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SECTION I

1. AIRCRAFT AGAINST TANKS

Lessons concerning the employment of aircraft against tanks, as learned by the Russians in the Orel-Kursk and Belgorod battles, were outlined in an article published recently in the Red Star. The article is reprinted herewith.

* * *

Our [Russian] aviation assists the ground forces by destroying tanks on the battlefield and in the enemy rear where other antitank means cannot be used. Activity of aircraft against tanks is particularly successful when the enemy sends large masses of tanks into battle, as was the case on the Orel-Kursk and Belgorod sectors.

Combat experience on both sectors showed that thorough and systematic aerial reconnaissance is of particular value in aiding aircraft in fighting tanks. At times, this type of reconnaissance is the only one that permits the detection of enemy concentrations of tanks. Air observation by aerial photograph must be made of areas of possible concentrations, especially on the flanks of our units. Survey of the vicinity (ravines, woods and its outskirts, branching roads, etc.) may be done by night as well as by day. Raids and bombings that make the enemy "speak up" and disclose well-camouflaged and concealed positions are very helpful.

In examining and collating aerial reconnaissance reports and photographs, the commander should not confine himself to verifying only the presence of tank concentrations. It is also necessary to determine the number of tanks, their different types, their arrangement, the location of fueling trucks, transports, available cover, and antiaircraft weapons.

Enemy tanks detected by reconnaissance may be attacked immediately or later, depending upon strategic conditions. Stormoviks give the best results; they should not, however, be used according to a wornout pattern, but as concrete conditions dictate, since definite conditions of fire (distance, direction, caliber of armor-piercing shells) are required in striking armored targets.

The fire of our Ilyushin-2 Stormoviks, which have large-caliber cannon, is effective against the main types of enemy tanks. The most advantageous attacking positions for aircraft are from the rear or the side of the tank; and when diving, at an angle of not more than 30 degrees. Cannon fire against cars and carriers with 10- to 14-mm armor usually is effective. The majority of German armored personnel carriers do not have tops and are furnished with low visors on the sides. Thus, when diving, even machine-gun fire of a Stormovik may destroy the personnel. Medium-caliber instantaneous bombs are most expedient against tanks. The hit can be either direct or in the immediate vicinity of the tank.

Action against tanks should depend on the armament of the plane in relation to the targets' armor. Thus, large-caliber armament is used against tanks and other heavily armored targets; smaller caliber, against personnel and various supply equipment.

The method of attack depends upon the position of the target (tanks in columns, initial position, places of concentration, and in combat formation). For example, an attack on tanks in column should be from the rear and side. Since tanks, when moving, are spread out, each subdivision of Stormoviks should be given a definite target and should not be permitted to scatter their fire power. Some of the planes should be assigned to neutralize enemy antiaircraft fire.

In addition to the use of cannon fire, it is well to drop bombs when enemy tanks are found in places of concentration. At the same time, the commander should pay special attention to the disposition of enemy equipment including fuel and ammunition dumps.

Because of good armor protection, our Stormoviks may be used with success against enemy tanks on the battlefield. Combat experience indicates that the closed circle over the tanks is an advantageous formation to use. Since the targets are scattered, this formation gives each pilot the chance of picking out the target and of attacking it several times. The attack is made from the rear for the following reasons:

(1) It permits fire on the most vulnerable parts of the tank;
(2) The tanks are unable to counter our attacks, since their guns are pointed in the direction of our ground forces;
(3) In case of a hit made by antiaircraft guns, the plane may glide within its own lines.

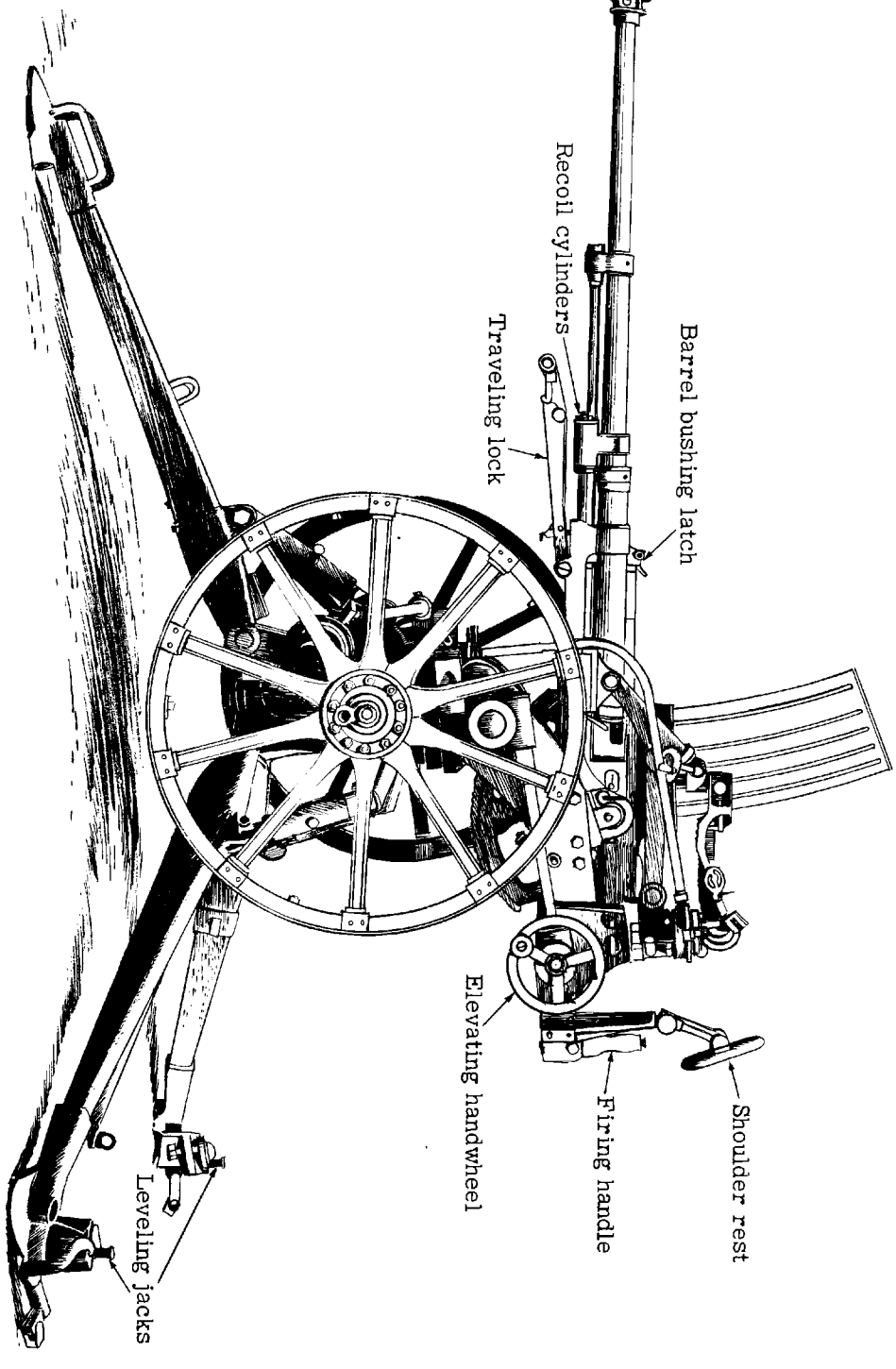
Disabled tanks which the Germans dig into the ground and use as stationary fire points during defense operations should not be attacked by Stormoviks or fighters. The ground forces attack such tanks. The chief attention of the pilots should be devoted to mobile tanks and especially those that are out of antitank artillery range.

The success of a raid depends largely on how well the pilots know the different types of tanks and how well they can distinguish them from the air. It is also necessary to be able to fire with precision.

ANTIAIRCRAFT

2. *JAPANESE AA/AT 20-MM MACHINE CANNON*

The Japanese Model 98 (1938) 20-mm AA/AT machine cannon is a weapon of unusual appearance, but with many practical advantages. The following account of the gun has been taken from Special Series No. 18, "Japanese Infantry Weapons,



JAPANESE 20-MM AA/AT MACHINE CANNON

which is in process of preparation by the Military Intelligence Division.

a. General

It is an all-purpose weapon. Because of its lightness in weight and maneuverability, it is an excellent gun for defense against low-flying bombers as well as against ground-strafing fighters. An experienced gun crew can probably place the piece in battery, ready for antiaircraft fire, in less than 3 minutes. In an emergency, the weapon could be fired as a straight artillery piece, because of its split trail and wooden wheels (see sketch).

b. Identification

The Model 98 20-mm AA/AT machine cannon may be identified by its general appearance. It is different from any other Japanese field piece, the front outrigger, the barrel traveling-lock and the marking which is on the top of the receiver are distinctive features.

(This marking, which is read "Kyuhachi Shiki" from top to bottom, means "98 Model.")

c. Characteristics

(1) General. It is automatic and gas-operated. The cycle of operation is loading, locking, firing, unlocking, extracting and ejecting; unlocking, extracting, and ejecting are done during recoil; loading, locking, and firing in counter-recoil.

The recoil mechanism consists of two spring-loaded cylinders that lie one on each side of the barrel. Air valves, located in the forward ends of the cylinders, allow air to be drawn into the cylinders during recoil; as the air cannot readily escape, it acts as a cushion during counter-recoil.

There is a vertical box-type magazine--with a capacity of 20 rounds--which fits into a slot in the top of the receiver and is held in place by a spring catch.

For traveling, towing shafts are inserted in slots at the end of the trails, and a traveling lock, which connects the forward part of the barrel to the bottom carriage, holds the gun steady in transit.

[redacted]

(2) Details

Principle of operation	gas-operated, automatic or single shot
Ammunition	high explosive, tracer, and armor-piercing
Type of feed	20-round magazine
Length of barrel:	
With muzzle brake	57 1/2 in
Without muzzle brake	55 1/8 in
Over-all length of gun with trails folded	180 in
Total weight of gun without wheels	836 lbs
Maximum horizontal range	5,450 yds
Maximum vertical range	12,000 ft
Muzzle velocity	2,720 f/s
Traverse without wheels	360°
Maximum elevation	85°
Minimum elevation (depression)	-10°
Rate of fire	120 rpm
Length of recoil	adjustable from 2 in to 2.5 in

d. Operation

(1) Safety. There are two safety features; (a) the lock on the firing handle, to the left and rear of the gun, must be depressed before the handle can be moved forward; and (b) the manual safety mechanism, to the rear and upper right side of the receiver must be turned counterclockwise before the weapon can be fired.

(2) To place the gun in firing position: Set trails and outrigger in the ground. Swing the eccentric (crankshaped) axle so that the weapon is resting on the trails and outrigger, and the wheels are clear of the ground. Then the wheels can be removed by releasing the spring catches, which lock them to the axle.

(3) The elevating handwheel is at the left rear.

(4) To traverse. Traversing can be done by the gunner by putting his shoulder to the shoulder rest at the left rear of the weapon.

(5) To load. Place a loaded magazine into the slot on top of the receiver. The first round can be pushed into the chamber by pulling the handcharging lever into the rear and then forward. (The handcharging lever is at the right of the receiver.)

(6) To fire. Press the lock on the firing handle and move the firing handle forward. Automatic or single-shot fire may be chosen by moving the selector

switch at the right rear of the sleigh.

(7) To unload. If there is a misfired round in the chamber, pull back the handcharging lever in order to extract and eject the round.

e. Ammunition

There are two types of ammunition, high-explosive and armor-piercing.

(1) The high-explosive ammunition has an abnormally large brass cartridge case, and a black projectile body. A green and yellow band are painted together around the middle of the shell, and a red band just below the bourrelet.

The complete round weighs 14.5 ounces, and is 8.187 inches long. The brass nose fuze is point-detonating, bore-safe, and supersensitive. There is a tracer compound in the base of the shell.

(2) The complete armor-piercing round is 8.183 inches long. Both the high-explosive and the armor-piercing rounds are wrapped individually in cardboard containers. The armor-piercing ammunition is packed 70 rounds to a wooden box.

The fuzes for the high-explosive round are wax-dipped, covered with a metal cap, and paper-wrapped. The wrapped fuzes are packed between holes in boards mounted in an unlined crate, and shipped separate from the rest of the round.

f. Maintenance

(1) Oiling and cleaning. This gun should be given the same care as U.S. machine guns and automatic cannon. The bolt parts may be oiled lightly, except in dusty or sandy countries, and then not at all.

(2) Stripping: (a) The barrel is keyed to the receiver by a set screw. When this set screw is loosened, the barrel may be freed by releasing a latch on the rim of the barrel bushing, and turning the barrel about one-sixth of a turn. The gas cylinder yokes will come out with the barrel as one assembly. (b) Place the bolt in the forward position with the handcharging lever. Remove the receiver rear-plate assembly and slide the bolt out to the rear.

g. Accessories

There is a carrying case for the sight, also a small box containing a quantity of headspace washers. The ammunition is carried in a caisson which may be horse-drawn.

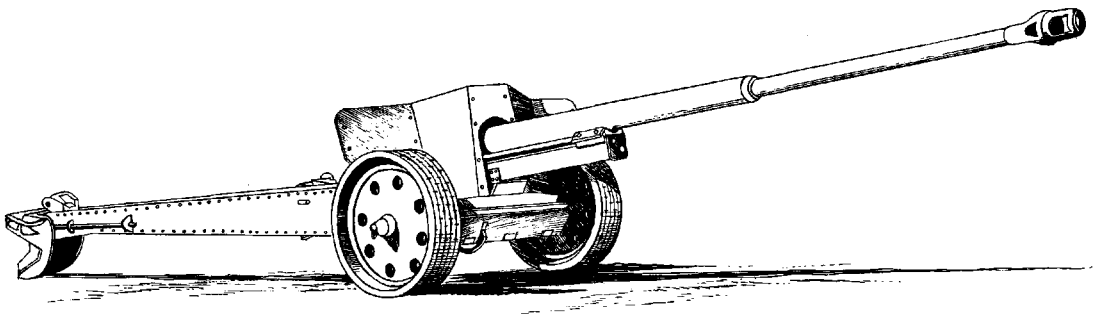
The sight-mount carrying case contains the following items: main part of apparatus, glasses, colored glasses, lighting apparatus, rain cover, small camel-hair cleaning brush, towel, oil-can and three brushes.

[redacted]

ANTITANK

3. NEW GERMAN 88-MM AT GUN

A photograph has been obtained of what is presumably a new AT gun. Although it is not possible to give accurate details of the weapon from the illustration, the barrel bears some superficial resemblance to that of the 8.8 cm Flak 41 (see Tactical and Technical Trends No. 29, p. 5) while the carriage shows considerable similarity with the mount which is interchangeable between the 105-mm gun (10.5-cm K-18) and the 150-mm medium field howitzer (15-cm s F.H.*), both standard equipment for the German infantry division. It seems probable, therefore, that the weapon is the Pak 43, which is believed to be the barrel and recoil assembly of the 8.8-cm Flak 41 on a field mounting for use principally as an antitank gun, with no AA role, and with which the name "Hornet" has been connected.



NEW GERMAN 88-MM ANTITANK GUN

The accompanying sketch has been made on the assumption that the barrel of the 8.8-cm Flak 41 fitted with a muzzle brake is, in fact, mounted on a modified carriage for the 105-mm gun and the 150-mm howitzer, with the addition of a low shield. It will be noted that the recoil cylinder and recuperator are now mounted below the barrel in accordance with the German antitank gun practice. In the sketch, the trails are shown as fitted with small ice spades and mount the large spade in the carrying position.

ARTILLERY

4. JAPANESE ARTILLERY IN THE ARAKAN

a. General

Actual contact with the enemy tends to dissipate the illusion of his power. This illusion is often present in the mind of a soldier until he has been in action. The following observations on Japanese artillery combat in the jungles of southwest Burma, drawn from a British officer's report, points up the foregoing conclusion.

* * *

*schwere Feldhaubitze-medium field howitzer

The outstanding fact about Japanese artillery in the latter part of the campaign was its inactivity. For the 30,000 shells fired at the enemy, he replied to this regiment with only some 400 rounds. These were mostly fired by 75-mm mountain guns. Moreover, the firing of his guns was such an event that regimental headquarters was always snowed under with requests for sound bearings, times of flight, etc., within a few moments of commencement of firing. To meet such requests, all compasses in the supported infantry brigade should always be calibrated by regimental headquarters as soon as possible. In some cases strenuous efforts on the part of the artillery were necessary to convince infantry battalions of the necessity of adding their own observations to those of the artillery. In other cases, infantry battalions seemed poorly equipped to do so.

Based on the many reports received, a fair amount of data was made available; this applied equally to the 75-mm mountain and 75-mm regimental gun, but not to the 70-mm battalion gun, of which little is known, apart from the fact that an artillery prisoner of war said it was useless.

b. Specific Observations

(1) Tactical. The gun is located often singly, with complete flash cover, (near regimental headquarters if a regimental gun), well off the beaten track. Most difficult to spot, it will always move if possible after firing. Usually its positions were out of range of the 3.7 howitzers, chosen if possible for the employment of extreme range.

(2) Technical. Registration will be carried out for some time before any particular target is engaged. Then usually only two ranging rounds suffice; however, more are sometimes required.

(3) The Gun. The Japanese piece was very accurate, with a 100% zone of about 50 yards at 7,000 yards using 50 rounds; crater, eighteen inches diameter, three inches deep; fragmentation, normal; concussion effect very small. The delay action, graze fuze, burst on small branches of trees. The angle of fall at 7,000 yards was about 38 degrees; the general effect of the shell was very small -- the sound of the burst of this gun was less than that of a 3.7 howitzer but quite like our own 2-inch mortar, while the rate of fire was very fast, up to 10 rounds per minute.

(4) Deception. One habit of the Japanese was noticed early in the campaign and frequently encountered afterwards. While our own artillery was firing on a close-in target, he opened up with his mortars on our own front line, timing his fire so that the burst of our shells and his bombs should be as nearly simultaneous as possible. Not only was our own attention apt to be distracted, thereby reducing the chances of his mortars being located, but also he obviously hoped (and on two occasions he temporarily succeeded) in making our own infantry believe that their casualties were being caused by short rounds from our own guns. [A similar deception has been reported from the North African operations.]

[redacted]

5. GERMAN 75-MM MOUNTAIN GUN

A preliminary examination of the German 75-mm Geb. G.36 (mountain gun) has been made and the following information obtained.

a. General

Caliber	75-mm
Length of barrel and breech ring	69.2 in
Length of barrel	58.0 in
Overall length of muzzle brake	12.32 in
Length of rifling	50.96 in
Rifling	Right hand polygroove
Number of grooves	28
Twist of rifling	1 in 24 uniform
Weight of barrel	233.2 lbs
Weight of barrel with breech ring top plate and breech mechanism	583 lbs
Weight of breech mechanism	68.2
Elevation	70° approx
Depression	-10° approx
Traverse	15° approx right and left

b. The Gun

Monobloc barrel fitted with perforated muzzle brake. The rear end of the piece is rectangular and fits into prepared recesses in the breech ring from which it is readily detachable. At the forward end is a binding ring with a lug which fits into a hook mounted on the cradle. A counterweight, weighing 114.4 pounds, is mounted on top of the breech ring. The breech block is of the horizontal sliding block type, opening to the right.

c. The Carriage

The saddle is shaped like a U lying sideways, prongs forward, and swings under the crosshead, being pivoted centrally. The trunnion bearings are at the extreme rear. The trunnion caps are secured by spring plungers. Traverse stops are fitted at the lower right and left rear.

The cradle is trough-shaped. A guideway extends the whole length on which a hook is mounted at the front, and at the rear, a rectangular surface to receive the forward end of the piece and breech ring respectively. A recoil indicator is fitted to the right side reading from 600 to 770, and inscribed Achtung Feuerpause 1244 (safety limit of recoil 1244 mm).

A compensator is fitted and consists of a spring-loaded cylinder situated inside the saddle. It is anchored at the forward end to the base of the saddle, and at the other end to the base of the cradle.

The crosshead consists of a rectangular shaft at each end of which are bearings to receive the trail heads. It is pivoted centrally in the vertical plane

[redacted]

to the axle and swings in slides secured to the axle at each end.

The axle is a simple straight rectangular shaft tapered at each end for the wheels. The wheels may be detached by lifting spring plungers which are situated at each end on top of the shaft.

The split trail consists of two hollow rectangular girders, prepared at the rear to receive spades, and mounted at the forward end in the bearings on the crosshead. Spring loaded plungers on top of the trail heads lock the trails in position when open. In the closed position they are locked by an arm attached to the rear of the left leg which is clamped to an attachment on the right leg by means of a rotating bolt. Two screw stops are mounted on the trail legs; when unscrewed these permit of approximately 2 degrees of traverse either way with the trail legs closed. The trail legs may be detached from the trail heads, on which they are normally locked, by means of a lever catch.

The elevating gear, on the right hand side, consists of a handwheel, universal joint, and two pinions, one of which engages with the elevating arc which is secured to the right of the cradle.

The traversing gear, on the left hand side, consists of a nut and screw device. The nut is enclosed in a cylinder attached at one end to the rear of the saddle, while the screw shaft is secured to the crosshead.

The recoil mechanism -- buffer and recuperator cylinders lie inside the cradle to the right and left respectively.

The sight bracket consists of a pillar secured to the left rear of the saddle with a trunnion at the top on which the sighting gear is mounted.

ARMORED

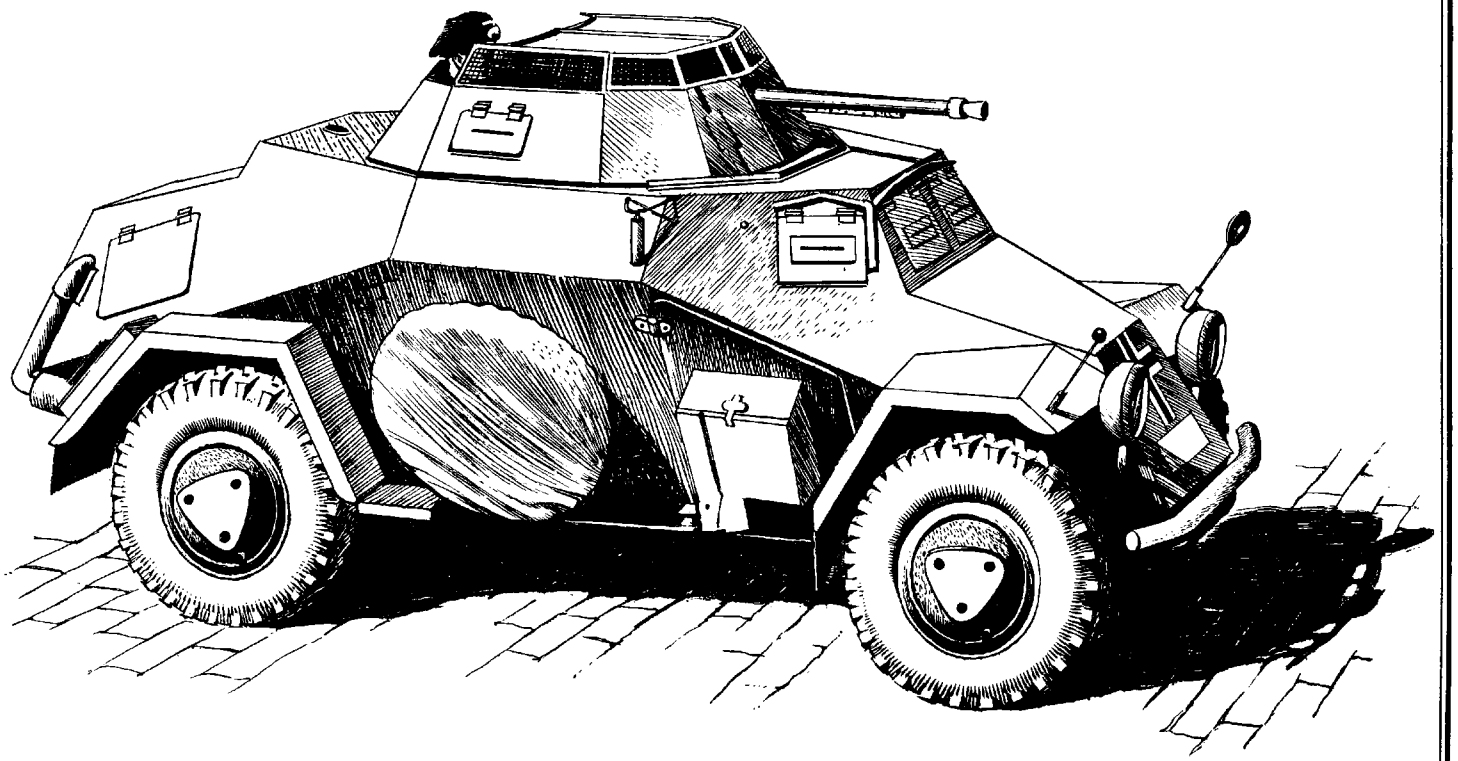
6. GERMAN FOUR-WHEELED ARMORED CARS

Four-wheeled armored vehicles used by the German army are of three main types, the Sd. Kfz (Sonder-Kraftfahrzeug)* 221, 222, and 223. (The eight-wheeled types are described in Tactical and Technical Trends p. 8, No. 32). Of these the 222 is the most common, the other two models varying slightly in weight, turret arrangement and armament. Model 222 is illustrated in the accompanying sketch. Principal differences between the three types are outlined below:

(a) Light armored car 222 (leichter Panzerspähwagen)

This carries a 2-cm. gun Kw.K 30 or Kw.K 38 mounted on a central pillar together with a coaxial 7.92-mm M.G.34 to the left and a telescopic sight for the

*Special motor vehicle



GERMAN 4-WHEELED ARMORED CAR, TYPE 222

[redacted]

gunner on the right. The firing mechanism is pedal-operated. Traverse and elevation are controlled by a single handwheel, and elevation is sufficient to permit of antiaircraft use. A submachine gun (M.P 38 or M.P 40) may also be carried. The car is equipped with a radio transmitter and receiver with a radius of about 4 1/2 miles. The turret is ten-sided, and its roof is fitted with two hinged frameworks covered with wire mesh which, in the closed position, together form a raised birdcage-cover over the roof of the turret, as a protection against grenades. There is a crew of three: commander-gunner, driver, and radio operator-loader.

(1) Specifications

Weight		
Unloaded		8,288 pounds
Loaded		10,528 pounds
Axle loading		
Front		4,480 pounds
Rear		8,176 pounds
Armor		Rolled armor plated, welded together

Turret Plate	Thickness (mm)	Angle to vertical
Front	8	35°
Sides	8	35°
Rear	9	35°
Hull		
Driver's plate	8	35°
Nose plate	8	35°
Sides (upper)	8	(30° front (35° center (32° rear
Sides (lower)	8	26°
Rear	8	34°
Glacis	6	72°
Engine cover plate	6	72°

Ammunition carried	20 mm	-	100 rounds A.P. 120 rounds H.E.
	M.G.34	-	2,000 rounds
	Submachine gun M.P 38 or 40		up to 12 magazines, each holding 32 rounds.
Miscellaneous	8 smoke candles 8 hand grenades		
Sighting arrangements	T.Z.F.* 3 A sighted to 1200 meters. A.A. course and speed sight (Fliegervisier 38).		

*Turmzielfernrohr - turret telescopic sight

[redacted]

Turret traverse

The turret, being concentric with the gun mounting, is traversed from the mounting through the medium of a linking arm, incorporating a spring shock absorber. It can be traversed through 360°.

Dimensions	
Length	15 ft 7 in
Width	6 ft 6 1/2 in
Height (to top of turret)	5 ft 11 1/2 in
Wheel track	5 ft 5 in
Wheelbase	9 ft 3 in
Clearance	10 in
Performance	
Step	9 in
Fording	2 ft
Radius of action	roads: 175 miles cross-country: 125 miles
Engine	
Maker	Auto - Union
Type	Horch V-8, gasoline
Bore	78-mm
Stroke	92-mm
Capacity	3.71 quarts
B.H.P.*	75 at 2,000 rpm
Fuel capacity	
Two 11 gallon tanks	
Consumption	
Roads	8 mpg
Cross-country	5 mpg
Brakes	
Mechanical - cable operated	
Both hand and foot brakes operate on all four wheels	
Gearbox	
Type -	crash
Ratios -	5 speed and 1 reverse
Suspension	
Type -	independent springs -- each assembly consists of two unequal length radius arms and two coil side by side arranged between lower radius arm and chassis frame.

*Brake horse-power

[redacted]

Tires		
Type	-	low pressure, cord reinforced
Size	-	8.19 x 18 in
Vision		
Hull	-	rectangular slotted visor in front plate for driver, hinged at top and opens outward
Turret	-	vision slit in each side plate. All vision devices have provision for fitting laminated glass blocks.

(b) Type 221

The Sd. Kfz. 221 has no radio, but communicates by flag signals. It mounts only an M.G.34, although a submachine gun M.P 38 or 40 is carried as auxiliary armament. It has a crew of two. The turret is seven-sided truncated pyramid, with a wire-mesh grid over the fore part only. Vehicle weight is 8,848 pounds. Fuel capacity is 24 gallons. Other specifications are the same as for the Type 222.

(c) Type 223 (Radio)

This, too, mounts an M.G. 34 as main armament, and carries a submachine gun M.P 38 or 40, like the Sd. Kfz. 221; but it has radio communication and a crew of three. A horizontal rectangular aerial is supported above the car on four uprights which can be folded downwards and backwards, giving the gunner a clear field of fire. In both positions the grid resembles a railing round the top of the car.

(1) Specifications

Specifications are the same as Type 222 except the following particulars:

Weight	
Loaded	9,632 pounds
Fuel capacity	24 gallons
Turret	Roofless forepart covered with wire mesh grid.

CHEMICAL WARFARE

7. GERMAN USE OF AREA SMOKE SCREENS

Air raids on military targets in Germany and in the occupied countries have compelled the Germans to intensify defensive measures through the use of area smoke screens (see Tactical and Technical Trends p. 8, No. 24 for previous reference to this subject). Such screens have been used to confuse our bombers by obscuring their targets and to interfere with our photographic reconnaissance.

Screens used early in the war showed progressive development but were,

*Based on information as compiled by the Office of Chief of Chemical Warfare Service.

[redacted]

in many cases, quite inadequate to conceal the places and installations which they were designed to protect. Small numbers of points of smoke emission, far apart, were characteristic except at Brest and Kiel where, over a period of time, screens of constantly increasing effectiveness were built up. Large, dense screens over Berlin were also noted in early 1941. It is probable that German experience at these places has been useful in the planning of screens for other cities, both inland and on the coasts. It is noteworthy that the smoke producers for most of the earlier screens were placed in close proximity to the targets.

Later screens show a greater similarity in technique, although there are still considerable divergences, some of which may depend on the relative importance placed on the defense of one point as against another.

Features of current activities in smoke screen defense are as follows:

(1) Daylight Screens

Coincident, no doubt, with the daylight raids of the U.S. Air Force, the Germans have been making much greater use of daylight screens than they did before January of this year. The technique appears to be the same as for night screens.

(2) Placement of Smoke Producers

An average spacing of 75 to 100 yards between smoke producers is the current practice, according to latest information. More closely placed producers have, however, been seen in several places, notably Berlin, Warnemunde, Gdynia and Foetten Fjord. In no place does it appear that any system of equal spacing is rigidly used. The different smoke-producing capacities of various types of equipment used and the directions of prevailing winds are undoubtedly controlling factors.

In some cases the smoke producers are now being located at considerable distances from the targets. This is done to conceal landmarks in the vicinity which would enable attacking airmen to estimate accurately the position of the target even when it is covered by a heavy screen.

It is a tribute to the effectiveness of our bombing raids that the enemy have been driven to the necessity of greatly increasing the size of their screens, involving more rapid consumption of their supplies of smoke chemicals and the provision of greatly increased amounts of equipment. At Bremen recently, smoke ejectors were seen to extend for a distance of 12 miles east and west and 11 miles north and south.

(3) Subsidiary and Decoy Screens

Other tactics tried for the purpose of protecting vital installations have

[redacted]

included the use of separate subsidiary screens to hide easily identifiable landmarks, and the use of decoy screens to confuse attackers as to the real location of their targets. Tactics of this kind are probably more effective at night.

(4) Time for Screen Build-Up

The time required by the Germans to build up an effective screen averages 15 to 20 minutes after the alarm is given.

(5) Number of Smoke Producers Used

The number of smoke generators necessary to produce a good screen depends on generating capacity. At Emden, 56 generators, spaced from 60 to 110 yards apart, formed a dense layer of smoke extending for 3 1/2 miles; at Brest, at least 117 generators were used, 70 yards apart on the fortifications, elsewhere 90 to 130 yards apart.

(6) Smoke Producers On Boats

To provide coverage over harbors, smoke producers are placed on moles and jetties and on small craft, suitably located, as well as on roads around the towns. At St. Nazaire, 17 barges anchored in the Loire river up-wind from the city, have served this purpose. Smoke floats may have been dropped off boats into the waters or harbors to increase the smoke output of spray equipment.

(7) Smoke Producers on Trucks

Smoke producers mounted on trucks have been used to reinforce smoke screens by moving from place to place according to need as dictated by wind direction and velocity.

(8) "Dazzle" Effects On Screens

Searchlights have been used in connection with low-lying smoke screens, not to pick up attacking planes but to cause a dazzle effect when the light is reflected by the millions of tiny particles of smoke cloud.

(9) Pouring Smoke Liquid On Water

Either experimentally or, more likely, because of a shortage of spraying equipment, the Germans, on a few occasions, have poured smoke liquid into the waters of a Norwegian fjord to produce a screen. It was estimated that it took a half hour before an effective smoke cover could be produced. The liquid used in this way was not identified but was possibly either titanium tetrachloride or a chlorsulphonic acid oleum mixture.

[redacted]

(10) Places Where Area Smoke Screens Have Been Used by the Axis

Berlin
Bizerte
Bremen
Brindisi
Brest
Bordeaux
Dortmund-Ems Canal
Dusseldorf
Emden
Essen
Genoa
Gdynia
Kiel
Lorient
Messina
Morlaix
Naples
Osnabruck
Palermo
Politz
Rostock
Sindelfingen
Spezia
Stavengerfjord
St. Nazaire
Stuttgart
Taranto
Trapani
Tripoli
Trondheim
Warnemunde
Wilhelmshaven
Wismar

(11) Reported But Not Confirmed Use of Screens

Bohlen
Burbach
Charleroi
Cologne
Corinth Canal
Duisburg
Ergste
Gelsenkirchen
Greiz (nr. Plauen)
Huls
Ijmuiden
Jena
Kassel
Linden (Hanover)
Lubeck
Magdeburg
Oranienburg
Saarbrucken
Stettin
Schweinfurt
Toulon
Volklingen (Saar)
Wiener Neustadt

8. ITALIAN 2-KG SMOKE POT

It seems probable that the Germans in Italy are using all available Italian equipment. An account of a particular Italian smoke pot candela fumogena 2-Kg (4.4 lb) thus appears to be timely.

a. Physical Characteristics

(1) This candela fumogena is shown in figure 1. It consists of a 30-gauge tin-plate can (2) 3 inches in diameter and 10 inches high, with a 9/16-inch recess at the top which houses the igniter pellet and striker pad during shipment, and is closed by a lid sealed on with adhesive tape. The bottom of the candle has a zinc

[redacted]

well, 3/4-inch diameter and 1 3/4 inches deep, into which the igniter pellet is inserted for firing. The candle is painted dark green and has a label with the marking F/ZN and instructions, (for use) translated as follows:

(a) Pull off the tape, take off the cover, and take the striker and igniting cartridge from the receptacle.
(b) Place the igniting cartridge in the zinc tube in the bottom part of the candle.
(c) Ignite by rubbing the striker on the matchhead.
(d) Place the candle lying down on the ground.
(e) Get away, preferably up wind.
(f) When the igniter does not set it off, try another.

NOTICE: The candle should be kept in a dry place.

Figure 1 (the smoke pot) shows the compartment in which the ignition element is shipped; the candle (2) shows the recess for the ignition element (6) - the latter consisting of a scratcher pad (4) with waxed wrapper (5) and cover (3). The match head, of the Bickford type fuze and starter pellet is wrapped in a waxed paper wrapper with a waxed paper sleeve (7).

(2) In a smoke pot which has been examined, the candle weighed 2.27 kilograms (5 lb) and contained 2.03 kg (4.47 lb) of the following Berger-type smoke elements:

Zinc Chloride (water soluble zinc)	0.80%
Zinc Oxide	21.07%
Zinc Dust (total zinc minus zinc chloride and zinc oxide)	25.83%
Kieselguhr (hydrochloric acid insoluble)	12.03%
Carbon Tetrachloride (by difference)	40.27%

(3) The igniter element weighed 10 grams (.35 oz) and consisted of a matchhead of the antimony sulfide-potassium chlorate type, a 1-inch length of Bickford type safety fuze, and a starter pellet 11/16 inches in diameter and 1 inch long, of the following composition:

Potassium Nitrate	55%
Calcium Silicide	45%

The calcium silicide consisted of approximately 31% calcium, 64% silicon and 5% iron.

(4) The scratcher pad was made of 1/16-inch cardboard, 5/8 inch by 1 3/8 inch, and sensitized on one side.

(5) Inside the can, on the bottom, were two cardboard disks, 2 and 13/16 inches in diameter, and 1/16 inch thick. The disks were probably used for insulating the bottom of the can in case the starter element was accidentally ignited.

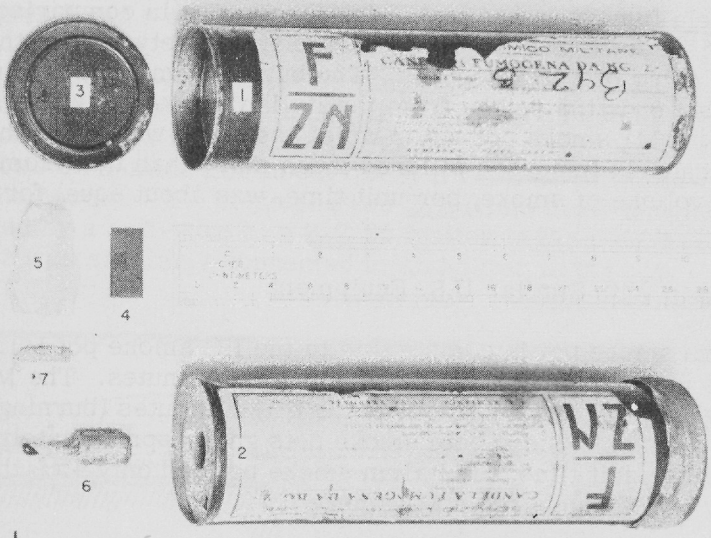


FIG. 1

ITALIAN 2-KG. SMOKE POT

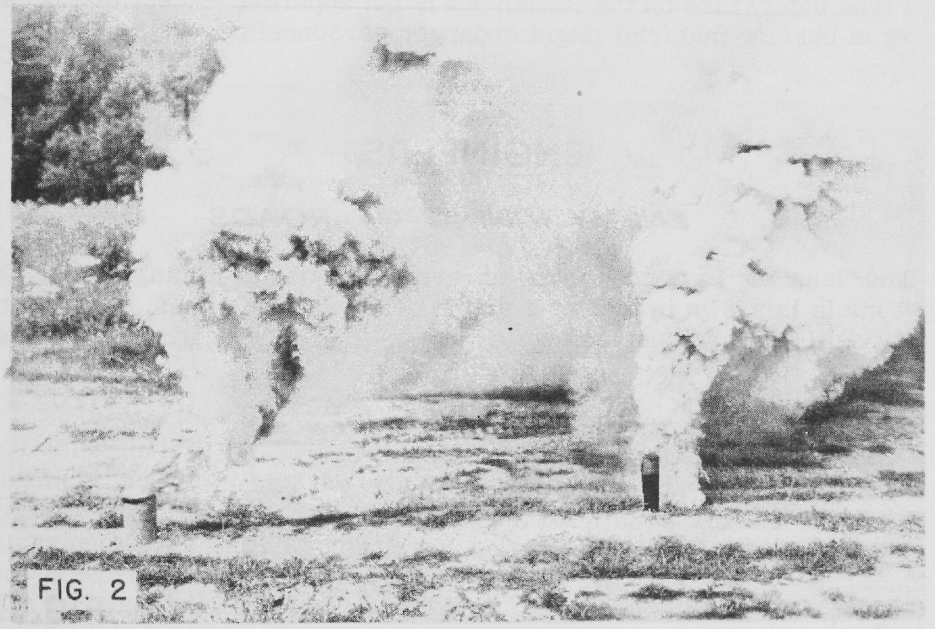


FIG. 2

AMERICAN MI (LEFT), AND
ITALIAN 2-KG. SMOKE POT (RIGHT)

[redacted]

b. Functional Characteristics

One candela fumogena was tested for functioning in comparison with the HC smoke pot, M1 (see figure 2). The Bickford type safety fuze in the candela fumogena gave a delay of 2 to 3 seconds. The burning time was 1 minute, 15 seconds. For the first 15 seconds the smoke from the Italian smoke pot was whiter than the smoke from the M1 smoke pot, after which the color was about the same. The smoke from the candela fumogena pillared much more than that from the M1 smoke pot. The volume of smoke, per unit time, was about equal for each smoke pot.

c. Comparison With Similar U.S. Equipment

The Italian smoke pot is comparable to the HC smoke pot M1. The candela fumogena weighs 5 pounds gross and burns for 1 1/4 minutes. The M1 smoke pot has a gross weight of 11 pounds and burns for 6 1/2 minutes (burning time varies between 5 and 8 minutes). Since both smoke pots gave approximately the same volume of smoke per unit time, the Italian smoke pot had only 45% the gross weight efficiency of the comparable M1 smoke pot.

The assembly of the M1 smoke pot is considered superior to the Italian since the ignition element in the base of the Italian pot is an extra part to be misplaced, but gives no added advantage. The need for the delay furnished by the Bickford type safety fuze on the Italian pot is not apparent, except that occasional scattering of burning material might endanger personnel.

ENGINEERS

9. ENEMY MINING OF ROADS

The Germans have used many different methods of mining roads. One method used in Tunisia is shown in figures 1 and 2. Three Tellermines, each having its igniter in position, were coupled together by an Italian detonating fuze. Groups of

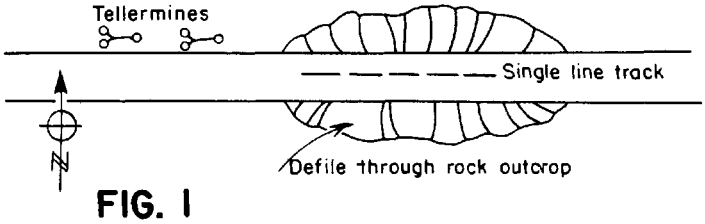


FIG. 1

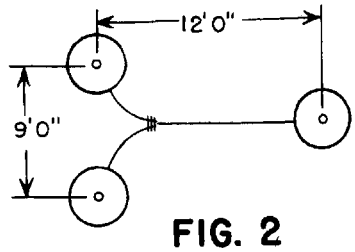


FIG. 2

the coupled mines were placed along the sides of narrow roads where vehicles might be expected to pull aside to permit another vehicle coming in the opposite direction to pass. The reason for using the three Tellermines together was probably

to ensure the maximum amount of damage to enemy vehicles.

Figures 3 and 4 show methods recently used in coupling antipersonnel mines to Tellermines. Figure 3 shows a Hungarian antipersonnel 3-pound mine (previously thought to be of Italian origin) connected by a wire inserted in the inner hole of the striker mechanism and tied to the handle of a Tellermine. The antipersonnel mine was buried about 18 inches below the surface of the ground. Figure 4 shows an S-mine laid about 5 feet from a Tellermine. The S-mine was fitted with the normal "Y" piece and two Z.Z (time fuze) 35 igniters. One igniter was connected by a pull-wire to a Z.Z 35 igniter in the side hole of the Tellermine and the other was similarly connected to an igniter in the base.

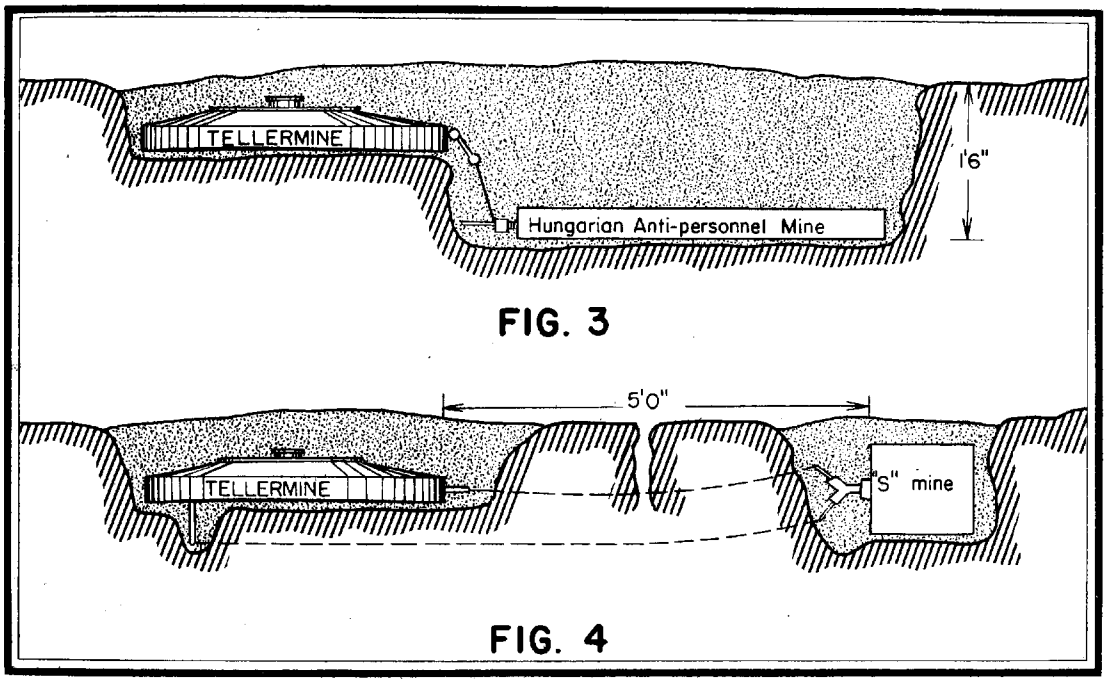


FIG. 3

FIG. 4

During their withdrawal from the Mareth position the Germans mined a road leading through a pass, the mined area being approximately 250 yards long, (see fig. 5). The east zone consisted of unarmed wooden box mines (presumably Italian) connected by Italian detonating fuze to similar mines which were armed. The distance between armed and unarmed mines was about 15 feet. A stick of gelignite was used under the loose cover of the unarmed mines so that the detonating fuze would explode them. In the west zone, Tellermines were connected by Italian detonating fuze to wooden boxes holding about 8 pounds of Italian gelignite. In both zones the rows of unarmed charges were interconnected with detonating fuze,

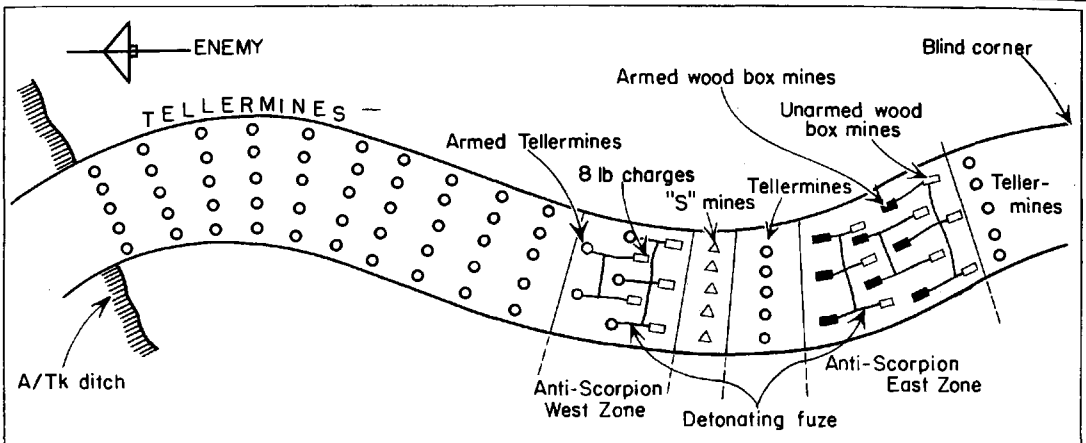

ENEMY
TELLERMINES
Armed Tellermines
8 lb charges
"S" mines
Tellermines
Armed wood box mines
Unarmed wood box mines
Blind corner
Teller-mines
A/Tk ditch
Anti-Scorpion West Zone
Detonating fuze
Anti-Scorpion East Zone

FIG. 5

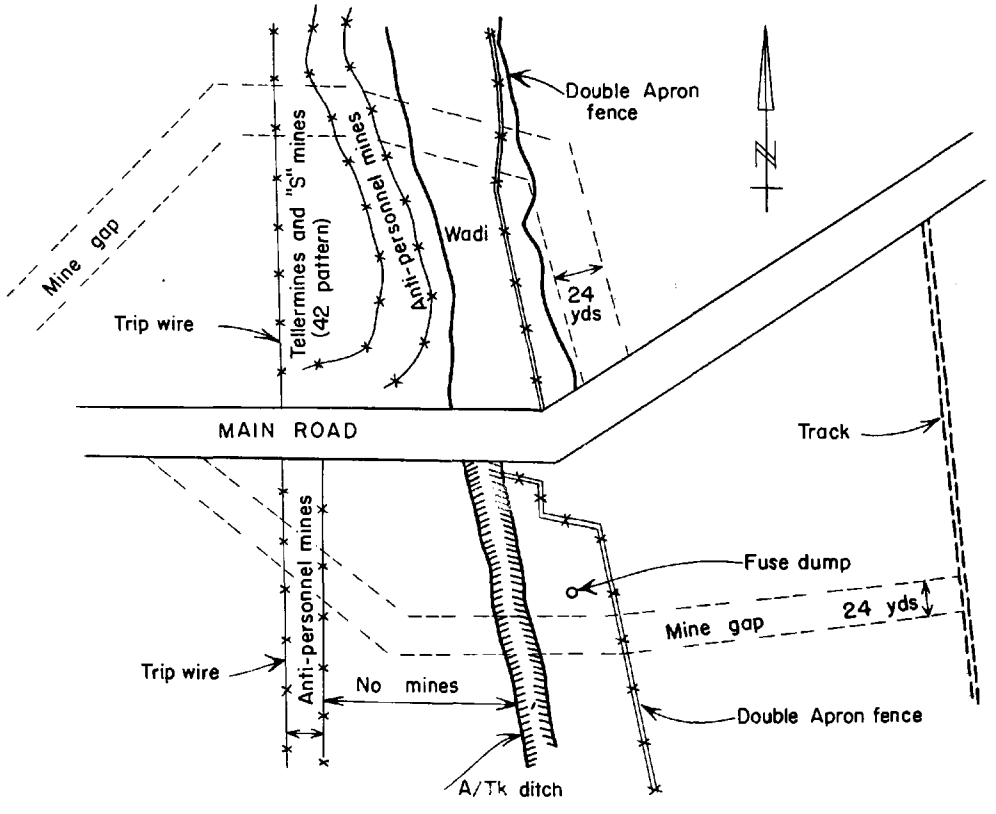

Double Apron fence
Mine gap
Tellermines and "S" mines (42 pattern)
Anti-personnel mines
Wadi
24 yds
Trip wire
MAIN ROAD
Track
Fuse dump
Mine gap
24 yds
Anti-personnel mines
Trip wire
No mines
Double Apron fence
A/Tk ditch

FIG. 6

so that had any of the armed mines been exploded, the whole row would have been detonated.

A diagram of another German road-minefield, recently encountered, is shown in fig. 6.

On the north side of the road two mine belts were discovered between the tripwire and the wadi. The first belt contained Tellermines, some of which were booby-trapped, S-mines were not laid in a definite pattern. The second minefield was a narrow belt 25 yards wide next to the wadi containing Italian antipersonnel picket mines and Italian wooden box mines. On the enemy side of the wadi no mines were detected.

On the south side of the main road only one belt of mines was encountered. This consisted of Italian picket mines and Italian wooden box mines laid in a 25 yard belt. The mines were not laid in any definite pattern. The front edge of the minefield was marked with a single strand of barbed wire knee high, and the enemy side with a double-apron fence. Both sides of the antipersonnel minefield were marked with a single strand of barbed wire. The total number of the mines lifted were as follows:

Tellermines 42 pattern	75
S-mines	23
Italian wooden box mines	222
Italian picket mines	19

10. GERMAN CAMOUFLAGE METHODS IN SICILY

Study of enemy camouflage in the Sicilian campaign tends to confirm the impression gained in the closing stage of the North African campaign that enemy methods in this direction have improved.

The Germans, generally, have made good use of available cover and terrain, while the Italians, no doubt prompted by their former ally, seemed to have taken a serious interest in camouflage, with mixed success. The fieldcraft and camouflage behavior of individuals, particularly Germans, was very good and full use was made of the many opportunities offered by the type of country concerned.

a. Dummy Aircraft

These aircraft were of good quality, and from makers' marks it is obvious that they were mass-produced in Germany.

b. Pillboxes

The camouflaging of pillboxes sited to deal with landing forces has, not surprisingly, been the object of a great deal of effort on the part of the enemy.

[redacted]

Great care was taken to blend these pillboxes--mainly made of concrete--into the general ground pattern. The profusion in the island of walls, small houses, and huts, has helped this form of camouflage.

In one section (the Pachino area) several pillboxes were covered with complete huts made of straw. One pillbox overlooking a road junction was an actual small house, reinforced with concrete and having a weapon slit just above ground level.

Examples seen in another area were straw-roofed and sited on slopes in the vicinity of limestone ledges, which made recognition difficult. They had straw "blinds" to cover the weapon loopholes. One pillbox noted and photographed was sited against a wall, and an attempt had been made with paint to simulate the pattern of the stone wall.

Many of these pillboxes were revealed by the poor siting of their defensive wiring. Instead of being sited to blend with the ground pattern, wire was taken haphazardly across fields. Many of the pillboxes were never used.

c. Gun Positions

Of the gun positions studied, half had been camouflaged overhead by grass-covered nets. Although the remainder had no overhead concealment, the guns themselves were garnished with brushwood or similar, natural material. Many gun positions were indicated by tracks, etc., and poor camouflage. Here and there, however, a good site was found; for example a single gun position, where the pit was dug out of an embankment at the side of the road. This position had a low overhead canopy of grass-covered nets, branches and the like.

One antitank gun position is worthy of comment. The gun was sited in a recently cut cornfield on a forward slope. There were several stacks of straw in the field, and a further stack had been constructed around the gunshield. This simple treatment was, from all appearances, successful.

d. Weapon Pits

Some examples of covers for weapon pits have been encountered. In each case the camouflage consisted of straw matting raised on poles about a foot above the pits.

e. Sniper Equipment

Snipers' clothing comprised two jackets, one having a helmet cover to match. They were of good cloth, printed with disruptive patterning of various colors. The jacket that had the matching helmet cover was made up of a close-weave cloth with an elastic inset at the waist. It can be used either the normal way or inside out. The outside pattern has a background of green, the inside of brown. The helmet cover is carefully made, also reversible, with elastic insets and holding hooks. The second jacket is of twill, tailored on the usual lines, and of a general

green color disrupted with brown. Both jackets blend well with the natural environment, but they both have the weakness of still revealing characteristic outlines, because they both fit closely to the body.

11. ENGINEER OPERATIONS IN THE JUNGLE

Military engineering under the most favorable weather conditions is a difficult art, particularly when complicated by the opposition of an alert and resourceful enemy. In tropical jungles and with native troops, the work is one of extreme difficulty. The following paragraphs are a condensed resume of a report made by an experienced British officer after five months of such operations.

a. Preparation

(1) General

To begin with, the officer writes, everyone should know how to swim and how to fight with automatic weapons. The men must be "absolutely fit" physically, and trained to take care of themselves in the field, which includes security discipline. Frequently engineers are engaged in cutting trails and building or repairing bridges, far from the protection of supporting units. Under these circumstances, it is absolutely essential that they be capable of repelling any probable attack. They must, moreover, be able to change quickly from motor transport to animal, and to understand the methods of animal-pack loading. Mechanical transport can only be used on good roads.

(2) Map Reading

Map reading must include both ordinary and stereoptican aerial map interpretation. A case was cited where a route for a trail was decided upon from the direct terrain observation and examination of existing maps. After two days work in cutting the trail, it was found to lead to a vertical cliff and had to be abandoned. Had this route been closely scrutinized by stereoptican interpretation of aerial photographs, the mistake would not have been made.

b. Notes on Jungle Operations

(1) Mine Fields

Jungle operations have their own problems in regard to mines and booby traps, since it is difficult to make sure the mine fields are properly marked and sited. For this reason, the writer comments, the division commander was reluctant to use them.

(2) Bridging

As most streams were tidal with muddy bottoms, nearly all bridges were

of timber-pile construction, with the material cut in the neighboring forest. A local type of pile-driver was used to sink piles 6 to 15 feet in the ground. While bridge-building was slow at first it became very fast with experience. The rate of progress by four squads of engineers on a pile bridge was about 30 running feet of bridge per day.

(3) Water Supply

Water was supplied by a local type of well-digging apparatus. Two-inch pipe with a nose piece was driven by the same equipment used in pile-driving.

(4) Care of Tools and Supplies

Attention must be given to the care of tools and supplies. This is the particular duty of the maintenance units. Early requisitions of other needed supplies were essential because of the distance from base, and there was a paramount need to use all local resources.

(5) Driving in Mud and Sand

Drivers should be trained in driving under all sorts of jungle conditions, getting on and off ferries, over wet ground, soft sand and in water.

(6) Maintenance of Communications

It is stated that 95 per cent of the engineer work was devoted to maintenance of communications, which included the building of dirt roads by the shovel-and-basket method, erecting bridges and ferries, and the construction of landing points. Native labor was used to within 5 miles of the front; after a bombing raid, natives were apt to desert. When all-weather roads were requested, they were built by the rear elements, which constructed brick fire kilns, made bricks and laid them with native labor.

(7) Tidal Streams

On large tidal streams, bridging was out of the question and folding boat equipment was invaluable. Assault boats were used to make improvised rafts for the transportation of animals. Getting across was easy but seventy-five percent of the time was consumed in getting on and off the rafts. Landing stages were built at different levels to cope with the tides, extension landing ramps being used on muddy ground.

Where tidal variations were not too great, pile bridges were built, and the small box-guirder type was used over narrow gaps, to be replaced later with trestle-type.

(8) Native Labor

Native labor was considered to be an advantage and 20,000 natives were

[redacted]

used at one time in a division area. The natives supplied their own food. Management was carried on through groups of about 40, under a foreman who was usually the village head man working under the engineer commanding officer.

(9) Supply Dumps

Supply dumps were established for wire, AT mines, etc. When an issue was made from a forward dump, that dump was replenished from one of those in the rear echelon as required. No regular daily supplies were sent. Material was transported by trucks from the motor pool.

(10) Ferry Discipline

Ferry discipline is most important. Engineers, particularly when under fire, have enough to do without handling the priority of individuals in crossing a ferry. That is MP work.

c. Equipment

(1) Weapons

There was need for additional light machine guns and submachine guns. Booby trap mechanisms were badly needed - two officers were killed attempting to make and install booby traps. The explosive provided must be capable of withstanding heat and dampness.

(2) Tools

Long knives of the machete type were invaluable Every man should carry one. Spades as well as shovels were required. Power tools should not be too heavy and power saws were valuable, as were the bull-dozers and graders. Some small motor-driven circular saws would have been useful.

The following tools were recommended as a squad tool set, and made up one mule load.

crowbar	axes, pick (four)
auger, wood, 3/8 x 4 1/2 in	axes pick, spare helves (two)
adze 4 1/2 lbs	shovels, engineer (four)
chisel 1 in	shovel, spare handle
hammer, carpenter's claw, 1 1/2 lbs	maul
hammer, sledge 10 lbs	rod, measuring 4 ft
saw, cross-cut 4 ft	tape, steel 100 ft
saw, hand, 26 in	tapes, tracing (two)
jungle knives, light (two)	level, field service
jungle knives, heavy (two)	cutters, wire
rope 1/2 inch	wire, 14 gage, 1 lb
ax, long-handled	nails, wire, 3 to 6 in, 1 lb

tape, 1/2 inch, lashing, 6 rolls

[redacted]

(3) Bridging and Ferrying Equipment

Outboard motors and other propulsion units which can be attached to rafts and reconnaissance boats were both in demand. On one occasion, proper pontoon equipment, which was lacking, would have saved three days in moving a brigade to meet a vigorous attack.

(4) Motor Transport

Shortage in motor transport was met by pooling. One jeep for each engineer company commander would have been desirable. Flat-bed, American-type trucks were particularly useful in handling engineer supplies.

(5) Clothing

The overall type combat uniform was not popular with either officers or men, who preferred shorts, particularly for working in water. Obviously, for protection against malaria, shorts are inadequate.

(6) Tubular Scaffolding

Tubular scaffolding would have been extremely useful in making jetties and for general landing purposes. It is quick to set up and is adjustable.

INFANTRY

12. GERMAN DEFENSE OF POSITIONS

A German directive for the defense of positions gives some interesting details of German defensive tactics during recent campaigns. A translation of the document is as follows.

* * *

1. Every man must be aware that the defense of a position must continue to the last man and to the last round. Every commander is fully responsible for the defense of the interdependent defense area assigned to him. It is not permissible, for instance, that the heavy weapons platoon-leader command the heavy weapons employed on the right as well as on the left flank of the company.

2. The enemy must be prevented by all means from removing mines or other obstacles which are laid in front of the position. Machine guns are most effective for this purpose.

3. All available machine guns are to be employed on the flanks when

[redacted]

possible. Especially at night the machine guns must command the entire terrain to the front. Shortly before dusk every machine gun, light machine guns included, will therefore be sited so as to be able to cover their designated zones. These sectors will be suitably marked. The sector of fire is to be marked by stakes on the right and left limits; the elevation, by a wire stretched horizontally.

4. The heavy weapons and artillery are placed in relation to the light infantry weapons in such a manner that their fire-power can be primarily directed against important positions and terrain features, which the enemy might possibly use during his approach.

5. Officers of all grades are responsible for the continuous preparedness for defense. In addition precise written orders are to be drawn up for each position, about which each man must be repeatedly instructed, and which he must know by heart. These orders must show, among other things:

(a) The position of the enemy, the defense-sector, adjacent units, scout-troops, and the security toward the front;

(b) Observation and scouting patrols by day and night;

(c) Supervision of order and alertness in the position. Fire preparedness of the weapons and the storage of ammunition;

(d) Action to be taken: under enemy artillery-fire (for instance, the soldier takes cover, with his machine gun or rifle, in his fox-hole); low-level air attack (machine guns fire at will); action by enemy assault troops (alertness for hostile feints); infantry-attack, tank-attack; penetration by adjacent unit;

(e) Significance of pyrotechnical signals, password.

13. PORT MORESBY--ATTACK DIRECTIVE

The following notes taken from an Allied publication, were issued in the abridged form in which they appear in this article. They are based on an original operational directive of a Japanese infantry unit which was to have taken part in the attack on Port Moresby. The wording of the directive has been followed, and although the actual text has been paraphrased somewhat, literal translations have been left where they appear typically descriptive or apposite.

* * *

a. Main Considerations

Most of the fighting will take place in jungle country. River crossing

[redacted]

engagements will be frequent. Enemy equipment is excellent.

b. Approach March

During the crossing of the Owen Stanley Range, the column will probably be spread out over a considerable distance; but on approaching more level jungle country, the column will close up to ensure adequate control and immediate readiness for battle.

(1) Speed -- Rapidity of the advance is of paramount importance. Any delay will give the enemy time to destroy bridges and build obstacles. Be prepared to swim across rivers if bridges are destroyed.

(2) Communications -- Commanders will ensure that full agreement is reached on signal communications, and that radio sets are correctly distributed. On the march, Bn. Hq. will have either a No. 5 or a No. 2 set, Co. Hq. a No. 6 set, and unit or organization Hq. No. 3 sets. All communications will be tested at halts.

(3) Reconnaissance -- Reconnaissance patrols must precede the main body. Their primary task will be the reconnaissance of ground so that during the approach march the maximum use can be made of cover provided by natural terrain features.

c. Battle Drill (General)

(1) Leadership -- The resolute leadership of junior commanders is essential to ensure that nothing holds up the speed of the advance. Prompt action in dealing with unforeseen situations is a guarantee for quick success. "If the advance is delayed, enemy preparations on the one hand will become greatly improved; while on the other hand our own ammunition and food will become exhausted and the sick will increase. Therefore each unit will ignore severe hardships, resolutely and promptly enter the fight carrying out the assault to the final objective."

(2) Alternative Methods of Attack -- Decoy the enemy from one direction by the use of smoke, firing or even shouting, and attack him from an unexpected direction. Utilize the advantages of rain and fog for catching the enemy off guard. Make an attack when our own aircraft are bombing the enemy. "Make an assault suddenly from positions which the enemy believes to be unapproachable, such as cliffs, rivers, streams, steep inclines and jungle."

(3) Precautions -- During an attack, avoid grouping in exposed positions such as hill tops, villages and bridges which provide excellent targets for enemy machine guns, artillery and bombing. For example, when one unit attacks, the following unit should deploy and take cover to prepare for the next assault.

d. Special Considerations

(1) Night Attacks -- "The use of dusk, night and dawn is a special tactical characteristic of the Imperial Forces. Although fatigue may be great from the combat during the day, courage must be renewed to take advantage of darkness to

[redacted]

develop the engagement."

On account of the heavy fire-power of the automatic weapons of the enemy and their skill at close-range firing, a headlong frontal attack, even at night, should be avoided. A night attack must be carefully planned, and full advantage taken of natural terrain features.

(2) Flanking Envelopment -- The utmost use should be made of natural cover. Part of the force will make a holding attack on the enemy's front, while the main body deploys to make a "bold, resolute and prompt flanking movement" to attack the enemy rear. Smoke should be used if the enemy anticipates the maneuver.

(3) Close Range Reconnaissance -- Patrols composed of personnel especially selected for their good eyesight (such as fishermen or the aborigines of Panape Island) should be formed for close-range reconnaissance of the enemy positions in thick jungle.

(4) Jungle Fighting -- No jungle country is impassable. On the contrary, its special features should be extensively utilized for surprise and out-flanking tactics. Infantry units must be adequately equipped with machetes; native knives are also suitable for hacking a way through thick jungle.

(5) Hostile Aircraft Attack -- With the considerable increase in enemy air activity, the following precautions will be taken: rapid deployment, night moves when practicable and use of natural camouflage and camouflage equipment. The location of the headquarters will be carefully chosen and the movement of personnel and vehicles around this area should be reduced to a minimum. If possible, each unit should detail an officer to be responsible for locating the headquarters of his organization. Wooded areas should be used for the camouflage of guns and ammunition. Smoke from cooking will be a certain target. Troops should accordingly be warned to keep at least a hundred yards distant from the source of any smoke during a raid. On the other hand smoke can frequently be used with success as a decoy.

(6) Communications -- When units are operating in an independent role, difficulty is often experienced in maintaining communications when fighting. Pay particular attention to the following points: find out when and what to report, send out as many (situation) reports as possible, and make certain that a report is sent out at least three times a day, even if it is only a unit position report. Ascertain the whereabouts of the radio section and confirm that it has been issued a communication time schedule. In general signal communications have fallen far below expectation.

(7) Use of Compass -- As most of the fighting will take place in jungle country and maps are inaccurate, as many compasses as possible should be distributed. The maximum information on road conditions should be obtained from our patrols, prisoners and natives.

(8) Enemy Supply Depots -- If the battle does not progress favorably,

[redacted]

enemy supply depots should at all costs be captured intact in order to ease our own supply difficulties. The enemy must be prevented from destroying his supplies.

(9) Use of Captured Weapons and Ammunition -- As our units are only lightly equipped with arms and ammunition, make a careful study of enemy weapons so that they can be utilized when captured. Note that our advance elements have already captured a quantity of enemy rifles and ammunition which have been found extremely useful.

e. Intelligence

All captured material and documents from prisoners and enemy dead must be promptly handed over for examination.

All important information including estimated losses, abandoned enemy corpses, captured weapons, and ammunition expended must be turned in by platoon and company commanders. Accuracy in the compilation of these reports is not essential, but speed is important.

Comment: Although much of the above may now seem trite, the theme running through the directive is still the basis of Japanese tactics. Note the special emphasis on careful reconnaissance, speed of advance, night attacks and the flanking movement through "impassable and impossible" country which have been the predominant features of Japanese battle drill wherever they have fought us. Note also that their G-4 staff are encouraged to cut supplies and equipment to the bare minimum and are permitted to anticipate the utilization of enemy equipment and especially supplies.

14. SOME GERMAN TACTICS IN TUNISIA

The following article is based on British reports dealing with German tactics in Tunisia. The reports emphasize the fact that because of the nature of the terrain, the tank played a less important part in the Tunisian fighting than in desert action but the mortar was used extensively. Since the Germans are exceptionally adept in the employment of this weapon it may be expected that the mortar will be widely used in the European theater (see Section II, p.47).

In considering the reports from Tunisia two points should be borne in mind: (1) tactics varied with the morale and efficiency of units, particularly in patrol activities; (2) during the later stages of the campaign the Germans were handicapped by a shortage of tanks, ammunition and gasoline, and throughout the campaign they suffered from a shortage of artillery.

The following are extracts from the British report:

* * *

[redacted]

a. Attack

Night operations by anything more than a fighting patrol were exceptional and first light was the favorite time for attack. However, German teaching based on experience in Russia has stressed the necessity of avoiding this rigidity in the timing of attacks.

Night approach marches of from 10 to 20 miles were made frequently prior to attacks. Infiltration was often skillfully executed but sometimes the Germans advanced in close formation. Reserves were seldom kept back to influence the course of battle.

b. Defense

Forward positions were thinly held, with sometimes two companies holding a frontage of 1,500 to 2,000 yards.

Knolls were always mutually supporting within company positions. A system of well-coordinated observation posts, equipped with machine guns, allowed a large proportion of the troops to rest by day at the foot of the reverse slopes, while at night the forward elevations (the day OPs) were held by platoon or section outposts. These OPs were usually 500 to 1,000 yards forward of the main positions.

Observation posts usually possessed good communications facilities, both laterally and to the rear. Outposts sometimes signalled to the rear with colored lights.

Antipersonnel mines, with tripwires near tracks and on likely patrol approaches, were employed.

Machine guns were sited down reverse slopes to engage attacking infantry approaching another objective. Defilade positions and concealment were good. The enemy made considerable use of alternative positions.

Counterattacks were either preceded by machine-gun or mortar fire already registered or they were made immediately from the reverse slope of the captured position.

When the Germans have sufficient forces at their disposal they will always attempt a counterattack before the attackers have time to organize.

c. Withdrawal

The Germans undertook the usual demolitions and road blocks. Apart from these, the counterattack at chosen points on the axis of advance had excellent delaying effects. These counterattacks can prove costly to inexperienced troops advancing with more zeal than prudence.

d. Patrols

In close contact, the Germans did not patrol offensively at night, nor did

they attempt deep reconnaissance. Many patrols were 30 to 40 strong, and they often moved at night in close formation, which made them vulnerable to ambush. However the Germans relied on their strength and made little attempt at concealment.

Often the Germans established advance positions for the purpose of surprising British patrols on the move. An ambush would be prepared early in the night, sometimes far in front of the German lines if a wide area existed between opposing forces, and any British patrol which used the same route continuously paid the penalty.

When the Germans made raids with patrols of platoon strength, their technique was to penetrate and then open fire with grenades and light machine guns, capturing prisoners in the confusion caused by the surprise attack.

e. Summary

The German always tries to outflank his enemy. This has been seen even in the preparation of an ambush or in the method of holding even a farm or a group of buildings where a machine-gun cross-fire is created by means of guns sited adjacent to the farm or buildings. The German particularly believes that both from the tactical and morale points of view, attempts should be made, whenever possible, to fire on the opponent from the rear.

In Tunisia the Germans continued their deceptive practices, using, among others, the following ruses:

The speaking of English words and orders on patrol and during night attacks;
Placing a second mine tripwire where a person might step while trying to avoid the first wire;
Answering British Very lights with exactly the same signal, often causing confusion, to the enemy;
Placing a row of Tellermines on the surface of a road, backed by another row well-concealed 100 yards farther on.

When in close contact, the Germans use many snipers. At close quarters the Germans use smoke grenades to aid themselves in escaping from difficult positions.

At the beginning of the Tunisian campaign, "Tiger" tanks were used with great boldness. When the tank commanders were sure that their flanks were secure they drove straight on. The "Tiger" tank must be regarded as a formidable weapon. Given adequate flank protection it adds very effective weight to German fire power.

In defense, these tanks were well-sited in covered and defiladed positions. PzKw 3's and 4's were used extensively to protect the flanks of the "Tigers."

[redacted]

Tank recovery was often effected with speed and courage. Disabled tanks were towed away by other tanks. When the Germans held the battlefield, tractors were brought up and the area was cleared of both German and enemy tanks in a very short time. When night came as much as a company of infantry was used to hold off our patrols or to stage a diversion while recovery was in progress.

The standard of concealment of German artillery was uniformly high and many alternative and dummy positions were used. German counterbattery fire was ineffective.

Eight-eight millimeter guns were used normally in batteries of four, often with two or three batteries supporting each other. Self-propelled antitank guns were used from hull-down positions to give covering fire to tanks as they went into the attack. These guns were also used against British reconnaissance units, withdrawing before an outflanking movement could be carried out. A roving 88-mm gun was used. Dumps of ammunition for it were placed at suitable points.

In Tunisia, the most important fighting qualities revealed by the Germans were boldness, thoroughness of organization, a high standard of technical proficiency and a detailed preparation in all operations.

MEDICAL

15. GERMAN MEDICAL NOTES

The demands which totalitarian war make upon the medical profession may be expressed in one sentence. "It is the duty of every medical officer, as a soldier, to direct his entire work and mode of thinking toward one goal, namely to strengthen the moral and physical strength of the armed forces in every respect; and to restore to health, safely and quickly, that part of it which has been injured and weakened."

German medical research in this war as in the last has applied its advanced technical and research facilities into probing and healing the wounds of battle. All research now centers in the Military-Medical Academy, the Institute for General and Defense Physiology, and the Institute for Physiological and Defense Chemistry, located in Berlin, according to an article on German medical research appearing in the Deutsche Zeitung in Norwegen. Some portions of this article are reproduced herewith as indicating various special techniques developed for the different cases reported.

a. Climatic Testing Laboratory

One type of special equipment is found in the Climatic Testing Laboratory. Here studies can be made of every combination of pressure, temperature, humidity, air composition, and their effect on the human body under work, rest and with varying diet.

[redacted]

An example of the accuracy of the devices used in the tests is the recording scale. This is said to record losses through perspiration to one tenth of a gram: yet the device is so large that it contains bed, working space, instruments, etcetera.

The person also can be exposed to winds of varying force when in the performance of labor under tests, in order that the tempo of work, proper rest periods, suitable clothing, etc., may be accurately determined under varying climatic conditions. The article states that this research work is important not only for its military value but also on the industrial front involving special industries such as mining, chemical manufacturing, and under all conditions subject to a "working climate".

b. Use of Spectroscope for Wound Diagnosis

In the diagnosis of wounds at the front, a notable procedure is that of observation with the spectroscope. It is frequently necessary, the article states, to ascertain the nature of the projectile which caused the wound, or the metal of which the projectile or splinter was composed. This is done with a small portable, but very sensitive spectroscope, which accurately records minute metal traces on the edges of the wound, down to a weight of one millionth of a gram and less.

This procedure is said to be important even in civilian life, especially in the investigation of crime.

The spectroscope has another important military use, the article states viz., the analysis of the soldiers' rations to establish the mineral contents. In addition to nutritive ingredients and vitamins, the food must contain minute proportions of certain metals, as zinc, manganese, copper, etc., and this can be easily ascertained through the use of the spectroscope.

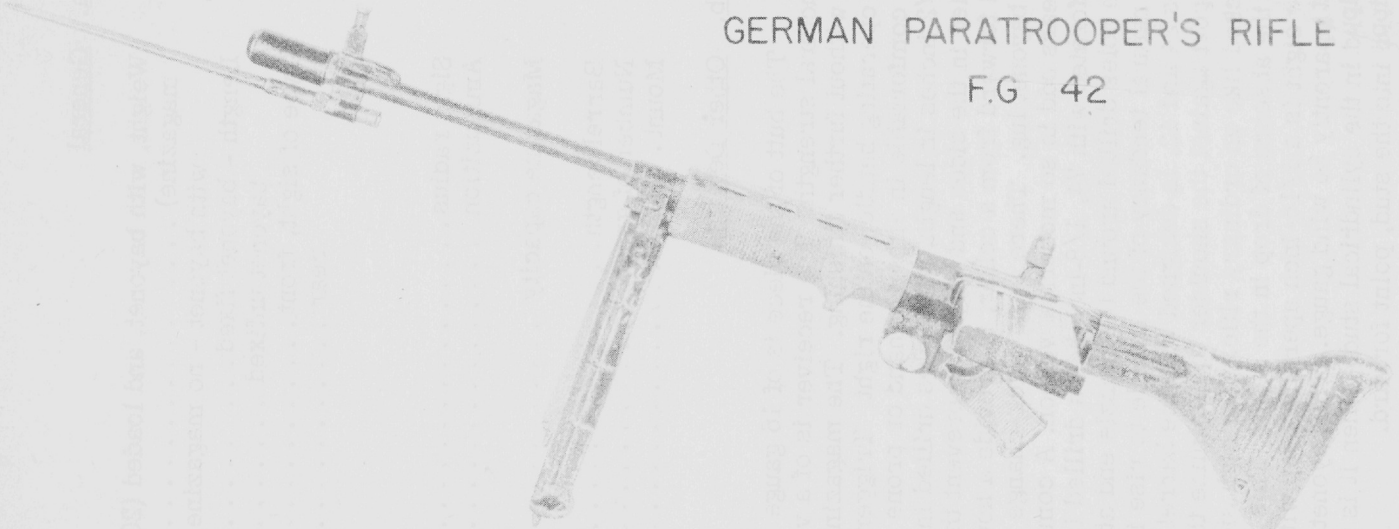
ORDNANCE

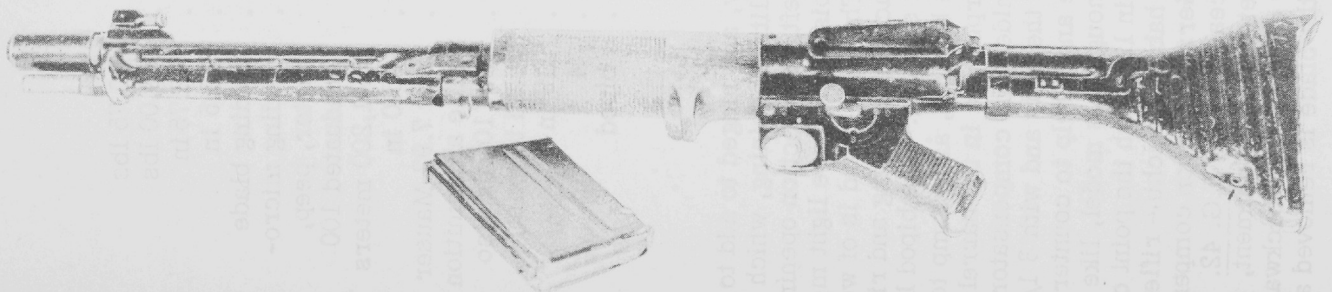
16. GERMAN PARATROOPER'S RIFLE F.G 42

The versatile German Ordnance Department has produced a new weapon in the F.G 42 (Fallschirmjaeger Gewehr 42), a semi-or-full automatic, gas operated, air-cooled paratrooper's rifle, caliber 7.92 mm (see accompanying illustrations). It is extraordinarily light for a full automatic rifle--10.75 pounds fully loaded -- conveniently stocked, and equipped with what appears to be an excellent micrometer aperture sight, an innovation in German fire-arms. The addition of a 11 1/2-inch spike bayonet appears to be somewhat superfluous, copied perhaps from the French Model 1936 rifle, but with a weapon weighing under 11 pounds, a bayonet might be used effectively.

GERMAN PARATROOPER'S RIFLE

F.G 42





[redacted]

a. General

Weight, with bayonet, and loaded (20 rounds in magazine)	10.75 lbs
with bayonet - no magazine	9.00 lbs
Length - bayonet fixed	42.75 in
bayonet unfixed	35.5 in
Type of sight, front	folding blade
rear	folding micrometer, peep, graduated 100 to 1,200 meters
Sight radius	25.0 in
Ammunition	any 7.92 Mauser rifle ammunition
Magazine capacity	20 (10 rds also said to exist)
Barrel length	19 in
Number of grooves	4
Mount	bipod

b. Other Details

The butt of the piece is of 16 gauge steel, hollow, and ridged to add to its structural strength. The receiver is of a very high quality machining, which is left without further finishing. The magazine is on the left, the ejection opening and operating handle, on the right. Trigger guard and pistol grip are light metal, and comfortable in either offhand or prone positions. The hand guard is of wood, 7 1/2 inches in length, with holes drilled in the top to facilitate cooling and ridges milled in the sides and bottom to prevent the hand from slipping. The bipod legs fold forward from a collar, to provide a housing for the bayonet, and clamp to the bayonet lug. There is no quick-change feature incorporated in the barrel, which appears odd in so modern a weapon. A combined flash hider and compensator perforated with 74, 1/8-inch holes drilled in the side of the body and with 8 1/8 inch holes drilled around the muzzle end at a 45 degree angle help to counteract the natural tendancy of the muzzle to rise in firing, although this model, like the MGs 34 and 42, is designed with the barrel practically in line with the point of support against the shoulder to minimize this annoying habit of machine rifles stocked like an ordinary rifle. The high sights of the German weapon compensate for the absence of drop in the stock. This is very noticeable in the F.G. 42. The rear sight is a 1/16-inch aperture peep with a micrometer type adjustment, but apparently no wind gauge. The bayonet is normally carried point-backward, cliped in the cylindrical stud. When it is to be fixed, the blade is removed and cliped into the stud, point forward.

c. System of Operation

Upon firing, the propelling gases are taken off through a .060-inch port, 6 1/2 inches from the commencement of the rifling, on the underside of the barrel,

and impinge on a piston head .620 inches in diameter. The piston rod passes through a gas cylinder 1 1/4 inches in length, with four 1/4-inch exhaust ports at the rear end. After the head passes these ports where the gases are dissipated, the piston rod continues to move rearward through a cylindrical guide at the rear of the cylinder, under its own inertia.

The bolt mechanism is attached to the piston rod by a lug on the under side of the bolt. The lug slot is approximately 3/4 inches long and twists toward the left-hand side of the bolt, allowing the lug to cam and turn the bolt a quarter turn to the left, and disengage the locking lugs. After unlocking, the bolt moves straight to the rear, as in the Lewis gun (although the bolt is known as the Solothurn type) and the piston rod has 3/4 inch of free travel before the bolt is unlocked, permitting ample time for the gas pressure in the barrel to be released before the unlocking of the bolt takes place.

By the use of a change lever which also acts as a safety, the gun may be operated either as a semiautomatic or with full automatic fire. The change lever brings into engagement one of two sears, depending on the type of fire selected. The unique feature of the operation lies in the fact that the gun fires automatically from an open-bolt position and semiautomatically from the position of the closed bolt.

The firing pin is attached to the piston-rod lug and the bolt-body moves around it under spring pressure contained in the firing pin spring compressed behind the lug. After firing each shot, the recoil is partially absorbed by compressing a driving-rod spring which then drives the bolt forward again to carry a new cartridge from the magazine into the chamber. This completes the operating cycle.

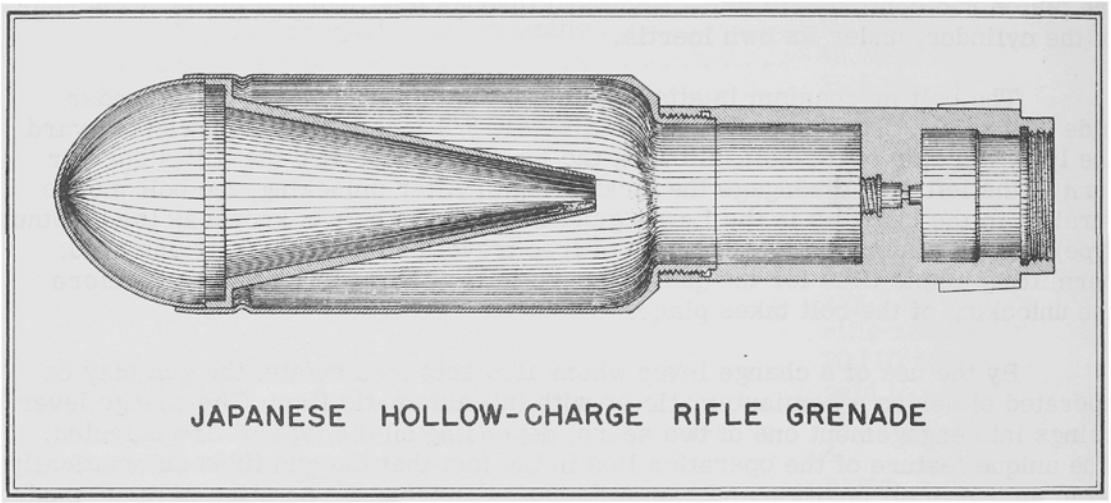
17. JAPANESE HOLLOW-CHARGE RIFLE GRENADE

Except for aerial bombs recently recovered, the only known use by the Japanese of the hollow-charge principle is in the rifle grenade, (see accompanying sketch) which is a copy of the German heavy AT rifle grenade, Gr. G.Pz Gr (see Tactical and Technical Trends No. 36, p. 34). The launcher is clamped to the standard Model 38 (1905) 6.5-mm rifle. The cartridge used to propel the grenade has a wooden bullet.

The sketch shows a sectionalized model of the grenade and illustrates the Japanese use of the hollow-charge principle. The complete round is 7.98 inches long and has a diameter of 1.58 inches at its greatest diameter. It has a bursting charge of 3.81 ounces of TNT. The cone formed in the TNT is 2.5 inches deep and 1.5 inches wide at the top.

The grenade is fired by impact with the target, a base-detonating inertia-actuated fuze being carried in the rear of the projectile behind the bursting

charge. Since the fuze is not armed until the grenade has been fired from the rifle and is in flight, the grenade is safe to handle, but it should not be jolted, since it is easily armed.



JAPANESE HOLLOW-CHARGE RIFLE GRENADE

With the exception noted above, this is the only instance of the use by the Japanese of the hollow-charge principle that has been discovered to date. It is to be expected that they will employ it in other weapons. The penetrating effect obtained is not dependent on impact velocity and the Japanese have in quantity a variety of low-velocity weapons of fairly large bore suitable for firing hollow-charge projectiles. Such weapons are the Model 92 (1932) 70-mm battalion howitzer and the Model 41 (1908) 75-mm infantry (mountain) gun.

QUARTERMASTER

18. USE OF RUBBER IN JAPANESE EQUIPMENT

a. General

Long after the U.S. Army had substituted webbing for leather in the soldier's individual equipment - cartridge containers, belts, etc., the Japanese continued to use only heavy leather for all of these items. Within the last 12 months, however, laminated canvas impregnated with rubber has replaced leather for practically every item. Belts, cartridges boxes, rifle slings and numerous other items have been captured, all made of laminated square woven fabric and impregnated with rubber to a varying degree.

b. Cartridge Boxes

The new cartridge boxes are especially noteworthy, in that they represent an ideal solution of a difficult problem. The material used in the box is laminated

canvas heavily impregnated with rubber and moulded into shape. The box top is of the same material but the center is a thick piece of pure rubber and the top is therefore somewhat flexible, permitting an unusually tight fit. This material is superior to leather, especially in tropical climates where leather is apt to rot. Other equipment was made up of fabric, of sufficient plies in thickness for the purpose intended, coated with rubber, and cured. Strapping and belting was cured flat; canteen covers and such items were cut to shape and cured over a mould.

c. Other Uses

The Japanese army is evidently plentifully supplied with rubber for any conceivable purpose. Heavy bags of pure rubber were used as food containers on Attu, and rubber boots and waders were of excellent quality.

GENERAL

19. GERMAN PORTABLE HAVERSACK FILTER

The Tornisterfiltergerät, a portable haversack filter, is standard equipment in the German army, and is issued on a company basis. The filter is said to be able to treat from 22 to 55 gallons of water per hour, according to the amount of solid matter contained. Although the Tornisterfiltergerat was designed primarily for clarification of water it is claimed by the Germans that this device will effectively treat water that has been contaminated by dead bodies and similar substances; however, it is expressly stated that the filter will not rid water of objectionable odors nor is it effective against water containing chemical warfare agents or substances in solution. Methods of water purification used by the United States and Japanese armies were described in Tactical and Technical Trends, No. 22, p. 33.

a. General

The gross weight of the filter and accessories is approximately 45 pounds. The whole assembly is packed in a canvas case, provided with two carrying straps so that it may be carried on the back, haversack-fashion. The assembly consists of two parts, viz., spares and accessories box shown at (1) in the accompanying sketch, and the filter; the box contains six pockets, each of eight spare filter pads; also a cleaning brush and instruction manual.

The filter consists of a chamber through which water is forced by means of a pump (2), actuated by a handle (3), the grip of which is hinged and can be set at right angles to the shaft, as shown. The pump is supplied with water through a reinforced rubber intake pipe (4), terminating in a metal strainer (5). The standard length of the intake pipe is probably about 6 feet 7 inches. Water is delivered to the filter chamber through the delivery pipe (6). The filter chamber is contained between a front plate (7) and rear plate (8) which are held together by four tie-bolts and wing nuts (9). The two lower bolts are hinged to the rear plate and they can

be swung outwards when the filter chamber is to be dismantled. The wing nuts can be tightened by means of a key (10) which is normally located on the bar (11). At (12) on the front plate is an air valve, with a safety valve (13) and (14) the water outlet. Inside the filter chamber are four screens (15), provided at one side with top and bottom annular porcelain projections which fit together when the screens are in position, forming a continuous water channel. Alternating with the four screens (15) are three frames (16), also fitted with annular porcelain projections. Between each screen and frame, and between the two outer screens and the front and rear plates, are eight filter pads (17).

b. Method of Operation

Water is sucked by the pump (2) into the strainer (5) and intake pipe (4), through the delivery tube (6), past the air valve (12) and safety valve (13) into the upper and lower channels formed by the porcelain projections on the frames (16). From each of these two channels three small openings (18), one in the center of each porcelain projection, lead to the inside of the frame; the water is forced through these and then through the filter pads (17) into the screens (15), where it goes into the upper and lower channels formed by the porcelain projections on the screens, and can be collected at the water outlet (14).

c. Method of Assembly

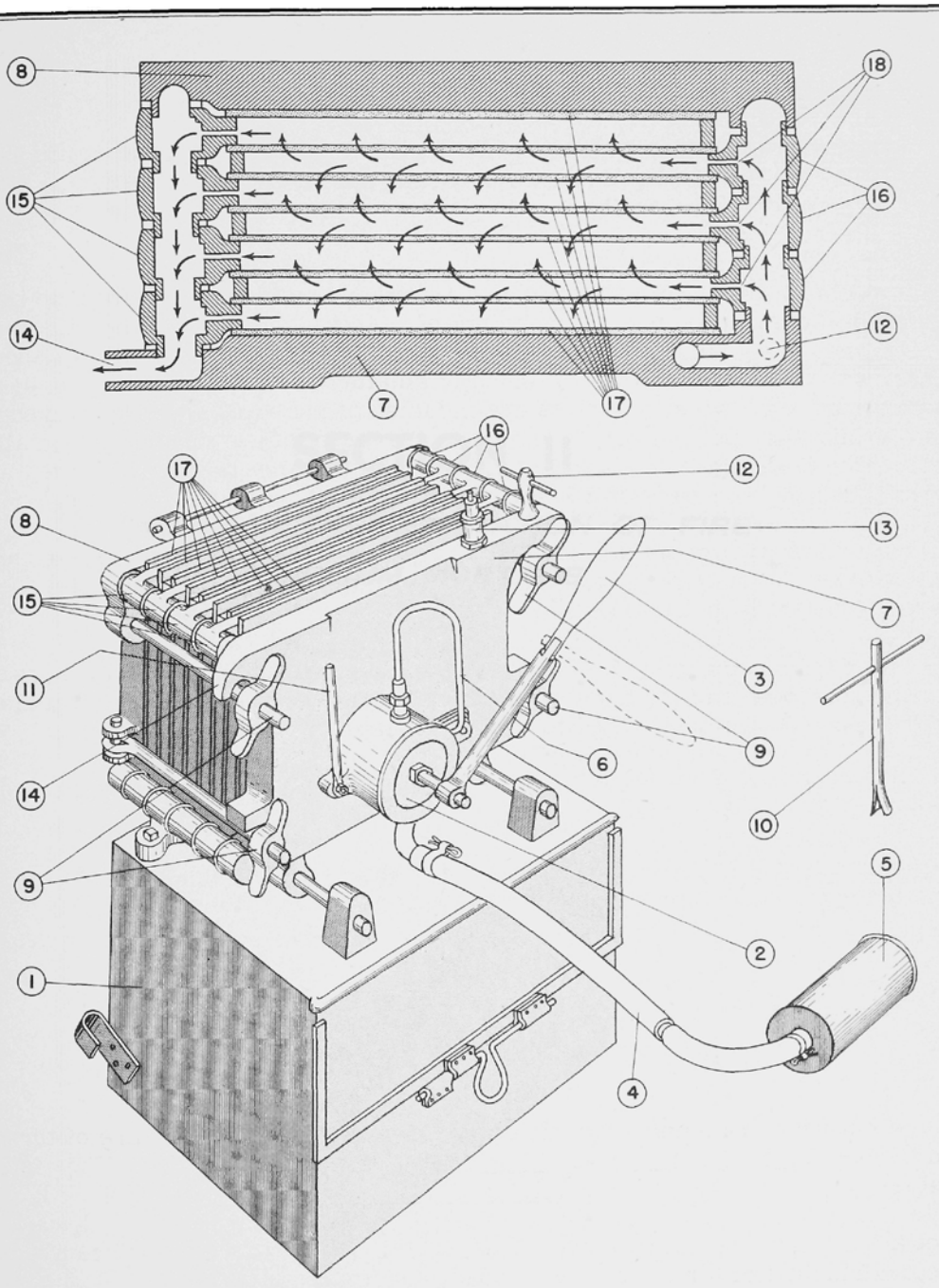
Remove and roll up the canvas-cover. Unscrew the 4 wing nuts. Move the 2 lower tie-bolts outwards. Pull the front plate (7) forward. Remove the screens (15) and frames (16). Insert 8 filter pads in position so that they rest on the cross bars on the lid of the spares and accessories box, so that the rough side of the pad faces toward the frame. Push back the front plate (7). Swing the 2 lower tie-bolts back into position on the front plate. Tighten the wing nuts, first by hand and finally with the key (10). Place the strainer (5) in the water, making sure that it does not sink into mud. Open the air valve (12) by putting the handle in the vertical position. Fix the grip on the pump handle (9) at right angles to the shaft, and begin to pump slowly. As soon as water issues from the air valve, close the valve and continue pumping until water begins to issue from the outlet (14).

d. Changing Filter Pads

Cease pumping. Open the air valve. Unscrew the four wing nuts. Dismantle the front plate, screens and frames. Remove, and if possible, bury the used filter pads. Carefully rinse down the front and back plates, screens and frames, then brush them, and finally rinse them again. Take eight new filter pads and insert them as directed in method of assembly instructions.

e. Care and Maintenance

After it has been used the filter should be dismantled, washed, and thoroughly dried. The strainer should be unscrewed, cleaned and reconnected. As soon as the parts are completely dry the filter should be reassembled without filter pads, the outer edges of the screens and frames covered with a thin layer of grease, and the canvas cover replaced.



GERMAN PORTABLE HAVERSACK FILTER

SECTION II

GERMAN CONCENTRATION OF FIRE-- MEDIUM MORTARS

[redacted]

GERMAN CONCENTRATION OF FIRE--MEDIUM MORTARS*

The article which follows deals with the possibilities for concentrating fire and is confined to an explanation of the simplest methods. The directive embodying these details is in the nature of a supplement to the German Army Manual 104. (H. Dv. 104) 1940. No new aiming and firing procedures are involved nor is additional laying and firing equipment required.

Attention is particularly directed to the possibility of bedding-in the base plate and to the terms "voice control action" and "position correction."

The German thought here shows the tendency towards concentration of supporting fire, and though it purports to be a supplement to the Manual of 1940, it does, in fact, it appears, represent a considerable change in policy.

An American unit in the field compares the supplement and the earlier Manual as follows: "The earlier Manual considers that medium mortars should normally be sub-allotted in pairs to forward companies, and even foresees occasions when single mortars may be placed under command of infantry platoons; the control of medium mortars by the mortar platoon commander and their concentration at battalion level is regarded as exceptional whereas in the later supplement all the emphasis is laid upon concentration as the normal policy. Recent fighting has demonstrated the effectiveness of the new policy."

Since mortars are likely to be among our most formidable enemy weapons in the future, this whole account should prove of interest.

Where an English equivalent exists but differs from a literal translation of the German, the English equivalent has been preferred. The terms "section" and "section commander" have been used to translate the German "Gruppe" and "Gruppenführer" and mean respectively a section consisting of two mortars, and the NCO in charge of such section.

* * *

a. General

(1) Concentration of the fire of several mortars increases fire effect. The fire of one section, two sections or of a complete platoon may be concentrated, depending upon the tactical situation, the number of the targets, their nature, and the ground. When two sections or a complete platoon are engaged, the fire unit will be the section. The effectiveness of the concentration will be especially high if the target can be taken by surprise by a sudden hail of fire at maximum intensity.

(2) Platoon and section commanders must, therefore, continually strive to concentrate their fire on the most important targets not only at the beginning

*Translated from the German Manual "Richtlinien für die Feuerzusammenfassung mit s. Gr. Werfern" 8 February 1943.

of an attack but throughout its duration. Should a number of targets appear at the same time it may then be more effective to silence them one after another by the concentrated fire of the section, than to engage them simultaneously each with a single mortar. The platoon or section commander must decide (guided by the nature of the target, its breadth and importance, and the demands of the situation, or of his own troops) how, and in what order targets are to be engaged.

(3) Concentration of fire may also prove very effective in defense when directed on enemy OPs, machine-gun nests, assembly areas in dead ground, woods, outskirts of villages and so on; it may be the deciding factor in the repulse of enemy attacks. Platoon or section commanders must take all measures within the framework of the fire plan to ensure that the fire of their mortars can be concentrated on the maximum number of points.

(4) Sound intercommunication is essential for rapid concentration of fire--in the case of a section, between the section commander and his mortars, and in the case of two sections or the whole platoon, between the platoon commander and the individual sections.

In the first case, transmission of orders by relayed voice or remote control procedure will normally suffice. The provision of a line link from the section commander's OP to the mortar position, or to the OP of the second mortar is only necessary where considerable distances are involved owing to the nature of the ground or enemy activity, and will be the exception.

On the other hand, when two sections or the complete platoon are engaged, a line link will frequently be necessary from the platoon commander's OP to the section OPs. The platoon commander will detail the sections providing signals apparatus, and decide whether the link is to be laid and maintained by platoon HQ orderlies or by section personnel.

(5) Rapid and unhesitating target indication makes for quick fire concentration, and increases the flexibility of the fire. A given target may be indicated by:-

(a) Pointing out on the Ground

This method is the rule where a section is to engage. The section commander points the targets out personally to both detachment commanders in cases where he hands over fire control to them. Should he control a mortar himself, then in order to save time he will normally entrust the detachment commander of this mortar with the task of indicating targets to the other mortar.

When a complete platoon is in action, this method of target indication is only possible if the sections are close together. In general, the method is excessively lengthy, and as a result, the platoon commander will normally choose one of the following procedures according to the situation, and time available.

[redacted]

(b) Fire by the "voice control" section

In order to be able to control and, if necessary, concentrate the fire of several sections, or to bring the fire of one section quickly down onto a target, the platoon commander will site his OP within shouting distance of a section OP (i.e. the OP of the "voice control" section). Then, to indicate a target to the other sections, he orders the "voice control" section to fire on the target using one mortar. In this connection it should be noted that the element of surprise will be forfeited by the preliminary round. This method is therefore only to be recommended when engaging targets which cannot quickly move out of the fire (see paragraph 7 below).

(c) Named features

The platoon commander names a number of conspicuous topographical features distributed in breadth and depth over the battlefield in the presence of the section commanders:-

e.g. "right hand edge of wood", "haystack", "lone tree", "brown knoll". Any target appearing will then be described in relation to one of these reference points, or its distance in line from one of them given in terms of mils* measured by the binoculars:-

e.g. "machine-gun right hand edge haystack", or, "OP 50 mils left of the lone tree". This method is quick, and will be found convenient where speed is necessary, as for instance in the case of an encounter attack or while an attack is still in progress.

(d) Target key

The target key takes the form of a simple field sketch or panorama, in which conspicuous points are indicated by a capital J and a number**. The key is then distributed to sections. Indication of targets follows in accordance with paragraph 5 above. Fire orders will be determined and referred to in relation to individual J-points. The key must agree with the key in use by the unit to which the mortars are subordinated (company, battalion, etc.) This method takes time, and its use is, therefore, frequently confined to the deliberate attack and to defense.

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*A Mil is 1/6400th part of a circle and at any range subtends a distance of approximately 1/1000th of that range. There are approximately 18 mils to one degree.

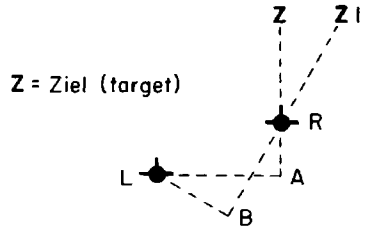
**The "J" indicates an infantry (German-Infanterie) target. German practice is to number targets from the right, using numbers from the block 100-199 for battalion support weapon targets, e.g. MMGs and mortars; and from the block 200-299 for regimental support weapons, e.g. infantry guns. German artillery proper adopts a similar system except that numbers are used without the letter prefix. Note: It is to be observed that originally the Roman J was a Gothic I (see H. Dv. 139/9, paragraphs 91, 92) derived from Infanterie, and may still be found in some documents.

[redacted]

(6) When fire is concentrated individual mortars will nonetheless be laid on the target or the allotted portion of the target area in accordance with the laying procedure given in Army Manual 104. Bunching and careless behavior during laying must be avoided.

(7) In order to retain the element of surprise when fire is concentrated, ranging will normally be carried out by a single mortar firing on a registration point (i.e. another target, or a feature in the vicinity of which the enemy is believed to be). This registration point must lie at approximately the same range as the target which is to be engaged, and should not differ from it in line by more than 300 mils*. A range finder is considerable assistance when firing on the registration point. As long as all mortar platoons are not equipped with this instrument, the platoon commander must obtain one on loan from one of the MMG platoons. Measurement of large variations in line using the binoculars requires much practice and should be frequently exercised on training.

(8) The other mortar in the section accepts the established range to the target and corrects it for position correction. Position correction is the distance in meters measured along the line of fire by which the second mortar of a section is either forward or to the rear of the first one.



In the above sketch the line R-A is the position correction of the left mortar in relation to the right one. Should large switches be made, then the position correction alters, as shown by the line R-B. In this case it must be worked out afresh.

The mortar position NCO estimates, or if sufficient time is available, paces the position correction. In order to do this he moves prolongation of the line Z-R counting his steps, until he reaches a point at which the left mortar appears to be at right angles. He adds this distance (in meters) to the ordered range for the right mortar. For example, if the ordered range for the right mortar is 1,200 meters, and position correction for the left mortar 55 meters, then the order for the left mortar will be "left 1,260." Should the second mortar be sited forward of the first one, then position correction must be subtracted from the range.

(9) Fire for effect, will normally be proceeded with only after the mortar has registered. When engaging fleeting targets, parties of troops in dead ground, wooded areas, or targets of considerable size, then shooting-in may be dispensed

*i.e. about 17 degrees.

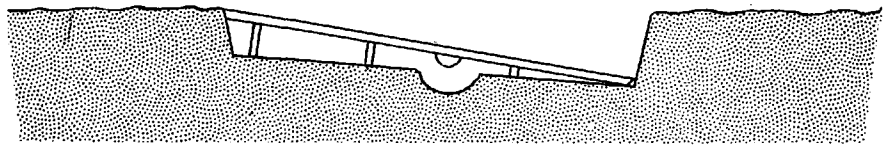
[redacted]

with if the situation demands it. When concentrating fire on large targets surprise effect or the necessity for conserving ammunition may make it expedient to register or shoot-in only one of the mortars.

(10) Bedding-in the base plate will minimize the disadvantages which arise when shooting with mortars which have not registered.

The following directions will be complied with when bedding-in the base plate:-

After the detachment commander has aligned the base plate in accordance with H.Dv.104, he will mark its dimensions on the ground and have the bed dug out. Its forward edge should be dug to a spade's depth* and the rear edge to half a spade's depth; this will produce a slope of 15 degrees (see sketch).



An additional depression will be made to correspond with the breech piece socket, and the rear edge of the base plate should be level with the surface before firing. The base plate will then be stamped in. Large stones, roots, etc., should be removed from the bed.

On loose, sandy soils with a grass or heather surface, the turf that has been removed should be used to make the bed.

If the ground is frozen or hard the bed should first be be broken up in order to prevent bounce, which makes shooting-in more difficult, and puts a severe strain upon the mortar.

On stony ground the bed should be dug deeper than usual and made up with earth or clay.

The construction of the bed takes from 3 to 5 minutes.

(11) When firing mortars which have not shot-in one must be prepared for a considerable dispersion of the first rounds, which may possibly also involve some short ones. This method should accordingly only be used when one's own troops are not situated too close to the target which is being engaged.

*The German entrenching tool is 8 1/2 inches long.

[redacted]

b. Concentration of Fire within the Section

(12) When preparing to concentrate his fire, or when actually firing, the section commander may either entrust detachment commanders with fire control, or himself control it.

(13) He will adopt the first course if the mortar positions are far apart. In this case the section commander merely indicates the target to the detachment commanders (or the relevant portion of the target, if the target is large), lays down the registration point for each mortar, should this be necessary, and instructs detachment commanders to report to him when ranging is completed. The detachment commanders carry out ranging individually and the section commander helps them out with observation. As soon as ranging has finished the detachment commanders switch onto the target line and report, e.g.,"Right mortar ranging complete. Mortar aligned on target."

According to the situation, the section commander may order both mortars to carry on with fire for effect either immediately after ranging has finished, or on his order. The amount of ammunition expended during fire for effect will depend upon the nature of the target and the state of ammunition supplies.

Should ranging have been carried out on registration points which differed considerably in line from the target, then if the situation permits, line and range to the target may be confirmed by a few rounds before fire for effect begins.

(14) Should the section commander himself act as fire controller, then he may either range both mortars one after the other, or only one of them. In the latter case the detachment commander who has been detailed to assist the section commander will range the other mortar while registration is proceeding. The base plate of this latter mortar may be bedded-in if the ground permits (see paragraph 10 above).

The mortar position NCO determines the position correction for the mortars.

As soon as ranging has finished, the mortar position NCO applies the necessary position correction to the range, and passes the result to the second mortar. The section commander then proceeds with fire for effect in accordance with paragraph 13.

c. Concentration of fire of Two Sections or of a Complete Platoon

(15) The section is the fire unit even when the fire of several sections is being concentrated. The section establishes the necessary data and carries out the engagement of the target in accordance with the platoon commander's orders.

(16) If the fire of several sections is to be concentrated, the platoon commander will site his OP at a point from which he can obtain the maximum uninterrupted observation over the battlefield. He details the section which he proposes to have close at hand as voice control section, and arranges communication

[redacted]

to the other sections. He makes suitable preparations for target indication, bearing in mind the time factor and the tactical situation (see paragraph 5 above).

(17) Concentration of the fire of the sections will be regulated both in space and time; regulation in space will be co-ordinated with the method of target indication and must be as simple as possible e.g.,"right section right half of target, left section left half of target." Section commanders will distribute the fire of the individual mortars.

(18) Limitation in time may be necessary on tactical grounds or for technical reasons--for instance, when ranging. Normally ranging will be in accordance with paragraph 7, which makes it possible for the platoon commander to lay down the registration points for individual sections.

The tactical situation may demand that sections range gradually, and at varying intervals, in order to preserve the element of surprise. In this case the platoon commander will order the time at which each section is to range.

(19) As soon as ranging is reported complete, the platoon commander will order fire for effect. This will be carried out in accordance with paragraphs 12-14. Simultaneous opening of fire by all sections in the case of surprise fire may be produced on the commander's order. The order will be passed, as the situation demands, by line, or by the fire of the voice control section. It can also be arranged on a time basis. If fire has to be brought down on the target at a certain time, the time of flight must be borne in mind.

(20) The platoon commander will observe the general pattern of each section's fire and report it to the relevant section, e.g.,"No. 1 section short", or "Left mortar No. 3 section shooting left 30 mils". The section commanders thereupon adjust their MPIs (main points of impact). The fact that the platoon commander is also observing does not, however, absolve section commanders of their duty of constantly watching their fire and making independent efforts to improve it.

(21) Concentration of the fire of several sections is facilitated if the mortar positions are sited as close together as the situation, task and ground permit. Under these circumstances, also, the section continues to be the fire unit. Ranging may occasionally be carried out by only a single mortar. In this case position correction must be applied to all the other mortars when firing for effect. However, should the mortars not have been shot-in, shooting-in may be omitted (see paragraphs 9-11).