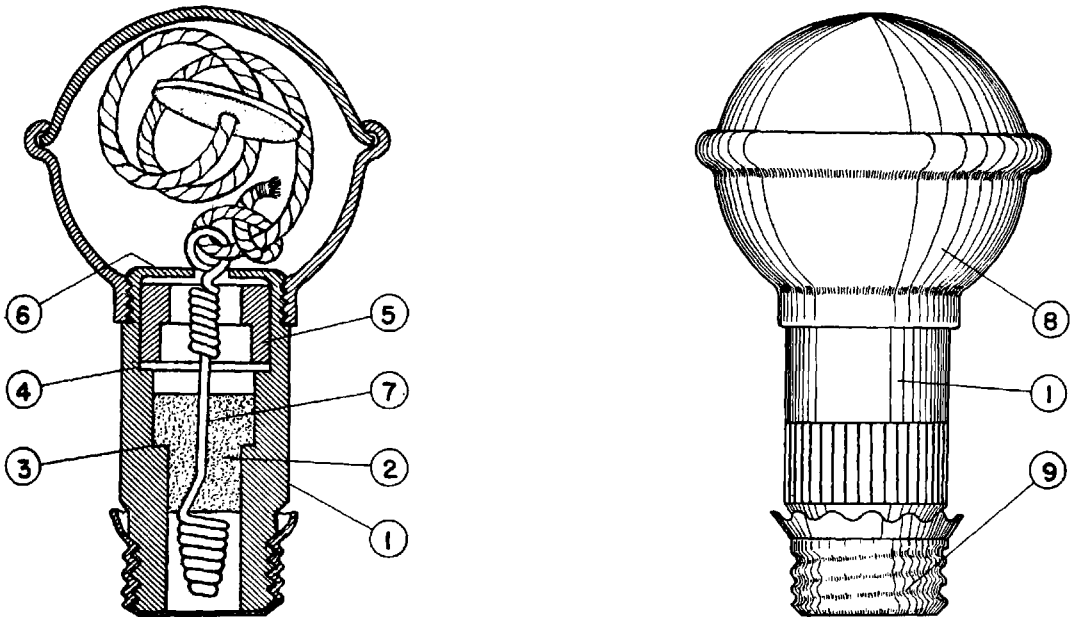
ignites the friction composition. To neutralize the igniter if the ring (7) is free, the cover (6) should be secured to the body by a piece of insulating or adhesive tape.

b. The Zdschn. Anz. 39

The Zdschn. Anz. 39 is used primarily for ignition of safety fuze in normal demolitions. Its use in improvised mines and booby traps, although not impossible, would be inconvenient because of the absence of a suitable means for attaching a trip- or pull-wire.

The body (1--see sketch) of the Zdschn. Anz. 39 igniter has the same dimensions as that of the Zdschn. Anz. 29, and encloses the friction composition (2) which is contained in a copper capsule. This capsule is retained within the body (1) by an internal shoulder (3) and a disk (4), which is secured by a collar (5). The collar is itself secured by the top of the igniter body which is pressed over circumferentially at (6). The friction wire (7) runs through the friction composition and is coiled at its lower end. At its upper end, it is attached to the cap (8) by a short length of cord terminating in a disk. The cap (8) screws on to the top of the igniter. In transit, a brass screw cap (9) of standard type serves to

protect the friction composition. To fire the igniter, the head is unscrewed and the cord pulled, thus forcing the friction wire through the friction composition.



ZDSCHN. ANZ. 39

The safety fuze to be ignited is attached in the same manner as for the Zdschn. Anz. 29 described above.

12. LAND-MINE LAYING FOR ROAD OBSTRUCTION

The following methods of tank obstruction have been adopted by the Germans in the Middle East.

a. Tellermine's

In all cases, these were used for roads, laid in potholes to a depth of 2 to 4 inches and covered with sand. In some cases they were laid half on the shoulder of the road and half on the road where the surface had broken away.

Two antilifting methods were used:

(1) A small made-up charge was buried under the mine, complete with pull-igniter and length of wire. The wire was attached to the handle of the mine.

(2) The pull-igniter was screwed into the base of the mine and attached to a wooden peg with a length of wire. In a few instances, it was found that Tellermines were buried below normal detector capacity in what appeared to be potholes squared out for refilling with road surface.

b. French Mines

These were laid on the roadside, in cuts through sand-dunes, and were covered up to look like a normal bank of drift sand. They were laid in nests of up to eight mines to a nest, and to a depth of 18 inches. All mines were laid normally, and in no instance were they connected collectively or individually to antilifting devices.

c. "S" (Jumping) Mines

These were fitted with three-pronged igniters and were used entirely as antipersonnel, in shoulders, loose sand-cuts, and areas where vehicles might detour from the road. In all cases they were well buried to ground level.

d. "Dummy" Mines

To retard the speed of clearing, the enemy buried old cans and pieces of metal well down in potholes but not too far for the detectors to pick up. This had the desired effect, for it undoubtedly retarded progress. Also, heaps of wet sand were laid at the side of the road to look like filled potholes.

e. Craters

In all cases craters were in culverts blown by approximately 15 shells, detonated by a small charge and a length of fuze. The result was an effective crater, the complete width of the road and 4 to 5 feet deep. Tellermines were laid at a radius of about 50 yards from the center of the crater, where vehicles would normally make a detour in order to return to the roadway. They were buried either with or without antilifting devices. "S" mines were not found in the crater itself, but up to three per crater were found in the loose soil around it, and in the road shoulder about 10 feet from the edge of the crater.

13. RUSSIAN DEFENSES BEFORE MOSCOW

A brief description of the Russian line of defenses in front of Moscow has been translated from an authoritative German military publication. In the account below, it will be noted that the numbers refer to defense zones on the sketch map.

* * *

Twenty-five miles was the depth of the defense zone which the Soviets had built in front of their capitol to block the way of the German armies. Seven

different systems, some very narrow, some in depth, were designed to make the obstacle zone impregnable (see sketch map). At (1) on the map is a long line of flame-throwers (figure 1), of which the tanks were buried in the ground with only the nozzles extending above ground level. On the approach of German soldiers, these devices were to be electrically fired from a hidden bunker.

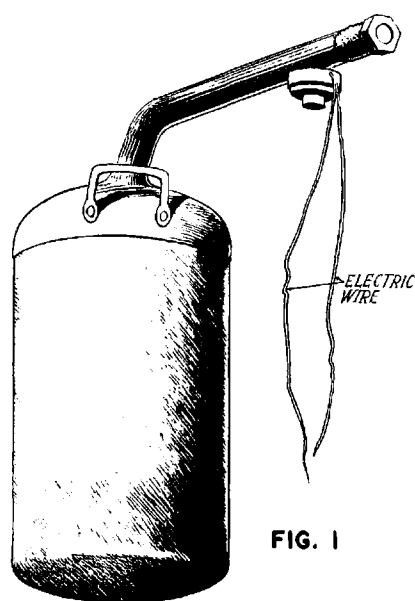


FIG. 1

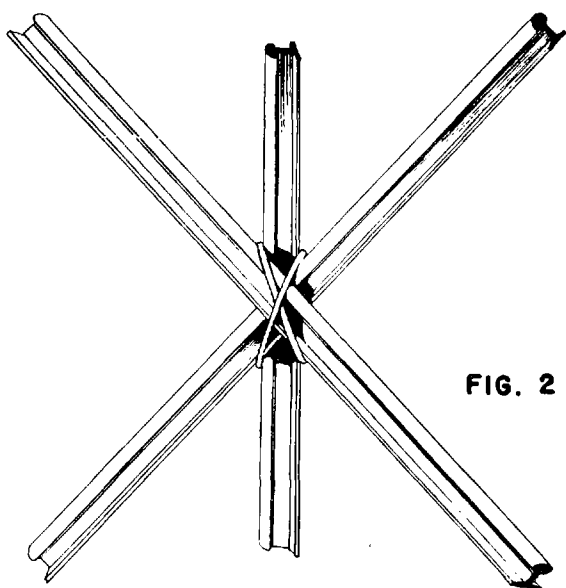
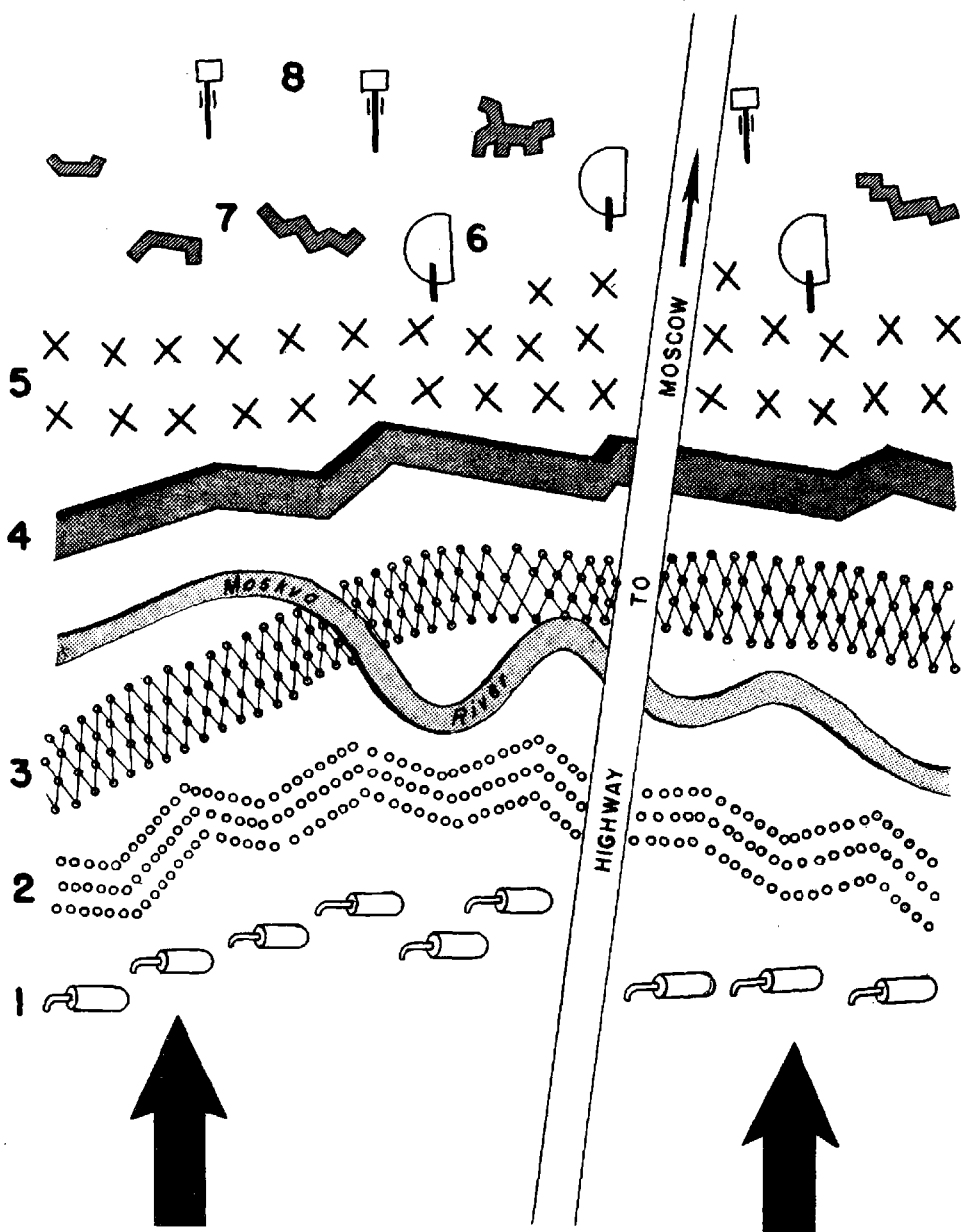


FIG. 2

A deep system of trenches set with upright logs to trap tanks is indicated on the sketch map at 2. The German troops called them "asparagus beds." In addition to the log obstacles, the trenches were heavily mined. Closely adjoining this antitank trench to the rear, along the swampy tributary of the Moskva, was another zone (3), 1 kilometer deep, made up of wire obstacles. Then followed a tank trap (4) in the form of a deep antitank ditch several meters wide. The next defense zone (5) consisted of endless rows of chevaux-de-frise, made of sections of railroad rails welded together (figure 2). Only then were found bunkers (6) of all kinds, and field fortifications (7) as well as artillery emplacements (8).

Comment: In spite of the elaborate nature of this defense system, the Germans assert that it was successfully penetrated. However, the outcome of the operation indicates that the penetration was limited.

SYSTEMS OF DEFENSES BEFORE MOSCOW



INFANTRY

14. GERMAN COMBAT EXPERIENCES IN RUSSIAN WOODED COUNTRY

In many respects, combat in woods is similar to that in towns. Some woods, owing to their location and size, are naturally strong defensive areas. The Germans, it is supposed, derived considerable experience in this kind of warfare during the fighting on the Eastern front. Some of these experiences, based on German sources, are recounted in the following paragraphs.

a. Characteristics

Training for fighting in wooded country not only improves self-confidence and ability for decisive action, but is at the same time good practice for fighting in darkness and smoke.

The Russians show extraordinary powers of resistance when fighting in marshy and wooded country. They make full use of their exceptional sense of direction and masterly camouflage. They use woods to a large extent, not only for approach, but also in defense, tending, in that latter case, to defend the edges of the wood strongly. The Russian does not give up easily, and therefore the attack in woods must be systematically carried out section by section. The enemy will cover trail crossings with heavy weapons. The difficulty of movement necessitates the allotment of heavy weapons and artillery to units at the start of an operation in order to avoid delays later on.

A coordinated fire plan for attack and defense is often impossible, and reliance must be put on coordinated infantry thrusts. Surprise is a more decisive factor in woods than in open country, and systematic preparation and silence in all movement are essentials.

It is easy in wood fighting to allow one's forces to be split up, especially when patrols, and flank and rear guards, have been detached. Every effort must therefore be made to keep one's forces intact. Movement should be made in deep formations.

A detailed plan must be drawn up, and when a departure from the original plan seems inevitable, permission from the next senior commander must be sought so that he can inform the supporting elements of the changed conditions and avoid any possible danger from one's own fire. (This departs from the modern practice in German tactics, which encourages flexibility of action among junior commanders, and must presumably apply only to the specific conditions of wood fighting).

The results of air reconnaissance are often inadequate, and the employment of numerous and strong fighting patrols is of increasing importance. Efficient signal communication cannot be too strongly stressed.

b. Reconnaissance

Surprise by the enemy must be countered by continual ground reconnaissance. Patrols should be sent to the flanks. Intervals should be sufficiently great (in thick woods, 150 yards) to prevent a patrol from hearing the noise of neighboring patrols, which might often lead to confusion and loss of direction.

The arms carried should include submachine guns, rifles (preferably automatic with telescopic sights), and plenty of egg grenades; machine guns are cumbersome. Stick grenades are unsuitable as they easily become lodged in branches. Egg grenades, on the other hand, break their way through. Steel helmets should be left behind; they impair hearing.

Tasks of patrols must include the following objectives:

- Where is the enemy expected to appear?
- Where is he?
- Where are his flanks?
- How far is he each side of the trails?
- Where is his main line of resistance?
- Which trails and roads does he use?

Ground reconnaissance must clarify the following:

- Existing roads, trails and clearings, ditches, rivers, and bridges;
- Condition of the woods and their undergrowth, such as thickness and height of trees, marshy ground, rises and dips in the ground;
- Location of tree snipers.

Trails give valuable information as to the direction the enemy has taken. Branches broken off at about head height, axe marks on tree trunks, and bundles of leaves hanging in branches might be used to show the route taken by the enemy.

c. The March

Under difficult conditions the rate of march is sometimes as low as 2 to 3 miles a day. Engineers must be well forward, and special units for clearing and improving routes must be formed. The help of the local inhabitants as guides must be obtained when possible. Advance guards must be strong enough to envelop enemy forces which are likely to offer resistance along the line of march. Heavy weapons, artillery, headquarters, and signal detachments should also be well forward. Mechanized vehicles with infantry support will be used as protection where possible. Flank and rear guards must be lightly equipped to give them mobility. Antitank weapons and tank-destroying sections must be distributed along the column.

d. Approach

Leave the roads as soon as possible. The thicker the woods, the closer should be the formations. Moves must be made in bounds and covered as far as practicable by heavy weapons and artillery. It has proved worth while to have single rifle squads distributed forward and to the flanks for close-in security. When reaching clearings, trails, etc., and also when leaving woods, a halt should be made to enable patrols to make a careful reconnaissance in order to avoid surprise by ambush and tree snipers. Rifles, submachine guns, and machine guns must not be carried slung, but must be ready for immediate use.

e. Attack

(1) General

In order to effect surprise, feint attacks can often be usefully carried out in woods. Every effort must be made to effect a flanking movement, the enemy being held down frontally by the fire of heavy weapons while strong forces envelop the flanks.

Fire discipline is very important in wood fighting. Irregular, single bursts of rifle and machine-gun fire are of little use. The fire must be controlled in short and heavy bursts. A strong burst of fire has a big moral effect. When the attackers come under fire from the enemy, which will be at quite short range, it has been proved less costly if the attackers rush the intervening ground than if they take up positions and exchange fire. It is no use, after breaking into the enemy's position, to follow up with fire alone, as a withdrawal can easily be made under cover.

The enemy must be speedily reengaged, and given no respite. It must always be remembered that ammunition consumption in wood fighting is heavier than in the open.

(2) Attack against a Weak Opponent

Flanking movement is generally easily accomplished without great loss. Sound signals are best used, as visual signals are readily missed.

(3) Attack against a Strong Opponent

Assault troops armed with close combat weapons and supported by flame-throwers must break into the enemy's position and effect a narrow penetration. It will often pay to make a surprise breakthrough without first opening fire. Heavy mortars and single light infantry and antitank guns will generally be allotted to the rifle companies. Antitank shells can be used very effectively in woods. Numerous observers must be placed well forward to direct the artillery.

f. Clearing a Wood

Combing through woods over a wide area with intervals of a few yards be-

tween each man has been proved ineffectual, because there is always the risk that the enemy having concentrated his forces can easily break through the weak line. The rule must be to keep one's forces together and send in strong assault support from various directions with the aim of encircling the enemy. This must be the subject of very careful and coordinated planning on a time basis. Attempts to break out of the wood must be countered by covering the edges with fire from heavy weapons and artillery, as well as by the employment of tanks and assault guns.

g. Defense

To avoid being surprised there must be constant reconnaissance; it is wrong to wait for the enemy to approach under cover; it is right to search him out and destroy him wherever he is. The very mobility of the defense deceives the enemy as to one's strength and intentions. Reserves must be ready to make counterattacks. Woods offer numerous possibilities for obstacles in depth; these hold up the enemy or divert him to routes favoring defensive fire. If time is too short for construction of continuous defensive positions, every effort must be made to arrange strongpoints of resistance, with all-around defense if possible. These should be surrounded by mines. Weapons should be placed 30 to 50 yards behind the edge of the woods, so long as visibility is not impaired. Wood defense requires a large number of observation posts, and signal equipment must be obtained from the division signal unit for the necessary links. Trails must be cleared of dry wood and other material which causes noise. Wire must be anchored to the ground; otherwise, its removal with implements such as hay-forks is possible. Listening posts must be changed daily.

h. Training

The following points in training are particularly important:

(1) Individual

Silent movement; working forward in thick undergrowth; crawling in various types of woods; visual training and indication of targets; finding direction; marking routes, and recognition of enemy markings of routes; cover and camouflage; close combat and engaging tree snipers; antitank close combat in woods; tree observers; patrols; pickets; firing in woods.

(2) Heavy Weapons

Transporting heavy weapons; rapid emplacement; creating fields of fire; observation and keeping contact; reporting targets; fire coordination.

(3) Engineers

Building bridges and dams, and clearing paths and trails in marshy ground;

rapid removal of tree obstacles in depth; building wire and tree obstacles; building observation posts; preparing gun positions and making clearances in the field of fire.

(4) Formations

Formations for movement and fighting in woods; marching to the sides of trails and by night; movement by bounds; quick deployment; surprise with light and heavy weapons; attack on limited objectives, coming under enemy fire; break into enemy position, and quick exploitation of success; defense alarms; reserves counterattack; security at night.

15. SOME BRITISH OBSERVATIONS OF JAPANESE TACTICS

From a very recent British report, the following observations on Japanese tactics have been selected. Quite possibly, some or many of the details are already known to our troops, but there appears to be much of general interest in these notes. It is worthy of mention that the British are making use of our experience as we are of theirs.

* * *

a. A Hint about Pass Words

The old Japanese trick of using the language of our troops to try and discover our positions has again been used in Burma.

One voice was heard shouting in Bengali "Don't shoot, we are the--Rifles. Where are you?" On other occasions English and Urdu (a Hindu language) were used.

It is, however, generally quite simple to distinguish whether friend or foe is calling, as the Japanese find many of our words impossible to pronounce correctly.

The following short table indicates the manner in which the Japanese would pronounce certain groupings of English letters. Note that they substitute "r" for "l," "su" or "za" for "th," and "b" for "v."

Words employing any two or all of the letters would certainly be mispronounced by Japanese. It is useful to bear this in mind when formulating pass words.

<u>English Letters</u>	<u>Japanese Phonetic Pronunciation</u>
La	Rah (soft r)
Ly	Rye (soft r)
Th	Su (soft s as in "soft")
The	Za or Zeh
Very	Bedy (y like double "e" in "see")
Velvet	Berubet

b. Reconnaissance Methods

A number of Japanese documents from fighting areas show how the Japanese stress the importance of reconnaissance.

Scouts are instructed to sketch hostile dispositions from observation posts and to bring back their reports without taking any unnecessary risks. Urgent reports, it is stated, must be made by telephone or orally and afterwards confirmed by sketch maps. In reconnaissance much use is made of all available natives.

In New Guinea the primary task of reconnaissance was the pinpointing of positions: personal reconnaissance by officer patrols took place. Preparations for night attacks in Guadalcanal included the sending out of scouts "since enemy security during the night is not always sufficient." Officers were ordered to "study aerial photographs and reconnaissance reports in detail, remembering outstanding features in the area to be attacked."

c. Approach through Jungle

The following extracts from a divisional order secured in Guadalcanal illustrate the detailed precautions taken by the Japanese when approaching a combat area.

"Even though the march through dense forest at night is planned beforehand, there are naturally many occasions when maintenance of contact is difficult. For this reason, during movement at night lights should be used. It may be necessary to use glow worms taken from dead trees to maintain contact:

"If one man is ordered to carry out the work of cutting away the undergrowth through the dense forest, the march will be impossible. A squad of 30 men and an officer is necessary as a clearing squad under jungle conditions to keep the column moving.

"Contact in the forest must be maintained by the use of a small whistle, and it is very important not to shout. The enemy often sets up a microphone on elevated ground and directs his artillery fire when our position is known."

d. Camouflage

In certain instances, gun emplacements have been camouflaged by building up the sides of a gradual slope and coloring the whole position to correspond with the sand or soil surrounding it. The tone blending is complete, but the circular outline remains clearly visible. Overhead covering is not used on this type. In other types, overhead covers are used, the cover being a "flat" made up of a net interlaced with cut scrub. The position is none the less easily observed because of signs of activity on the trails and the tendency of the Japanese to cover only the area immediately over the gun. They also neglect to bridge the "slashed" area in the virgin scrub, which surrounds the emplacement.

In one area our troops found four well-camouflaged guns. Here, a net interlaced with garlands and strewn with small bushes to give relief was used to hide the guns. However, they were readily discernible on photographs because the camouflage did not form a complete cover. The ground surface could be seen, and the light sand, where the emplacement had been dug, revealed its position.

Dazzle painting is another form of camouflage used. The general procedure has been to paint the roof and sides with wavy zebra-like stripes of alternate light and dark colors. Usually, bands of dark and light stripes continue from the eaves, but some roofs are painted with a band of light and dark stripes up to the ridge, and with the contrasting colors from the ridge down to the opposite gutter. This latter method forms a distinct line of demarcation along the ridge of the roof and destroys the illusion. These bands do not average more than 10 feet wide, regardless of the length of the building. Another type of dazzle painting is to paint the roof and sides with spots of dark color on a light background, in a manner that can best be compared to the spots on a giraffe.

The Japanese have been relatively successful in hiding some objects by completely covering them with earth. They have guarded against detection by building a slope of low gradient, thereby achieving the minimum relief.

e. Defensive Bunkers

(1) General Remarks

The Japanese are evidently exponents of the theory that the construction of a defensive position involves a continual process of development. It is normal for a new defensive position first to take the form of a series of fox-holes, which are subsequently, if time and circumstances permit, linked together into a coordinated defense system. Such a position may well include still other fox-holes, which are difficult both to locate and to eliminate. The third stage of development takes the form of the construction of strongpoints, or "bunker" type earthworks as they have been called in New Guinea. These strongpoints, as seen in Burma, fall into two types, both of which are illustrated in the accompanying sketch.

(2) The Double-Bay Bunker

These are built in two sizes, 25 ft. by 15 ft., and 60 ft. by 40 ft. They consist of mounds of earth from 5 ft. to 12 ft. in height, with a rear entrance well recessed into the mound. Forward, a central, apparently solid, block projects to form two bays. These bays vary in size. The smaller-size earthworks form part of the main trench system, with which they are linked, but the large "bunkers" appear to be isolated.

(3) The Single-Bay Bunker

This consists of a roughly circular mound of earth about 25 ft. in diameter and 5 ft. high, with entrance at the rear, opening on to a crawl trench or the main trench system. In front is a firing-slit at, or slightly above, ground level, from 6 to 8 ft. long and about 1 1/2 to 2 ft. high. Inside there is presumably a timbered dugout partly below ground level.

Comment: Up to now these bunker strongpoints have been identified in Burma in beach defense positions only, though there seems no reason to think that they cannot be equally well employed elsewhere should any particular position warrant such a comparatively elaborate defense.

It appears that these defensive positions are normally occupied in the first instance by a platoon armed with their usual weapons--light machine guns, rifles, and grenade dischargers. A position covering a front of some 600 yards may seem a very large assignment for one platoon, but this wide dispersion seems to be standard Japanese practice in the defense.

In the later stages of development of a position, when the strongpoints have been constructed, the platoon is probably strengthened by detachments from the machine-gun company or battalion infantry gun platoon. They appear to use both the single- and double-bay bunkers as positions for their heavy machine guns. The double-bay type may also be used as covered emplacements for their anti-tank guns. This does not preclude the use of either type also as positions for the normal automatic weapons of the platoon.

16. JAPANESE TACTICS IN THE MILNE BAY OPERATIONS*

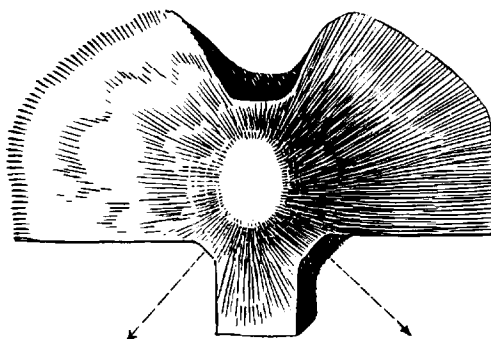
a. General

The present tactics and techniques of the Japanese have been developed as the result of combat experience against active enemies under varied conditions and over many types of terrain.

As is generally known now, the Japanese are cunning fighters, skilled in the use of ruse and deception. They are well trained in the tactics of infiltration,

*Based on British report.

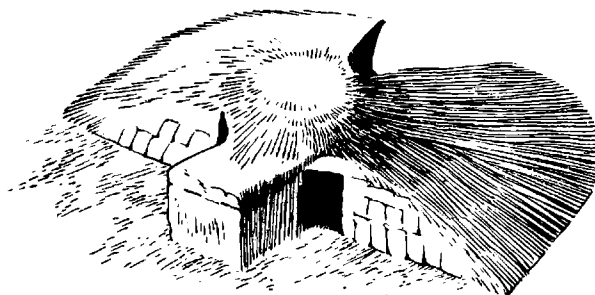
THE DOUBLE BAY "BUNKER"



Plan view

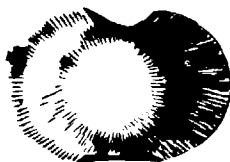


Front elevation



Oblique view

THE SINGLE BAY "BUNKER"



Plan view



Front elevation



Oblique view

especially in jungle and mountain country. Their favorite maneuver is the turning of an exposed flank. During the entire Milne Bay operation (see Tactical and Technical Trends, p. 28, No. 22 for previous reference to this operation), Allied flanks were never secure, because the Japanese had practically complete immunity by sea and so could make landings at any chosen point.

While it is true that the tactics employed at Milne Bay should be regarded as applicable to a particular terrain rather than as representing the normal situation in jungle warfare, yet the principles illustrated and the lessons learned are of general application.

b. Patrols

(1) Strength

From Japanese sources it is learned that in this operation the patrol strength for special tasks was one officer and six enlisted men, or one non-commissioned officer and three enlisted man. Normal night patrols numbered 18 men or more, while day patrols averaged from 6 to 10 men. In general, these patrols moved as a body and kept to the trails. Combat patrols were not employed by the Japanese for reconnaissance.

(2) Employment

Scouts made use of the thick jungle to approach our defense areas, or were left in position when the enemy withdrew from a night attack. In general, they would lie "doggo" and unobserved in order to get information to their troops. They allowed our patrols and working parties to pass unmolested.

c. Night Operations

The Japanese force relied almost entirely on night operations, for which it appeared to have been well trained.

There were no Japanese attacks by day and movement was limited. This might have been due to our complete command of the air. The main Japanese body rested by day with little regard for local security.

d. Approach March

During the approach march, the Japanese moved rapidly, in groups of 20 to 30, with little regard to flank protection. The main line of advance was the road or beach. Bodies of troops did not seem to have moved more than 300 yards from the road. A speed of movement was achieved which would have been impossible if an attempt was made to secure the flanks. Enemy troops talked a good deal during the approach march, but were careful about lights. Absolute silence was maintained just before the attack and while assembling.

e. Night attacks

During the assembly for the attack, Japanese troops tended to bunch up. Once the attack began, they made all the noise possible by firing mortars, grenades, and fire crackers, and by calling and whistling. This noise was made not only to draw our fire but also in an attempt to demoralize our troops and to encourage their own.

Night attacks were made on a small frontage, but mortars were fired well forward to the flanks to give an impression of a large force advancing on a wide front. The rear elements seemed to be more widely deployed for a probable flank envelopment.

When our troops opened fire, the Japanese tried to infiltrate through our flanks and rear. When in position, they attempted to rush our posts under cover of mortar fire and grenades.

f. Night Withdrawals

These night attacks were suddenly broken off before daylight. The Japanese withdrew again in chattering groups along the road. In two instances, the signal to withdraw was a bugle call. Snipers and observers in trees close to our main line of resistance and along trails were left behind as they withdrew. A great deal of equipment was abandoned, but no wounded were left.

g. Sniping and Field Craft

The Japanese used tree snipers to harass our troops during the day and interfere with the advance. Before opening fire the snipers would allow our troops to approach within a few yards, or to go past. These snipers cooperated with others hidden on the ground. When our troops exposed themselves to shoot at tree snipers, they drew fire from the ground. Other snipers lay hidden among their own dead and allowed our patrols and burial parties to go past before firing. The snipers' marksmanship was not as good as their fieldcraft.

The fieldcraft of these snipers was very good. They used foliage and body camouflage nets and secured themselves in the leafy tops of coconut palms and other trees. Their greenish uniform blended well with the vegetation. They were so well hidden that it was necessary to draw their fire in order to discover their position. Even then they were difficult to dislodge.

h. Defense

Japanese tactics in this action were mainly centered on attack. All defense positions were covered by a screen of snipers who were hard to deal with.

i. Infantry Cooperation with Tanks

At least two light tanks were used by the Japanese in this operation. Some machine gunners rode on the tanks or followed close behind. The glare of the headlamps prevented our troops from seeing these troops. In defiles, other infantry parties preceded the tanks to deal with antitank guns lying in ambush.

j. Deception

In addition to skillful fieldcraft, the Japanese made free use of English phrases in ruses to draw fire. Some were well chosen to give the impression that bodies of our troops were approaching the position; examples were "Do not fire, troops coming in," etc. However, a few of these expressions were quite inappropriate--as "Good morning" in the middle of the night, etc.

k. Recommendations by Brigade* Commanders

(1) Communications

Jungle fighting presents great difficulties for signal communication. Visual signaling is often impossible. To counteract this situation, it was recommended that a large and immediate reserve of wire and spare telephones be made available for issue to battalions in this type of operation. In all cases where lines and telephones were available, signal communication was maintained in the heaviest undergrowth.

(2) Transport

Only vehicles with high clearance and 4-wheel drives are recommended for this type of operation; also, that each company (if possible each platoon) be equipped with a light 2-wheel cart similar to the type captured from the Japanese. These carts are invaluable for rapid transport of mortar bombs, supplies, and ammunition, and in some cases for the evacuation of the wounded.

(3) Clothing

Recommendation was made that all enlisted men be issued capes equipped with cross-straps in place of the present type, which is a sort of cape thrown over the shoulders with a series of buttons down the front. It is awkward to handle, especially if the soldier is called upon to use his rifle.

(4) Ordnance

In place of drum magazines for Thompson submachine guns, it was proposed that the box type magazine be carried. Bayonets should be sharpened to a cutting edge to assist in the quick clearance of undergrowth. It was recommended that Royal Australian Air Force type signal pistols and cart-

*Brigade approximates U.S. infantry regiment.

ridges be issued, so that a more economical signal ammunition code would be established for the recognition of troops in forward areas, instead of the method involving considerable expenditure of Very cartridges. Finally, it was recommended that guns place one round of smoke on each side of the target to indicate positions to aircraft for bombing and strafing. This method was tried, and the round of smoke was placed on each side of the target according to the direction of the wind. This proved very effective, as the smoke drifted very slowly, hung about the tops of the trees, and was easily sighted by Allied planes.

MEDICAL

17. ATABRINE FOR MALARIA

Contrary to current popular impression, atabrine is not a brand-new drug for the treatment of malaria (See Tactical and Technical Trends, No. 20, p. 23). It was developed by the German dye industry some 12 years ago and has been in use for more than a decade. Tens of thousands of cases of malaria were treated with atabrine before the present war began. Careful research and extensive field tests were made to compare its effectiveness with that of quinine. It is generally agreed that atabrine is a good antimalarial drug and has no serious toxic effects. Like quinine it does not always cure malaria in one course of treatment, and also like quinine, it does not prevent infection when used as a prophylactic. Both drugs, however, given in small doses, are very useful in suppressing clinical symptoms, especially under emergency conditions such as a period of combat, when men must be kept on their feet in spite of malaria infection.

When the Japanese occupied the Dutch East Indies and thereby captured the source for more than 90 percent of the world's supply of quinine, it became necessary to conserve the present stock of quinine in order that it may continue to be available for the small proportion of malaria cases which require special treatment. To this end it has become the policy of the Army and the Navy, as well as our Allies, to employ atabrine both for suppressive and curative treatment wherever possible. In this connection it should be pointed out that atabrine is used both by the Japanese and by the Germans for the same purposes.

Atabrine is a yellow dye. Its continued use therefore usually causes a yellow coloring of the skin. This has no harmful effects, however, and soon disappears when the drug is discontinued. In a small minority of cases, atabrine may occasionally cause nausea and vomiting. These symptoms are seldom serious and can usually be avoided by taking the drug only after meals. The vast majority of people take atabrine without any unpleasant effects whatsoever.

With American and Allied armies operating in many of the most malarious countries in the world, vast quantities of antimalarial drugs are required. Since new sources of the cinchona bark from which quinine is extracted are meager, it is indeed fortunate that the synthetic drug, atabrine, is available. Without a sub-

stitute for quinine it would be impossible to carry out military operations in most parts of the tropics. Facilities for the manufacture of atabrine have been greatly expanded, and supplies for the armed forces are adequate. On the whole, atabrine is just as effective for the suppression and treatment of malaria as is quinine. Thus, the loss of most of the world's supply of quinine to the Japanese has not proved to be a serious handicap to the health of our fighting forces.

ORDNANCE

18. ITALIAN 75/27 HE FRAGMENTATION SHELL

The unusual feature of this ammunition is a "fragmentation piece," or segmented metal cylinder filled with TNT. The detonation of the shell is intended to break up the cylinder into small squares, thereby augmenting the antipersonnel effect. The shell body is of carbon steel, probably of low tensile strength, and is punched and drawn with a solid base, and the cavity is machined. There is a single copper rotating band. The nose, fuze adapter, and fragmentation piece are machined castings in gray cast-iron.

The shell may be identified by its specially processed gray surface with a 15-mm (.58-inch) light blue band, 20 mm (.79 inch) forward of the rotating band. An examination of the shell produces the following descriptive data:

Weight of shell body	6.98 lb	Length of shell body	7.97 in
Weight of nose fuze adaptor	1.87 lb	Length of nose fuze adaptor	2.16 in
Weight of fragmentation piece	3.85 lb	Length of fragmentation piece	6.46 in
Total weight (unfilled, unfuzed)	12.7 lb	Length of shell, unfuzed	9.25 in
		Length of shell in rear of Rotating band	1.48 in

19. ITALIAN 8-MM BREDA MEDIUM MACHINE GUN, MODEL 38*

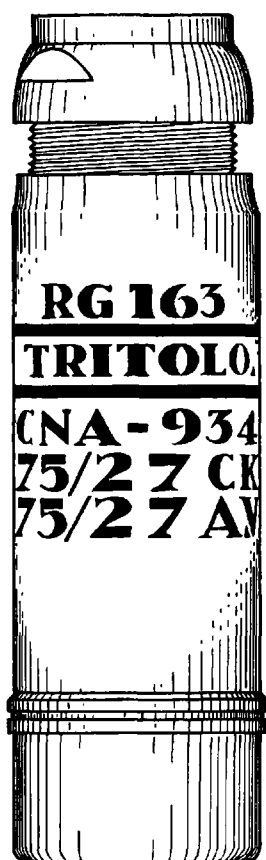
This weapon is a tank-pattern machine gun, and is fitted as standard in the following Italian tanks: the 6 1/2-ton Light (1940), the 11-ton Medium (1939), and the 13-ton Medium (1940).

The Italians have also adapted it for use as an infantry machine gun. For this purpose the gun is mounted on a machine-gun tripod (as shown in an accompanying sketch) by means of an adapter, and is fitted with a temporary rear sight on the right of the body and a temporary front sight on the right of the barrel at the muzzle. These temporary open sights take the place of the optical sight used when the gun is tank-mounted.

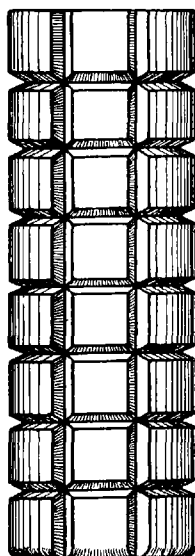
The gun is also sometimes fitted with a "cartwheel"-type AA sight and

*Extracted from a recent Aberdeen Proving Ground report.

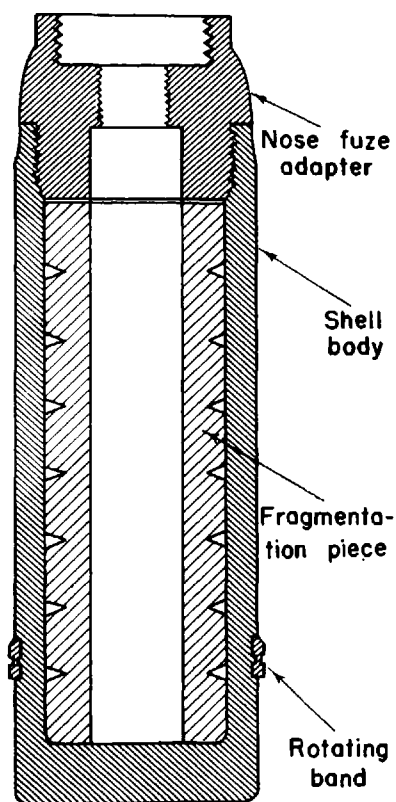
SHELL BODY



FRAGMENTATION
PIECE



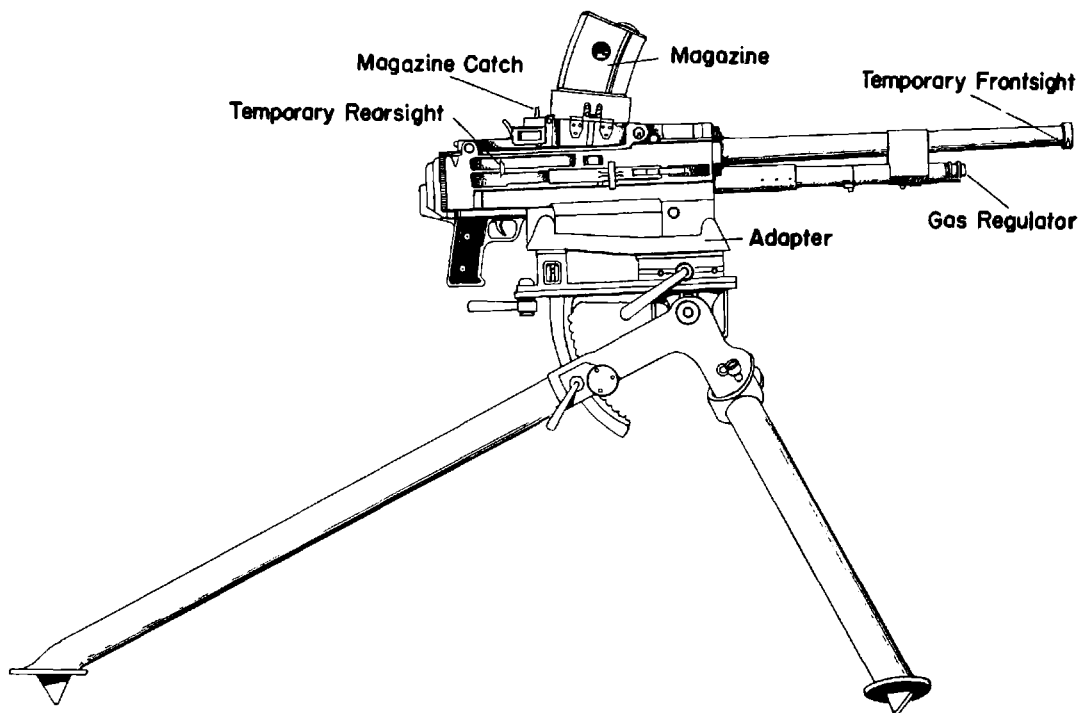
CROSS SECTION



ITALIAN FRAGMENTATION SHELL

arranged either alone or with another "twin" gun on an AA mounting.

The gun is air-cooled, gas-operated, and magazine-fed, and has a quick-change barrel. Its operational features are simple, and it is extremely easy to field-strip or disassemble completely. The barrel is sufficiently heavy (9 7/8 pounds) to enable it to fire a large number of rounds in quick succession without overheating.



The following are some of the characteristics of this weapon:

Weight of gun	33 7/8 lbs
Weight of barrel	9 7/8 lbs
Length of gun (over all)	35 1/2 in
Length of barrel	23 in
Feeding device	24-round vertical box magazine
Maximum (cyclic) rate of fire*	600 rpm
System of operation	Gas piston
Rifling - uniform, RH twist	Concentric
No. of grooves	4
Cooling system	Air

*This information has not been checked by U.S. test.

6.5 MM



8 MM



With ball ammunition, the maximum accuracy range is 800 to 1,000 yards, and the muzzle velocity is estimated to be about 2,600 feet per second. In addition to ball, the following types of ammunition are known to exist:

Armor-piercing	Green tipped
Armor-piercing tracer	Red tipped
Incendiary	Blue tipped
Tracer	Red or green tipped

It is believed that this ammunition can be used only in automatic weapons. Of the various standard Italian automatic weapons, in addition to this Breda 38, two other 8-mm medium machine guns, the model 35 Fiat (Revelli) and the model 37 Breda*, are known to use this 8-mm ammunition. The ammunition cannot be used in the standard Italian infantry rifle, carbine, and light machine guns, the caliber of which is 6.5 mm, nor can it be used in the Italian 7.35-mm Breda 38 light machine

gun** or the German 7.92-mm weapons. For a comparison of the external appearance of the 8-mm and 6.5-mm ammunition, see accompanying sketch.

SIGNAL CORPS

20. RADIO COMMUNICATION FOR GERMAN 105-MM GUN BATTERY

Recent information gathered from German sources refers to the radio facilities that are part of the equipment of these batteries. The equipment consists of two 30-watt transmitters, one mounted on an armored reconnaissance car, the other, on a truck when on the march, or near battery headquarters while stationary. In addition a battery has at least three portable transceivers known as "Fritz." This is a two-man outfit; one carries the transceiver, the other, the accessories, batteries, and antenna. Each radio set has two microphones, throat and mouth; however, the latter are preferred. The "Fritz" radio set is not a walkie-talkie and must be set up for operation. It has a range of about 5.5 miles. The battery also has direction-finding equipment.

a. Tactical Use of the Radio Equipment

The two 30-watt sets are only used when on the march. Then the armored reconnaissance car is sent out ahead and keeps in contact with the battery by radio. When in stationary position, it is stated that the 30-watt equipment was

*See Tactical and Technical Trends, No. 23, p. 25 for a description of this gun.

**This weapon has not been encountered in combat.

not used and that no radio net existed among the various batteries; only telephone was used.

Two advanced observation posts are set up by each battery. The forward advanced post is equipped with telephone and radio, the radio being used only as a standby. The forward observation post reports directly to the battery, and only in emergencies will it communicate with the other observer. Direction-finding equipment is theoretically to be used to locate enemy stations, but was also used in the Libyan desert by the observers to orient themselves in case they got lost or detached from their battery. Under ordinary circumstances, so it appeared, the direction-finding device was little used.

b. Use of Codes

Codes are used by the observers. The radio-station call signs and frequencies are changed every 4 hours. The call signs are made up of letters and numbers. The signal operation instructions concerning call signs and frequencies are issued every 3 days. No authenticators are used. It is thought that changing call signs and frequencies every 4 hours is sufficient signal security. All messages transmitted to the battery headquarters and all orders to observers are sent in a prearranged code. All points in view of the observer, and the area in general, have previously been mapped and designated points given code numbers. As a result, the observer gives all points mentioned in a report in code. Reference was here made to the fact that the sending of false messages by enemy troops either to the observer or to battery headquarters would be difficult. Only fire commands are given in the clear; otherwise, code is strictly used. The only exception to this is the case where the officer originating the message signs a statement that he wants it sent in the clear.

The statement was made that considerable trouble was experienced because the German radio equipment was not watertight. It was felt the British equipment was superior to the German in this respect. It usually took 3 days to get a set back when it was sent in for repairs. Other than the equipment getting waterlogged, no troubles were encountered.

GENERAL

21. PRISONERS OF WAR USED FOR PROPAGANDA

According to a captured South African recently released by the Germans, PWs are invited to speak over the German radio. It is thought that involuntary recordings of interviews with PWs have been made for propaganda purposes. A member of a German propaganda company circulates among the PWs asking them to repeat their name and rank and state how they have been treated. The propagandist has been observed to carry a mysterious little box, and it is believed that he recorded the answers by pressing a button on the box. The result in many cases provided a continuous broadcast of short interviews, featured by the German radio.

22. NOTES ON ITALIAN ORGANIZATION

a. General

It should be appreciated in connection with all Italian tables of organization that, although rigid in intention, they are continuously changeable in fact. At increasingly frequent intervals, regardless of the fact that the last promulgated new establishment has not yet been brought wholly into effect, the Italian War Office produces another organization which is itself in most cases fated to be realized only on paper. The intentions, under the ever greater influence of German tactical ideas, are usually good, but owing to lack of the necessary equipment and to the usual bureaucratic confusion the army is generally content with an approximation of the effect intended.

b. Divisional Organization

The main point of interest about Italian organization is that the infantry division has only two infantry regiments. Reorganization in the so-called "Binaria" division (organization begun in 1926 and largely completed by 1935) was intended for the kind of warfare in which, on the official theory, Italy would be exclusively engaged--a war of rapid movement and quick decision. This Italian hope, based mainly on the fact that the Italian resources are insufficient for a long war, has not been fulfilled, and in practice the system has been found to have the serious defect that it leaves the divisional commander no reserve. Particularly in the hard-fought Albanian campaign was it noted that after a division had been involved in active operations for any time, and sometimes even after only a week, it had to be withdrawn from the line to refit. In some cases where a withdrawal was impossible, elements of one division were simply incorporated in another; this has also occurred in Africa in the case of the Bologna and Sabrata divisions. All Italian divisions in Africa were drastically reorganized in the spring of 1942. The main features of the reorganization are increased artillery and the inclusion of support and antitank weapons within the framework of infantry units.

c. "Groups"

Another feature of Italian organization which is worthy of mention is the passion for forming "raggruppamenti," or groups. This is a method of providing, for instance, a headquarters and administrative detachment for various independent batteries of artillery which are meant to operate together. Another example is provided by such formations as the "Raggruppamento Celere Africa Settentrionale" or "RACAS" (North Africa Mobile Group) which is a force of armored cars, mechanised infantry, portee guns and light tanks. The use of "raggruppamenti" is evidence of the Italian bent for improvisation and the desire to break the back of a rigid system of tables of organization.

23. EXPERIENCE IN RUSSIA MODIFIES GERMAN TRAINING METHODS

The following material is taken from a training circular issued by the German High Command. Some of the points made illustrate the influence of the Russian Campaign on German training methods.

* * *

a. General

(1) It is very important to note that battle conditions will often not be as laid down in the text books, and that therefore, junior commanders must learn to be adaptable.

(2) There is great need for more practice and training in patrol activity.

(3) When organizing refresher courses behind the lines, it is not sufficient to work out a training program allotting certain periods for certain general subjects. It is necessary to make quite sure in detail what is to be taught within each period.

(4) Men must gain complete confidence in their weapons. They must be taught not only to shoot, but also to know their weapons and prevent stoppages. Firing at dusk and at dawn, and close combat, must be practiced.

(5) Infantry must be able to lift and lay mines, and to carry out engineer jobs independent of help from the engineers.

(6) It is important that training should also be carried out at night. Camouflage and digging-in must be intensively taught.

(7) A rapid change from attack to defence and vice-versa must be possible.

(8) Infantry must be taught to rely on their own weapons in taking gun positions, concrete emplacements, and fortified houses, and not to depend solely on the heavy weapons to destroy these points of resistance.

(9) Commanders must see that troops are instructed in the use of captured weapons.

b. Infantry Training in the Field

Time will generally be very short. Training will be made more difficult by lack of experienced instructors. New drafts must at the same time be incorporated in the fighting troops. It is necessary therefore to include only what is essential for the next battle. Subjects that cannot be taken up except in long

courses must be omitted. Troops will be mainly trained in the attack.

The following factors will influence the training program:

(1) Personnel (i.e., with regard to the physical and mental state of the troops; the state of training; the supply of instructors and personnel experienced in battle; and the number and quality of reinforcements); (2) Equipment (i.e., with regard to the condition of equipment, including motor transport, repair and maintenance facilities, and facilities for completion of equipment); (3) Billeting conditions; (4) Weather; (5) Leave; (6) Special missions during the training period (security duties, guerilla hunting, etc.); (7) Probable future employment in battle.

c. Training the Rifle Company

(1) This training will concentrate on combat training and marksmanship under battle conditions. Each man must be allowed to get on as fast and as far as his capabilities let him. In this way the company commander will form a reserve of good shots, and the competitive spirit will lead each man to improve his shooting. The best shots might be rewarded with telescopic rifles. Phases of the attack from 800 yards to the final breakthrough will be practiced. This is the only way to give replacements any idea of the battle conditions they will meet.

(2) Battle Training

Battle training is a preparation for battle firing, and therefore weapon instruction is a necessary preliminary. Special attention must be paid to digging in, which must become as automatic as parade ground drill. If 4 weeks are available for training, a number of combat exercises and practice shoots will be carried out in gas masks.

(3) Physical Training

Physical training, such as obstacle races, grenade-throwing, short and medium distance running races (some of which can be run in full equipment), is a preparation for battle training, in-fighting, and therefore battle itself. Physical training and games should not be omitted even though time is short.

(4) Lectures

Lectures will be cut down to essentials. Engagements in which the company has taken part will be used instead of lectures in general tactics. The chief usefulness of talks is in the raising of morale, and in the discussion of current affairs and of the meaning and the ideals of this war.

(5) Indoctrination

Periods are devoted to National-Socialist subjects such as "Mein Kampf,"

"German Lebensraum" ("living room"), "Total War," the "New Order for Europe," and "No Sacrifice is Senseless." Other time is given to explanation of the catchwords "Plutocrats," "Jewish Disruption," and "Herrentum" (the German Master Race), also of the characteristics of our Allies, rumors and whispering campaigns as enemy weapons, behaviour toward inhabitants of occupied territory, peculiarities of winter warfare, security, and defense on a wide front.

(6) Inspections

Inspections will concern only weapons and equipment used in battle, if time is short. Clothing and the full scale of equipment will be inspected only if there is plenty of time to put everything in order. Care of boots is as important as care of weapons.

(7) Platoon Commanders

Platoon commanders will be fully occupied in training their units, and their own further training in a four weeks' course will be limited to urgent subjects, such as giving commands, etc. Company commanders must make every effort to get platoon commanders together at least twice a week, not only to discuss past training but to prepare for the future as well. Training will be made easier if it is made clear which tasks have been satisfactorily accomplished and which have not, and if training objectives for the coming week are clearly laid down.

If the further training of platoon commanders cannot be satisfactorily carried out within the company, then battalions or regiments will arrange junior leaders' courses. Fresh platoon commanders should be taught not only the spade work of platoon leading, but also the technique of cooperation with the heavy weapons in ample time to pass it on to their units.

d. Heavy Machine-Gun and Mortar Platoons

Training will be concentrated on the crews. Special attention will be paid to the following points:

- (1) Firing, and observation exercises on the black-board and sandtable;
- (2) Giving of fire orders;
- (3) Fire coordination between two sections;
- (4) Locating the target.

e. Infantry Cannon Company

As with heavy machine-gun and mortar platoons, attention will be paid to the following additional points:

- (1) Knowledge of essential terms;
- (2) Quick giving of fire commands from observation;
- (3) Forward OP shooting;
- (4) Observation and appreciation of terrain;
- (5) Practice of fire direction with companies and platoons.

f. The Antitank Platoon

The object of training is to produce reliability on the gun. Firing and aiming are the chief points.

Aiming exercises will be held for a short period each day. Manipulation of the sight, target-finding, and changing targets and sights are most important in these exercises. Success will be achieved only by constant practice until the man is completely accustomed to his weapon. Accuracy is always more important than speed.

Target practice will always have a definite purpose, for example, shifting aim from one stationary tank to another at the same range. Even if ammunition is short, target practice is still possible. More value will always be put on the number of targets being hit than on the number of hits on one target. The man must be trained to find the vulnerable point on a tank.

SECTION II

TACTICS OF STREET FIGHTING ON THE RUSSIAN FRONT

TACTICS OF STREET FIGHTING ON THE RUSSIAN FRONT

In the Battle of France street fighting played but a small part, since at no time were the Germans forced to assault an important town or city against prepared and determined resistance. Operations in North Africa have not involved street fighting on an appreciable scale. However, the story is different on the Eastern Front. The fact is that this type of fighting has been one of the significant features of operations on the Russian front since the winter of 1941-42, and it may well prove of major importance in possible future operations in Western Europe with its many cities and towns.

With a few exceptions, such as the defense of Sevastopol and Stalingrad, the importance of street fighting in centers of population on the Russian front appears to have been largely overlooked. The following British report on street fighting on this front is therefore of interest. This report is felt to be reliable and to present a good analysis of the tactical principles involved.

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a. Strategic Importance of Town Defense in Russia

Fighting for, and inside, towns and villages on the Eastern Front has developed to a point where it has become of primary strategic importance in certain phases of the campaign.

(1) Early Period: Failure to Defend Towns

During the summer and autumn campaigns of 1941, fighting inside towns and villages did not play an important role in operations. Although the Russians did put up strong resistance in and around certain key towns, like Minsk and Smolensk, on the whole the German strategy of deep and rapid encirclement forced the Russians to abandon valuable towns in an attempt to extricate their armies. Certain cities were defended with great determination, namely, Odessa, Leningrad, and Moscow - but in each case all the fighting took place at their approaches.

(2) Later Period: Towns Are Defended

(a) First Phase: German Defense of Towns

The first phase of the campaign in which street fighting became important was during the Russian offensive in the winter of 1941-42, when the Germans stemmed the Russian advance by their determined defense of key towns and villages along the whole front. The tactical setting for this period of fighting was largely determined by the peculiar climatic conditions, in that an exceptionally cold winter and double the normal depth of snow denied to the Russians all freedom of maneuver and imposed on their troops a tremendous degree of hardship. The Germans were able to keep relatively warm in centers of population and to concentrate on the defense of the main approaches, and resorted to stubborn and

costly street fighting whenever the Russians did manage to break into a town or village.

(b) Second Phase: Russian Defense of Towns

The second phase of important street fighting was during the latter period of the Russian retreat in the summer and autumn of 1942 in southern Russia and Caucasia. Throughout July and in August, the Germans had advanced rapidly and had overwhelmed Russian resistance in some sectors by local air and tank supremacy. The Russians, at first, attempted to stop the Germans by getting off the main routes of German advance and striking at their lines of communication and supply, but this only interfered with enemy progress and did not stem his advance.

The Soviet High Command then issued strict orders that all withdrawals were to stop and every town and village must be defended street by street and house by house whether it was surrounded or not. This policy was put into effect with determination and ruthlessness, and achieved virtual stabilization of the whole front toward the end of August and throughout September, October, and November. This, in spite of the fact that in the steppe-type of country in southern Russia and north Caucasia the Germans had every facility to maneuver around centers of population. However, the determined defense in depth of all key points on main lines of communication made a sustained offensive by the enemy extremely difficult. The Russians were told to fight in towns even partially destroyed by aerial bombardment, and were taught to appreciate the tactical advantage of fighting in ruins.

(c) Third Phase: Stalingrad

The third phase in the development of the tactics of street fighting centers around the Russian defense of the city of Stalingrad; this operation was of the utmost significance to the whole course of the campaign on the Eastern Front and raised the tactics of street fighting to a level of importance never before envisaged. In this case, determined street fighting inside a large and unfortified city enabled the Russians to deny to the enemy one of the principal strategic goals of his summer campaign--the cutting of Russian communications along the Volga River.

b. First Phase--January - April 1942

(1) German System of Defense

Invariably the Germans prepare a town or village, likely to be attacked, for all-around defense. There is usually a belt of field fortifications outside the populated center, with ditches, minefields and other antitank obstacles protecting all approaches, every obstacle being covered by fire according to a well coordinated fire plan. Antitank weapons and obstacles are generally concentrated along the main avenues of probable tank approach, usually in the outskirts of the town or village.

The populated center itself is fortified according to a carefully designed plan, with emphasis laid on the importance of the element of surprise in all street fighting. Certain buildings are transformed into fortified strongholds, and several such building, capable of mutual fire support, form a defense area. Streets and houses which are outside these zones are covered by small-arms fire.

The ground floor of the fortified point is usually reserved for heavy weapons: artillery guns, antitank guns, and mortars. Sometimes tanks are placed in ambush inside barns or buildings, or partly dug in along the outskirts of the town where they might be least expected and, generally, covering the approaches to a fortified zone.

Heavy and light automatic weapons, snipers, and grenade-throwers are dispersed on the upper floors and on roof tops.

Artillery and mortars are also emplaced in parks, gardens, and courtyards and are more effective in repelling tanks than in close fighting.

If one or two buildings of a fortified zone are lost, the Germans attempt to counterattack vigorously before the enemy has time to consolidate his position.

(2) Russian Methods of Attack

(a) Preparation

Through costly experience the Russians learned that it is "the surprise nature of enemy fire in street fighting that has the deadliest effect," and that it is "often more difficult to find out where the enemy strongpoints are than it is to reduce them after they have been discovered"

Hence, the first prerequisite of a successful attack on a town or village according to Russian teaching is to determine the plan of enemy defense in detail, and to prepare a coordinated plan of attack, also in meticulous detail.

Therefore, the Russians insist on the value of detailed intelligence, which must aim not only at locating the fortified zones in the town, but also determining the defensive fire plan and locating the principal weapons. The importance of discovering means of approach to the fortified zones which will afford the best cover is equally stressed.

If all this cannot be established from intelligence sources, thorough reconnaissance and even reconnaissance in force to draw enemy fire is recommended. A detailed plan of the town or village is drawn, if one does not exist, and the probable enemy system of defense is sketched in. Then the plan of attack is worked out in detail.

(b) The Attack

(1) The Approach

The Russians stress the importance of surprise. If reconnaissance has been thorough or local guides are available, they prefer to attack by night. If possible, the attack is carried out by simultaneous thrusts from different directions. A feint is made generally to pin down the main antitank weapons. Although the objective may be surrounded prior to the attack, an avenue of retreat is left to the enemy, for experience has taught that cornered Germans fight desperately and that reducing fortified buildings is more expensive in casualties than is fighting in the open. Therefore, the attempt is made to force the enemy to retreat after a number of strongholds are taken and after the probable line of retreat is ambushed.

The Russians usually employed tanks in attacking villages, but used them sparingly, and often to pin down the main defensive weapons rather than to rush the defenses and take part in street fighting. Often the tanks are thrown in from an entirely different direction from the main infantry attack, but the importance of coordinating and timing these various blows is always stressed.

Close artillery and mortar support is insisted upon. A preliminary bombardment or creeping barrage to cover the approach is not usually necessary. The main thing is to plan and coordinate artillery and heavy mortar fire with the action of other arms and, in the initial stages, attempt to distract or deceive the enemy in order to effect the maximum surprise.

(2) Fighting to Reduce Strongholds

For fighting inside villages and towns the Russians rely principally on infantrymen armed with submachine guns, hand grenades, and bottles containing an incendiary mixture. Although the importance of training all infantry units in the art of street fighting is continually stressed, it is considered advisable to train and equip special detachments of assault troops for this task. It is not known how these groups are organized and whether each infantry battalion, regiment, or division has such detachments. It is known that each detachment is subdivided into a reconnaissance force and a main body. The reconnaissance detachment ascertains the best lines of approach and the cover which will enable the assaulting forces to approach their objective. The main body specializes in assault tactics and in hand-to-hand fighting.

The assault troops are taught to avoid advancing along streets or across squares. They must find their way to their objective by using back yards, fences, and lanes, and even by making their way from house to house, breaking through walls or moving from roof to roof if necessary.

The objective of an assault group should be to isolate and reduce a group of fortified buildings which compose a stronghold, and then go on to the next objective if necessary.

The importance of effective artillery support is stressed, but the difficulty of providing it is fully realized. The following procedure is recommended. Before the attack the infantry and artillery commander agree on a preliminary, definite, and simple plan of artillery support and establish a number of Very light signals, preferably, to indicate the progress of the attack.

On the other hand, it is the duty of artillery and mortar commanders to keep in the closest possible touch with the assaulting troops and to use their initiative in giving them close support wherever circumstances permit. A proportion of guns is actually moved forward to take on targets over open sights and to take part in street fighting.

(3) Consolidation to Repel Counterattacks

The Russians have learned from experience that the German is a skillful and dangerous opponent as long as he can keep his enemy at a distance by effective fire, but that he dislikes hand-to-hand fighting. Thus if the ground floor of a building is captured, there is usually no difficulty in clearing the rest of the house, but if a strongpoint is lost and the Germans have been forced to withdraw by hand-to-hand fighting, they usually stage an immediate and determined counter-attack from a new direction.

Hence the importance is stressed of mopping up the ground taken, clearing it of booby traps and mines, and fortifying it against counterattacks as quickly as possible.

It is usual to assign the mission of fortifying and garrisoning a captured stronghold to a specially trained group forming part of the assault detachment.

c. Second Phase--August - November 1942

(1) German Method of Attack

The German methods of attack on towns and villages along their line of advance in southern Russian and Caucasia were radically different from the Russian methods under conditions of winter warfare.

Whenever the Germans expected to meet Russian resistance at a key point, they preferred to disorganize the defense by terrific aerial bombardment and rushing the defenses in their stride by a massed tank attack. Their local air supremacy and speed of advance, and the lack of natural obstacles, contributed to the surprise of such an onslaught.

(2) Russian System of Defense

The Russians gradually developed the following means of combating the German blitz tactics:

(a) To prevent the enemy from rushing the town defenses with tanks, a belt of defensive works was constructed in length outside the town. The depth and intricacy of these defenses depended on the garrison available for their defense.

(b) Inside the town, houses are reinforced and organized for defense in groups, as on the German pattern, with artillery emplaced on ground floors, in barns, squares, and parks.

(c) Particular attention is paid to antitank defenses. The Russians insist that tank obstacles to be effective must be planned with ingenuity and cunning. An ordinary tank barrier covered by fire is of little effect. The object should be to erect tank obstacles and traps so as to force the tanks to hesitate or turn and be taken by surprise. For instance, if along the probable avenue of tank approach obstacles are erected in the form of a labyrinth which would force the tanks to maneuver around and through the obstacles, this would allow the garrison to deal with the tanks effectively both by well-concealed antitank guns and rifles and by bundles of hand grenades and incendiary bottles.

(d) The principal lesson which the Russian Command had to teach their troops was that a town or village largely burnt down or even destroyed by preliminary air attacks, was even more suited to prolonged and stubborn defense than one with all its buildings intact.

The troops are taught to improvise fortified nests among ruins and charred remains of houses as quickly as possible, and to provide a number of alternative sites, all interconnected by a system of deep trenches. The debris offers greater opportunities for camouflage, surprise, and ambush than do standing buildings, is not as likely to be affected by subsequent bombardment, and is not vulnerable to incendiary attack.

(e) After the enemy has penetrated the area of the town or village, the importance of surprise counterattacks, when and where he least expects them, is stressed. In order to achieve this, it is important not to give away one's position or fire plan by movement or desultory firing; hence, practically all essential movement is restricted to the night. It is then that supplies and ammunition are brought up and the wounded evacuated.

(f) In preparing fortified positions the importance of eliminating all dead space is stressed. This can be best achieved by enfilading fire and by having mobile groups armed with submachine guns make use of available or improvised cover to attack enemy assault groups in flank and rear. The Russians make excellent use of snipers whose special task is to pick off officers and NCO's. The Germans have suffered heavy casualties among artillery forward observers, who keep in the vanguard of the assault to control the supporting artillery fire more effectively.

(g) It is never advisable to erect tank obstacles or barricades in front of firing points, because the enemy expects it and it is only likely to draw his fire.

d. Third Phase--Defense of Stalingrad

Street fighting tactics in the fighting at Stalingrad (August 26 - November 23) were on the whole no different from those outlined for phase two - both with regard to the methods of German attack or Russian defense - but the scope, intensity, and versatility of these tactics have not been paralleled in this war.

Before even reaching the city's outer defenses, which had been improvised apparently in haste and probably consisted of ordinary field defenses, the Germans pulverized Stalingrad by continuous aerial bombardment. Then followed repeated assaults supported by great numbers of tanks. This is how a German officer described these first assaults on Stalingrad:

"The attacking German troops move forward behind tanks and assault guns, sweep away barricades with gun fire, knock holes into house-walls, and crush down wire obstacles. Guns and mortars batter concealed positions, antitank guns cover the side streets against possible flanking operations by tanks, antiaircraft guns are ready to meet attacking aircraft. Low-flying aircraft and Stukas attack the rear sections of resistance in the inner town, and the supply points and routes inside the town. Machine guns engage snipers on the roofs. Covered thus, infantry and engineer assault detachments, keeping close to the walls, advance over the wreckage from street to street, break down blocked doors and cellar windows with explosive charges and grenades, smoke out the less accessible corners with flame-throwers, and comb houses from ground floor to roof. In all this, they have frequently to engage the enemy in hand-to-hand fighting."

These assaults failed to make much progress, partly due to the great quantity of artillery concentrated by the Russians, and partly due to the way in which the large number of reinforced concrete and stone buildings were adapted by the Russians for defense, even when they were in a ruined condition.

The Germans were virtually forced to give up large-scale tank attacks as being too costly, and the fighting reverted to intense street fighting between relatively small infantry and engineer assault groups, liberally supplied with flame-throwers.

The main difference between the fighting in Stalingrad and that which took place at other inhabited localities along the Eastern Front was that considerable quantities of artillery of every caliber participated on both sides. Many of the Russian batteries were emplaced on the islands and the east bank of the Volga, while others remained among the ruins of the town. The whole site of the city became a complicated tangle of trenches, deep dugouts under blasted buildings, and strongholds in ruins or in the remains of large and strong reinforced concrete buildings, such as abounded in the vast factory area. Here, the theory that the ruins of a city constitute one of the most formidable types of fortification in modern war, was proved to the hilt.