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TACTICAL AND TECHNICAL TRENDS

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SECTION I

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AIR

1. RECENT FLYING LIMITATIONS IMPOSED ON GERMAN AIRCRAFT

An indication of possible reckless or unintelligent flying on the part of GAF pilots may be found in recent instructions, establishing certain restrictions on the operation of various airplanes, issued by the Germany Air Ministry. This was done to reduce the loss of, or damage to, particular planes by overtaking their capabilities. The particular types covered are the FW-190, the Me series, the He-177, and the Ju-88.

The maximum permissible operating speeds for the FW-190 have been reduced from 466 mph at all heights to the following:

Up to 10,000 ft - 466 mph
From 10,000 ft to 16,500 ft - 428 mph
From 16,500 ft to 26,250 ft - 360 mph

These speeds are to be marked on the air speed indicators in each aircraft and are only permissible with strengthened elevators. Aileron corrections at high speeds must remain within moderate limits.

The He-177 combines light elevator control with good elevator effect, but has a comparatively low factor of safety, with the result that wrinkling of the skin on the wings or wing failures may occur from careless flying. Permissible full-out acceleration at the present time amounts to 2.3g with a flying weight of 27 tons, and crews are reminded that high stresses may be caused when pulling out of a glide at high speed, by sharply pulling up out of horizontal flight at any speed, and in steep turns or by strong vertical gusts at high speed. A warning is issued that the automatic pull-out apparatus can unintentionally cause a strain of over 2.5g by tail-heavy trimming before the release of the bombs, by pulling back on the control column at the time of the automatic pull-out if the centre of gravity lies too far to the rear, or when dive-bombing is done in very gusty air. In the latter case, speed should be reduced to 186 mph. The pilot must be trained to watch closely the air speed indicator and the acceleration warning apparatus during every pull-out.

In the case of all aircraft of the Me-109 series, including the Me-109G, attention is called to the numerous accidents caused by wing breakages, resulting from strains induced by air speeds in excess of the permissible maximum limits. All previous limitations are therefore cancelled and the following are substituted (previous limits are given for comparison):

	<u>Limit</u>	<u>Previous Limit</u>
Up to 10,000 ft	466 mph	466 mph
At 16,500 ft	435 mph	425 mph
At 23,000 ft	357 mph	382 mph
At 30,000 ft	280 mph	341 mph
At 36,000 ft	248 mph	304 mph

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A corresponding notice is to be placed on all airspeed indicators in these aircraft.

Warning is also given against yawing in a dive, which under certain conditions leads to high, one-sided wing stresses which the wing tips cannot support. When yawing occurs, the dive is to be broken off gradually, without exercising force. Wing tips must be examined and checked frequently for signs of failures. When yawing is encountered during turning, correction must be made with the rudder only and not with the ailerons. Mention is also made of high-wing stresses caused by the unintentional unlocking of the landing gear, especially the dropping of one side in a dive. It is stated that steps are being taken to prevent this.

Apparently, even the yellow recognition paint on the ailerons changes their characteristics unfavorably and paint already put on is to be removed.

Reference is made to the difficulty of controlling Ju-88 aircraft at a dive angle of 60° , and it is stated that in the future they are to be rigged for a dive angle of 50° only. This will limit the indicated air speed in the dive to between 329 and 341 mph as against 341 to 354 mph obtained in a 60° dive.

2. THE Me-109 G

A new "G" series of the Me-109 has been reported and at least two sub-types, the G-1 and G-2, have been in operation. The sub-types are numbered from 1 to 6, the difference being that the odd-numbered models are fitted with pressure cabins which the even-numbered versions lack.

In general, the design and structure of the airframe is similar to that of the Me-109F, with a wing span of 32 ft 7 in, a length of 29 ft 4 in, and a gross wing area of 172 sq.ft. It is powered by a Daimler-Benz 605-A1, inverted "V", 12-cylinder, liquid-cooled engine, which, in the case of the G-2, gives a maximum speed of 378 mph at 23,200 ft. with tropical equipment, and 395 to 400 mph at 22,000 ft. without it. The non-tropical version is estimated to climb to 18,000 ft. in 5.3 min., and at that altitude is believed to have a normal range of 415 miles and a maximum range of 725 miles. The regular fuel capacity is estimated at 106 U.S. gallons, and there is provision for a jettisonable fuel tank of a 78-gallon capacity fitted to a quick release hook below the fuselage. This feature increases the normal range to 755 miles and the maximum range to 1,250 miles. Although the main fuel tank is generally not self-sealing, an aircraft was found to be fitted with one that was self-sealing.

The armament consists of one 20-mm cannon firing through the spinner, two 7.9-mm machine guns mounted above the engine, firing through the propeller arc, and provisions have been made for two 20-mm cannon

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mounted in fairings below the wing, about 12 in. inboard of the leading edge slots. When used as a fighter-bomber, either one 550-lb. bomb, four 110-lb. bombs, or 96 antipersonnel bombs can be carried. In such case, no jettisonable fuel tank could be fitted.

The pilot's back is protected by 8-mm armor plate and his head by 10-mm plate, the latter attached to the jettisonable cockpit cover. There is a laminated, duralumin bulkhead about .75 in. thick, placed behind the fuel tank. In front of the pilot is a 2-1/2-in. bullet-proof windshield, forward of which is 1/4 inch of plexiglas plate fitted with a glass plug screwed in the corner, containing a moisture-absorbing substance to prevent condensation between the two plates. While the cockpits in all models are probably sealed, only the odd-numbered versions are pressurized. In the latter aircraft the pressure inside the cabin can be regulated by moving a pressure valve within small limits, to "Rising" or "Falling" up to 19,700 ft. altitude. Desired compensation of pressure (presumably during descent) may be obtained by operating a rapid-pressure-release valve, and up to 9,800 ft. altitude ventilation may be obtained in the same manner. The cabin is also provided with dessicant "cartridges" between the double panes of the superstructure.

ANTITANK

3. GERMAN ANTITANK MAGNETIC CHARGE

Until a technical analysis reveals a detailed breakdown of the functional operation of this device, a practical, field analysis, made in the Middle East, is given in this report with a sketch which is not to scale.

a. The Grenade

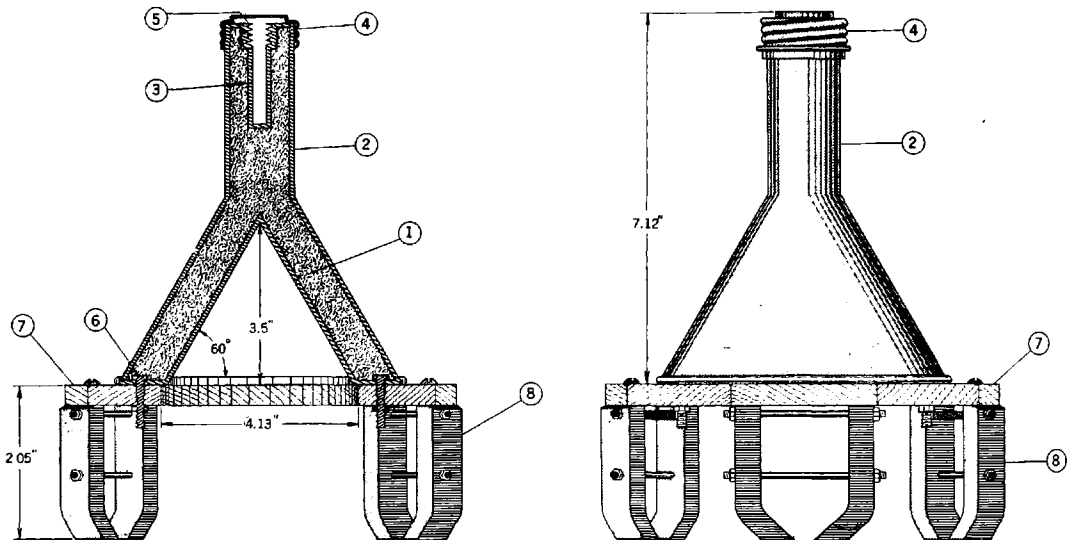
It is painted field gray. The magnets attached to the base of the charge are said to be strong enough to hold it against a vertical surface. The total weight is about 6.5 pounds--the magnets themselves weighing about one-half the weight.

The main filling (1) is contained in a pressed metal container. The neck (2) performs the dual function of forming a hand-grip and also contains a recess (3) for the detonator. A screw-threaded closing cap(4) is set above internal screw-threads (5) which receive a BZE igniter (see description below of this igniter). Six bolts (6) tie the base of the conical portion to the magnets. Between the magnets and base of the conical portion is the plywood framework (7). There are three horseshoe magnets (8).

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Additional information obtained from enemy sources further serves to identify what is apparently the same grenade. The grenade is called Hafthohlraum Granate (clinging hollow-space grenade); it is funnel-shaped, and adheres to an enemy tank by magnetic attraction. It was said to be first employed on the Russian front in July 1942. These grenades are either transported in cardboard containers or else suspended from the soldier's belt.



In using the grenade, it is reported that the soldier moves forward towards a tank, via the "dead area" where the tank is unable to reach him with its fire. Upon reaching the tank, he places the grenade against the hull where it adheres through magnetic attraction. The fuze is pulled at the same time. Meanwhile, the grenade holds fast to the metal for several hours.

The destruction is caused by simultaneous melting of the metals and by destructive explosion.

The funnel-shaped body of the grenade is made of thin steel. The incendiary material is described as a pink dust which, when ignited, gives off a terrific heat - sufficient to burn through the armor plate almost immediately. Heat is accompanied by an explosion and the emission of choking gases.

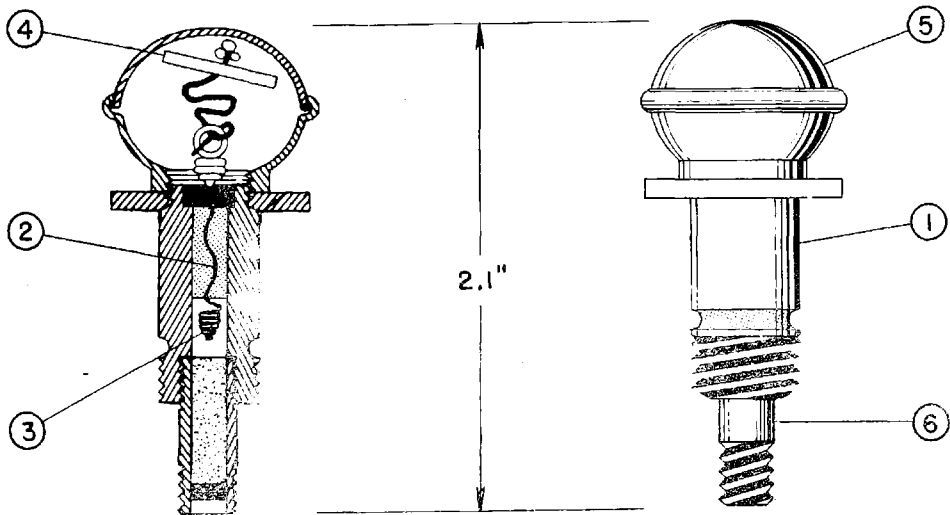
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b. BZE Igniter

(1) General

This is the standard igniter for the German egg-shaped grenade; it may also be used with demolition charges and booby traps. The head (5--see sketch) is painted blue; this igniter has a delay of about 4 1/2 seconds. However, there is a similar igniter with a head colored RED which has a delay of only 1 second. The latter is used with the so-called German "shaving stick grenade" (used as a booby trap) and a signal smoke flare; when used with these, the igniter cannot be easily removed because of the locking nut on the underside of the lid of the container, but they are reasonably safe to handle once the igniter has been neutralized.



BZE. IGNITER

It is important to note that it has recently been reported from North Africa that German egg-shaped grenades have apparently been booby-trapped with the 1-second delay igniter; if the red cap is removed and the firing cord pulled the grenade detonates almost instantaneously.

(2) Description

The BZE igniter consists of a brass body (1), which contains the friction composition through which the pull wire (2) is drawn. The lower end of this wire is coiled (3) to provide the resistance to the pull. The upper end of the wire has a loop through which is fastened one end of a cord 2 1/4 inches long.

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The other end of the cord is attached to a disk (4) inside the spherical head (5). As the head is unscrewed and pulled, the slack in the cord will be taken up when the disk catches in the opening of the head. Pull is then exerted on the wire, the friction composition is ignited, and in turn ignites the compressed powder in the steel tube (6).

(3) To Neutralize

(a) If the igniter is found with the head in place, it is safe to handle without further manipulation.

(b) To render the igniter inoperative, carefully unscrew the head, taking care not to exert any pull on the cord.

(c) Cut the cord by means of scissors and replace the head with the cord inside.

ARMORED FORCE

4. COINS AS A MEASUREMENT OF ARMOR THICKNESS

A convenient means of measuring armor thickness when no scale is available, is by comparison with a coin of known diameter. The following table may be of interest. The measurements are in terms of inches.

<u>U. S.</u>	<u>British</u>	<u>French</u>
1 cent - 0.750	1/2 penny - 0.650	5 centimes - 0.630
5 cents - 0.835	1 penny - 0.984	10 centimes - 0.866
10 cents - 0.705	6 pence - 0.737	20 centimes - 0.945
25 cents - 0.955	1 shilling - 0.905	50 centimes - 0.669
50 cents - 1.205	2 shillings ("Florin") - 1.102	1 franc - 0.905
Silver dollar - 1.500	2 shil. 6 pence ("Half Crown") - 1.220	2 francs - 1.063

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ARTILLERY

5. GERMAN VISUAL SIGNAL SYSTEM FOR ARTILLERY FIRE CONTROL

Recently information has come in from German sources of what seems to be a simple visual signal system for artillery fire control in the event of failure of other means of communication. Apparently, it is employed between OP and gun position. Also it may possibly be used between a forward observer and his communications detachment, when, for one reason or another, it is necessary for the latter to remain at a distance from the observer.

No knowledge of any general signal code is required, and the apparatus can be nailed together and painted in half an hour.

Two disks or panels (see sketches) are required, attached to short rods or handles--such as a barrelhead nailed to a broomstick. The disk is possibly painted half red, half white or whatever other colors that may be more suitable to the background. These disks are used as shown in the accompanying sketches. At night lights are used.

CHEMICAL WARFARE

6. GERMAN ACID SMOKE FLOAT

German smoke floats, captured at a North African port, are described below.

Each float weighs 42 pounds empty, and 83 pounds charged, and is 32 inches high by 12 3/4 inches in diameter. The time of emission is 8 to 9 minutes.

The float consists of the chemical container arranged inside a drum-shaped buoyancy chamber. A pipe, open at the bottom and closed by a valve at the top, admits water to the chemical container. The valve is operated by a spindle extending to the top of the float.

When smoke is required, the valve spindle is withdrawn and the float is lowered into the water. Water entering through the inlet pipe reacts with the chemical filling, thought to be sulphur trioxide, and smoke is emitted through an outlet pipe at the top of the float.

The floats were tried out and gave a good smoke cloud, but difficulties due to corrosion may be encountered.

 ONE

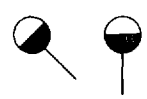
 TWO

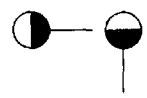
 THREE

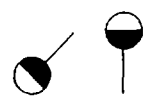
 FOUR

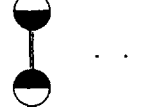
 FIVE

 SIX

 SEVEN

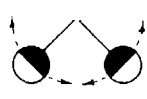
 EIGHT

 NINE

 ZERO

 FUZE QUICK

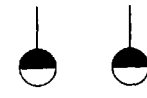
 FUZE DELAY

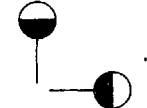
 CHARGE (PROPELLANT)

 FLAT TRAJECTORY FIRE

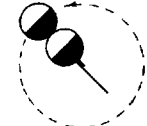
 HIGH-ANGLE FIRE

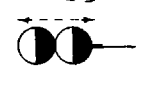
 QUADRANT ELEVATION

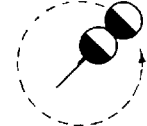
 ELEVATION

 MORE

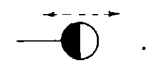
 LESS

 CHANGE POSITION FORWARD

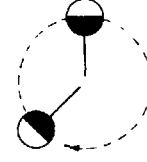
 VOLLEY FIRE

 CHANGE POSITION TO THE REAR

 ASSEMBLE PLATOON (MARCH ORDER ?)

 RIGHT

 LEFT

 DEFLECTION

GERMAN VISUAL SIGNAL SYSTEM

7. GERMAN CHEMICAL WARFARE VEHICLES

a. General

The Germans have given much attention to the development of decontamination, gas-detection and smoke-generator trucks. Most of the equipment, as will be seen hereafter, is mounted on 1-and 3-ton half-tracks, some on medium heavy six wheelers, as illustrated in the accompanying sketches.

b. Bulk Contamination Vehicles

The Germans have developed two vehicles which form part of the equipment of contamination units. These vehicles are employed in spreading persistent agents. Each has a crew of one in addition to the driver. The spray is operated from a panel behind the driver's compartment and appears to be emitted from a jet on a swivelling arm at the top of the vehicle, the nozzle being fed by a flexible hose of small diameter hung on support arms. It is probable that the nozzle traverses in an arc, which would enable a wide zone to be sprayed; 100 grams (.22 lb) per sq. meter is the minimum degree of contamination considered effective by the Germans. One machine is 15 feet 3 inches by 5 feet 11 inches, 5 feet 9 inches high, weighs 4.5 tons, and is mounted on a 1 ton (Sd.Kfz* 10/3) (see figure 1) half-track; the other, (Sd.Kfz. 11/3) likewise mounted on a 1-ton half-track is 18 feet 2 inches long by 6 feet 7 inches wide, and 6 feet 11 inches high with a weight of 7.3 tons (see figure 2).

c. Decontamination Vehicles

Light and medium decontamination vehicles exist, which are mounted, respectively, on the 1-ton and 3-ton half-tracked chassis. In both cases the equipment carries a hopper at the rear, by which the decontaminant is distributed over the road or terrain requiring treatment. Between the driver's compartment and the hopper, eight large drums of bleach, for use in the hopper, are stacked. In addition to this, each vehicle carries 16 decontamination canisters, each holding 22 pounds of decontaminant, for use by hand on isolated areas. The crew of each vehicle is three men.

The light vehicle is Sd.Kfz. 10/2 (see figure 3). It is 15 feet 7 inches by 6 feet 1 inch and 5 feet 4 inches high, weighing (equipped) 4.8 tons. The medium vehicle is the Sd.Kfz. 11/2 (see figure 4). It is 19 feet long, 6 feet 7 inches wide and 7 feet 10 inches high. The battle weight is 6.7 tons.

According to a reliable report the medium vehicle carries 760 kilograms (1,675 pounds) of bleach; a strip 1.7 meters (5 feet 7 inches) wide and 1.4 kilometers (just over a mile) long can be decontaminated by using a density of 300 grams (0.66 lb) of bleach per square meter. The density at which the vehicle distributes decontaminant is independant of the vehicle speed, the maximum potential density is 600 grams (1.32 lb) per square meter.

*Sonder Kraftfahrzeug - Special Motor Vehicle

CHEMICAL WARFARE VEHICLES

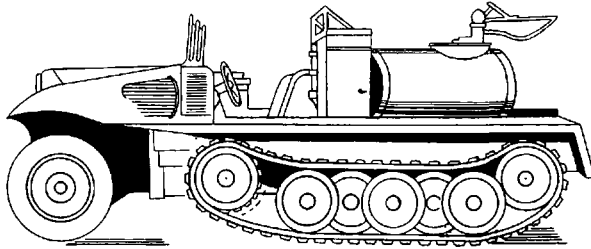


FIG. 1
LIGHT BULK CONTAMINATION VEHICLE
(Sd. Kfz. 10/3)

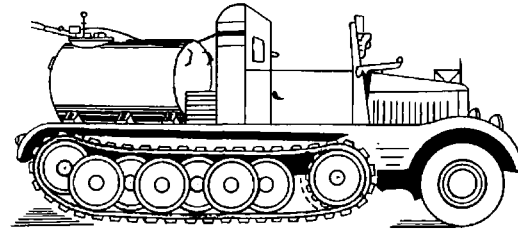


FIG. 2
MEDIUM BULK CONTAMINATION VEHICLE
(Sd. Kfz. 11/3)

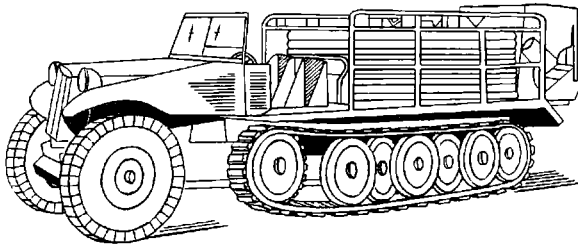


FIG. 3
LIGHT DECONTAMINATION VEHICLE
(Sd. Kfz. 10/2)

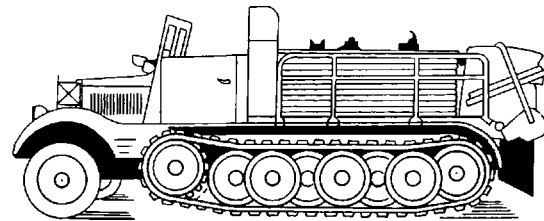


FIG. 4
MEDIUM DECONTAMINATION VEHICLE
(Sd. Kfz. 11/2)

CHEMICAL WARFARE VEHICLES

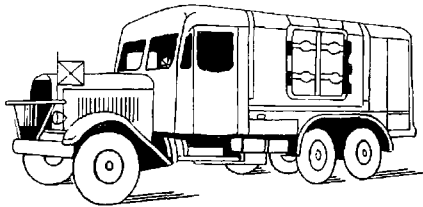


FIG. 5
VEHICLE FOR DECONTAMINATION OF CLOTHING
(Kfz. 93)

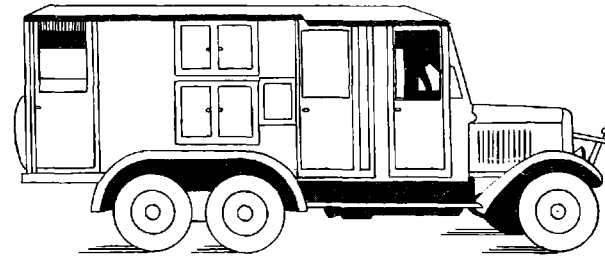


FIG. 6
VEHICLE FOR DECONTAMINATION OF PERSONNEL
(Kfz. 92)

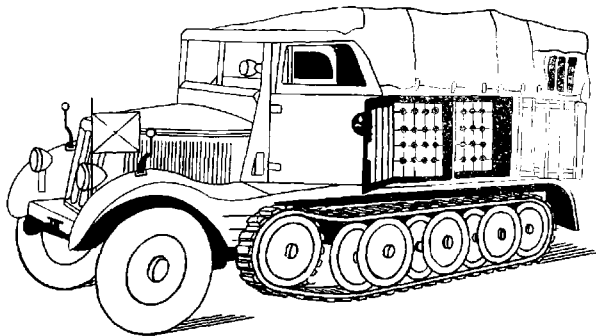


FIG. 7
SMOKE VEHICLE (Sd. Kfz. 11/I)

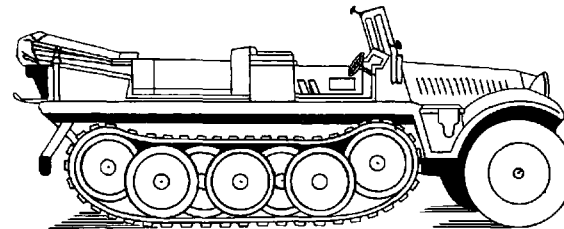


FIG. 8
GAS-DETECTION VEHICLE (Sd. Kfz. 10/I)

d. Gas-Detection Vehicle (Sd.Kfz. 10/1)

This vehicle (see figure 8) appears to be very little different from the standard, light, 1-ton half-track. It is, in all probability, simply that vehicle fitted out to carry personnel of the gas scout section and their equipment.

e. Vehicle for the Decontamination of Personnel (Kfz. 92)

This has a large box body with doors just behind the driver's compartment and at the rear (see figure 6). No details are available on the internal fittings and equipment, but it is presumably some form of mobile bath. It is a 6-wheel, Henschel medium 9-ton truck, 23 feet 4 inches long by 7 feet 7 inches, standing 9 feet high.

f. Vehicle for Decontamination of Clothing (Kfz. 93)

This has a large, closed body with heavy doors at the center of the left side, giving access to the chamber in which contaminated articles are arranged for treatment (see figure 5). Decontamination may be carried out by steam or hot-air treatment, mixed with suitable chemicals where necessary. The vehicle is completely equipped with an oil-fired boiler, fans, water tanks, etc., necessary for the work. This machine, like the personnel decontamination truck, is a six-wheel Henschel 23 feet 3 inches in length, 8 feet 2 inches in width, and 10 feet in height, weighing 9.7 tons.

g. Smoke-Generator Vehicle (Sd.Kfz. 11/1)

A large part of the body of this vehicle (see figure 7) is taken up by what appear to be racks for smoke thermal generators or other munitions. There is, in fact, no evidence as yet that the vehicle is designed for more than the transport of smoke ammunition. This vehicle is a 7.3-ton half-track. It is 23 feet 7 inches by 8 feet 2 inches, and 8 feet 10 inches high.

ENGINEERS

8. GERMAN "S" MINES COMBINED WITH TELLERMINES

Minefields are reported which contain both Tellermines and "S," mines. At the risk of possible repetition, it seems worth while to point out here the difference between these two types, as engineers clearing Tellermines, if "S" mines are unexpectedly encountered, may be in a rather difficult situation.

The Tellermine ("Teller" is "plate" in German) is the standard antitank mine, a flat, round device looking not unlike a stack of wheat cakes. Unless booby-trapped with a supplementary pull, pressure, or release igniter, the Tellermine will ordinarily explode only when run over by a tank or other vehicle. Where pressure is equally distributed over the top of the mine, the weight required for detonation is approximately 400 pounds. However, if pressure is brought to bear on the edge of the mine, about 175 pounds is sufficient for detonation. The figures referring to pressure apply to mines buried at a depth of about 3 inches.

The antipersonnel "S" mine, otherwise known as the "bounding mine" or "silent soldier," is a much more ingenious device. Buried in a shallow hole, it is tossed into the air by a light charge of powder in its base, and explodes violently when some 5 feet up. In size, the mine is about as large as a quart tomato can. It weighs about 9 pounds, and the bursting charge of approximately 1 pound of TNT scatters some 350 steel balls with such surprising force that they are dangerous at 200 yards. Both trip-wires and direct step-on devices are used to ignite them.

9. GERMAN VIEWS ON RUSSIAN SUMMER CAMOUFLAGE

The following is a translation of a German pamphlet on Russian summer camouflage, printed in the spring following the German invasion of Russia in June 1941. The Germans evidently found Russian camouflage methods disconcerting, and some were apparently new to them. The great care the Russians apparently devote to camouflage training is worthy of note; their success in effective concealment seems to have resulted from ingenuity and strict camouflage discipline.

* * *

a. Preface

The following examples are taken from reports from the front and captured orders. They represent only a part of Russian camouflage methods, but are in some cases new and worthy of imitation. They can be used in improvised form by our own troops. A detailed knowledge of Russian camouflage and methods helps our own troops to recognize the enemy and his tricks without delay. In this way surprise is avoided and troops can operate with greater confidence.

b. Camouflage Material

The camouflage instinct is strongly developed in the Russian, and his inventive ability is astounding. This gift is systematically encouraged by thorough camouflage training which begins on the first day of military training and is continued throughout the whole period. Camouflage discipline is good even among troops who otherwise might be well below the average as regards weapon training. Infringements of camouflage discipline are severely punished.

(1) Prepared Camouflage Material

(a) Summer Camouflage Suit

The suit consists of a jacket and hood of green-colored material in which tufts of matting in various shades are woven. In appropriate surroundings, a man in a prone position in this clothing cannot be seen more than a few paces away.

(b) Summer Camouflage Smock

This consists of colored material with patches in dark shades, and is suitable for use with a broken background of woods and bushes.

(c) Camouflage Net for Rifleman

The net is about 5 by 2 1/2 feet and weighs about 1/3 pound. It is woven with natural camouflage material taken from the immediate surroundings and can be used either as a covering or spread out in front of the rifleman. By binding several nets together, rifle pits, machine guns, and entrances to dugouts can be camouflaged.

(d) Camouflage Mask for Rifleman

This consists of a wire contraption divided into several pieces, covered with material. In it is a hole through which the rifle can protrude. It represents a bush and is in use in three different colors. It can be folded up and carried on the person in a bag. The rifleman lies in such a position behind the mask that his body is fully hidden. In attacking he can move forward in a crouch and push the mask in front of him. The mask is only visible to the naked eye at a distance of 150 to 200 paces.

(e) Camouflage Cover for Machine Gun

The cover consists of colored fabric in which tufts of colored matting are woven. When moving forward, the cover will not be taken off. The machine gun with this cover can only be recognized when within about 100 yards.

(f) Camouflage Fringe

The fringe consists of a band about 3 yards long, from which grass-

colored matting is hung. On the ends are hooks for attaching the fringe on the object. The rifleman can fix the fringe on the helmet or shoulders. Five of these fringes are used to camouflage a machine gun, and six for an antitank gun.

(g) Nets

For covering gun positions and trenches, nets of various sizes are issued. The net is woven with shreds of matting or paper; when in use, additional natural camouflage is added, such as grass, twigs, etc. These nets are also used by tanks, tractors, trucks, and trailers. The standard net is about 12 feet square, and by joining several together, large surfaces can be camouflaged against aerial observation (see figure 1).

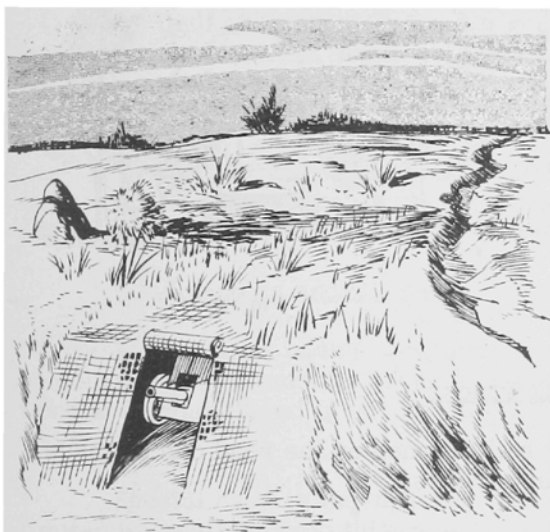


Fig. 1



Fig. 2

(h) Camouflage Carpet

This consists of shreds of various sizes into which colored matting and tufts are woven. It is used mostly for camouflaging earth works.

(2) Improvised Camouflage Material

(a) Observation and Sniper Posts

A tree stump is hollowed out and stakes are used as supports. Another method is to insert periscopes into a frame made to look like wooden crosses in cemeteries (see figure 2). Imitation hayricks are often used.

(b) Camouflage Against Observation from the Air

Shadows can be cast by fixing frameworks on the side of a house or on the roof so that the object cannot be recognized. Branches fixed on wire strung over the object can make it invisible from the air (see figure 3).



Fig. 3

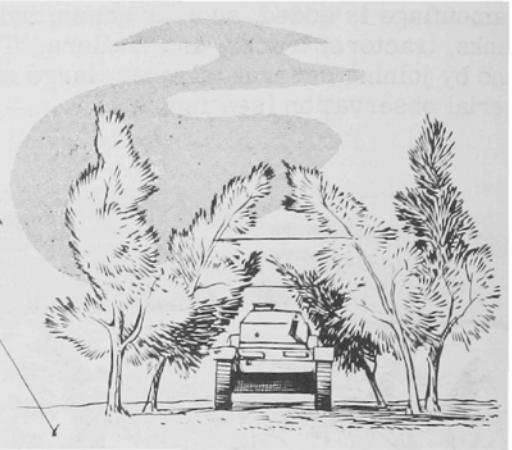


Fig. 4

(c) Camouflaging Tanks and Tank Tracks

Tanks when being transported by rail or when on the road can be made to look like roofed freight cars or ordinary trucks.

When there are groups of trees, camouflage can be quickly obtained by bending the tops of the branches over the objects to be camouflaged (see figure 4). Nets can also be spread over and attached to the trees, with natural material laid on top. Among low bushes, tanks can be covered with grass, moss, or twigs. Freshly cut trees, one-and-a-half times the height of the object to be camouflaged, complete the camouflage. Tanks on a slope can be effectively and quickly camouflaged by the use of netting or other covers. Tanks in hollows can be made invisible by covers and, even without natural camouflage, nets or covers can completely alter the shape of tanks.

Tank tracks can be obliterated by dragging a fir tree behind the tank; rolls of barbed wire with an iron rod through them can also be used for this purpose.

c. Use of Camouflage

(1) On the March

As equipment being transported by rail cannot be fully concealed, the

Russians attach particular importance to preventing the recognition of the type of equipment by making guns, vehicles, tanks, fuel trucks, etc., look like ordinary roofed freight cars. This is done by means of some sort of superstructure. Loading and unloading generally take place at night, often in open country.

Movement of large Russian units takes place either at night, with meticulous attention being paid to blackout regulations, or by day in wooded country. If the march must take place by day in country which offers only limited natural concealment, movement takes place by bounds from cover to cover. Motor vehicles are, where possible, diverted from main roads to side or wood roads. All bunching of vehicles on bridges, defiles, etc., is strictly avoided. A group of vehicles will halt under cover a distance from a defile; the movement through the defile will be made only by single vehicles or in small groups.

On the approach of German aircraft, vehicles of all descriptions take cover without delay. If single vehicles are forced to remain on the road, they either remain stationary, or, failing any camouflage protection, they take up positions diagonally on the road in order to look like broken-down vehicles.

Track discipline is carefully carried out. When tanks have to leave the main road, they travel in single column as far as possible so as not to give away their numbers by leaving many tracks.

(2) Quarters and Bivouacs

All evidence of the occupation of a village is avoided. Tanks, guns, and vehicles, if they cannot be brought under cover, are placed in irregular formations and camouflaged in yards and gardens, and against hedges, bushes, walls, and trees.

Special care is taken to see that movement from one place to another is limited to small groups; this rule applies also when issuing food, gasoline, etc.

Destroyed villages and burned-down premises are preferred for quartering men, weapons, equipment, and vehicles, as these areas lend themselves easily to camouflage.

Bivouacs are cleverly camouflaged against houses, hedges, gardens, etc. If possible, thick woods are used, and use is made of branches. In open country, hollows and ditches are used to the utmost, and bivouacs spread out in irregular formations. Tents are covered with natural camouflage material; if this is lacking, no use is made of tents. Instead, holes and pits are constructed. When bivouacs are taken up, tracks are obliterated in order to give the enemy no indication as to strength.

(3) Battle

Stress is laid on the necessity of being able to crawl for long distances at a quick pace. Patrols are well equipped with camouflage suits, and make full

use of darkness and bad visibility.

When working forward, the Russian moves in short, quick bounds, and is capable of moving through the thickest undergrowth in order to work his way close to the enemy position. If the defense is on the alert, he is able to lie still for hours on end.

Russian tree snipers are particularly difficult to recognize. Tank-destroying sections with Molotov cocktails, grenades, and mines, are distributed in wheatfields and at places several yards from the edges of woods and fields.

In defending built-up areas, the Russians make use of positions outside the area. These consist of many rifle pits, organized in depth and well camouflaged with fences and bushes. When firing from houses, machine guns are placed well back from windows and doorways to prevent the flash being seen, and also to smother the report.

When German aircraft appear, every movement ceases.

After firing, any discoloration in front of a gun is covered with suitable camouflage material. When the gun remains for some time in one position, a board of sufficient size, and colored to match the surroundings, can be laid in front of the muzzle.

As the presence of tanks leads to definite conclusions regarding the main effort of the attack, the Russians are very careful to camouflage their armor.

(4) Lay-out of Defense Positions

Reconnaissance patrols are instructed not only to study the ground from the tactical point of view but also as regards possibilities for camouflage. This includes shape of the ground formations, the background, the coloring, the available natural camouflage, and what suitable artificial camouflage material can be used. Positions are selected to conform to the natural contours of the ground, and comfort is of secondary importance. As much use as possible is made of reverse slope positions. Parapets are kept as low as possible and are carefully camouflaged with grass, etc. Positions are often camouflaged with covers made of boards, fir branches, or straw. If time does not allow, only single portions of the trench system will be covered, so that to an observer they look like connecting trenches. Provision is made to conceal vision slits. Anti-tank ditches are either entirely covered, or partially covered in such a way that they look like narrow, easily passable ditches (see figure 5, following page). Pillboxes are carefully camouflaged with nets or covers. The open walls are painted with a mixture of tar and asphalt, and covered with earth or hay. Wire obstacles can be made invisible by passing them through hedges and fences.

In woods, thick undergrowth is preferred in selecting a position. Cutting down trees to give fields of fire is avoided for reasons of camouflage.

Russian signalmen use telegraph poles, with the bark still on, and set them up at irregular distances. The line of poles is laid to conform with the country. Earth at the foot of the poles is carefully camouflaged, and trampling of the earth along the line of the poles is strictly avoided. Wire is also laid to conform with the general contouring.

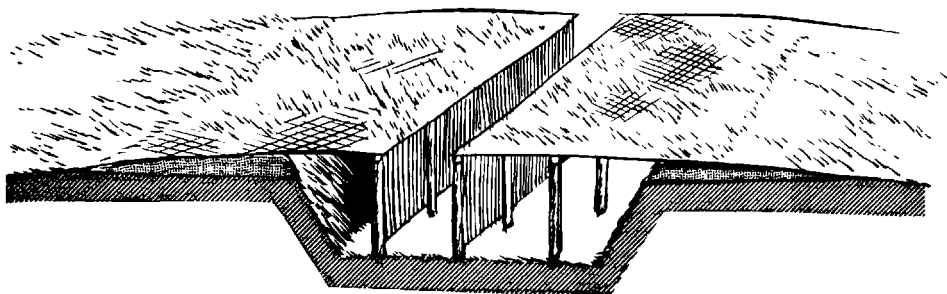


Fig. 5

Camouflage discipline in occupied positions is very good, and one seldom hears talking, rattling of weapons, or sees the glimmer of a cigarette. In order to prevent the enemy realizing that a position is weakly held, single riflemen keep up strong fire activity at various points.

d. Dummy Positions

The Russians often use dummy positions.

Dummy trenches are of normal width, but are dug only to a depth of about 1 1/2 feet. The bottom can be made dark with soot or pine needles. Dummy dugouts can be made by the use of props, with the entrance made of cardboard or paper. Dummy loopholes and observation slits can be made out of black paper or felt. Dummy gun positions can be arranged by turning over grass, or burning it in order to imitate discoloration from muzzle blast. Dummy gun positions must be at correct distances. The representation of dummy tracks leading to the dummy positions must not be forgotten. The desired result is achieved by mowing grass to the normal width of a track, and letting the mown grass remain, or rolling it. When the ground is open, color must be used in order to make the tracks light and trenches dark.

Dummy obstacles can be erected by mowing grass and making little heaps out of the cut grass. On a ploughed field, it is sufficient to plough at right angles to the furrows to the width of the particular obstacle it is desired to represent. Dummy mine pits can be made by taking out sods of turf and laying them down clumsily. The dummy minefields should be two to four times as obvious as the normal. In dummy minefields 5 to 10 percent of live mines are generally laid. Dummy light installations are used a great deal in order to portray a station, industrial plant, or airfield. Lanterns, dummy bivouacs, and camp fires are often arranged to give the impression of the presence of troops.

INFANTRY

10. SOME GERMAN BATTLE OBSERVATIONS ON THE RUSSIAN FRONT

Below appears a translation of a German document discussing in outline form one of their later Russian offensives.

* * *

a. Preparation

Detailed preparation for the attacks was made possible through the constant collection of information dealing with previous actions, exchange of information between various headquarters and distribution of this information down to companies. Preparations included rehearsals over similar ground and under similar conditions; also, measures to deceive the enemy.

b. The Attack

The attack was carried out by surprise, with no artillery registration or preparation. The attack opened with coordinated fire on a narrow front from artillery and all smoke mortars and heavy weapons available. As success depends upon speedy removal of obstacles in depth, especially minefields, strong engineer elements were allotted to the leading elements. Cooperation with the air force was close. Flight schedules were arranged to leave sufficient time for refueling and resupply of ammunition. To avoid bombing of friendly troops, the air force was kept closely informed of the positions of troops on the ground by the aid of air-force liaison officers, and by ample supplies of cloth panels, etc.

c. Minefields

Minefields were quickly crossed by reconnaissance and by mine-detector sections, pushed well forward to mark the lanes. Mine-clearing sections rapidly widened the lanes through the fields from 5 to 10 meters. Two lanes were made for each company sector.

d. Observations

(1) Whenever strong tank attacks were launched, the Russians coordinated the fire of all available antitank guns, and antiaircraft guns in an antitank capacity.

(2) The Russians would often let our attack come so close that our artillery could not continue to fire. Heavy weapons were therefore pushed well forward for use against positions where such tactics were expected.

(3) Mass formations had to be avoided in favor of organization in depth.

(4) When signal communications had not been set up, traffic difficulties were encountered between responsible headquarters.

(5) The use of the Fieseler Storch (a small liaison and command plane capable of landing and taking off in a very small space) was necessary for commands responsible for observing the battle situation and directing traffic.

11. GERMAN VIEWS ON RUSSIAN TACTICS IN WOODS

Much thought has been devoted to the tactics employed by the Japanese in the close jungle country of the southwest Pacific areas. Of particular interest therefore is the following brief extract from a German training pamphlet.

* * *

The terrain of the Eastern Front and Russian methods of fighting are both such that battles have often to be fought in thick, marshy, and extensive woods. To overcome their nervousness of woods, officers and men must be trained in forest fighting, a training which serves equally as training for fighting by night or in fog.

The following is an account of some lessons learned in fighting on the Russian Front.

When fighting in woody or marshy terrain, the Russians show their greatest powers of resistance. Here, their superiority of numbers, cunning and skill at camouflage stand them in good stead. They are adept in the use of ground, in the use of trees for observation and as sniping posts, and at erecting field fortifications in woods. They deliberately seek out woods for purposes of approach and defense; by holding their fire, they entice the enemy to approach within a short distance and come to grips in close-quarter fighting. Despite the thickness of the undergrowth and the density of the trees, they even strengthen their defense with tanks, and attack against them then becomes difficult and costly.

The Russians tend to make great use of the edges of woods, and in particular to concentrate heavy weapons and antitank guns at points where trails and roads enter the woods. The Russians do not surrender even when the woods may be surrounded. They must, therefore, be attacked and destroyed within the woods.

Lines of communication which run through woods, even when they may be behind the front, are particularly precarious. When they retreat, the Russians leave detachments behind in woods. These detachments, reinforced possibly by others dropped from planes, form partisan bands for the special task of harassing the enemy and of interfering with his rear communications. The mopping up of woods which may have been occupied by partisan or other dispersed groups of Russians demands much time and the planned use of sufficient forces. Merely to comb out roads that may run through woods is fruitless and costly, for the Russians disperse off the roads into the woods.

12. FIGHTING ON THE KOKODA TRAIL IN NEW GUINEA

Direct reports from the front are always worth reading. Even if there is some repetition of detail, the repetition itself drives home important lessons. The notes that follow were sent in by a U. S. Army Colonel.

* * *

In the fighting on the Kokoda Trail, (between Port Moresby and Buna) our troops found that on making contact along a road or trail in the jungle, the Japanese usually followed this procedure:

An especially trained advance guard pushed ahead of their column, took up a position astride the trail, and tried to pin down our defense with machine-gun and mortar fire. Next, if various feints and demonstrations did not induce us to give away our position by opening a premature fire, the Japs would try to infiltrate around the flanks. Their groups moved swiftly under cover; targets were poor and fleeting. If our troops held their fire till a good target presented itself, these forward groups could usually be stopped. There were many cases where, when the advance elements were allowed to sneak by, the supports which followed them could be ripped up by machine-gun and rifle fire. However, if the defense disclosed its position by too early or too powerful a fire, the Japanese brought up machine guns and mortars and blasted our lines.

To test the possibility of further advance, the Japanese used many tricks based on two natural human traits - fear of the unseen and unknown, and curiosity. They appeared to place much confidence in the effect of noise, and for this reason did considerable firing, both to bolster their own courage and to lower our morale. Captured weapons were shot off to give the impression that our men were firing them; they fired machine guns out on the flank to give the impression that our position was being

turned; or they talked loudly and shook bushes to draw nervous shots or cause movement. In order to distract attention and cause confusion, they exploded fire-crackers.

There must be depth to positions in order to prevent effective encirclement, and bold handling of combat patrols to meet their flanking tactics. The counterattack cannot be overstressed. All-around defense, at night, or in thick country, is necessary.

In their attack on prepared positions, the Japanese used a more or less standard procedure. By reconnaissance and ruses, they made every effort to determine our strength and location. After they had discovered what they thought was a soft spot, they persisted in attacking there. Should the first attack fail, it was shifted to some other place, but the Japanese usually returned again to the original point of attack. Consequently, it was dangerous to weaken that point to reinforce some other.

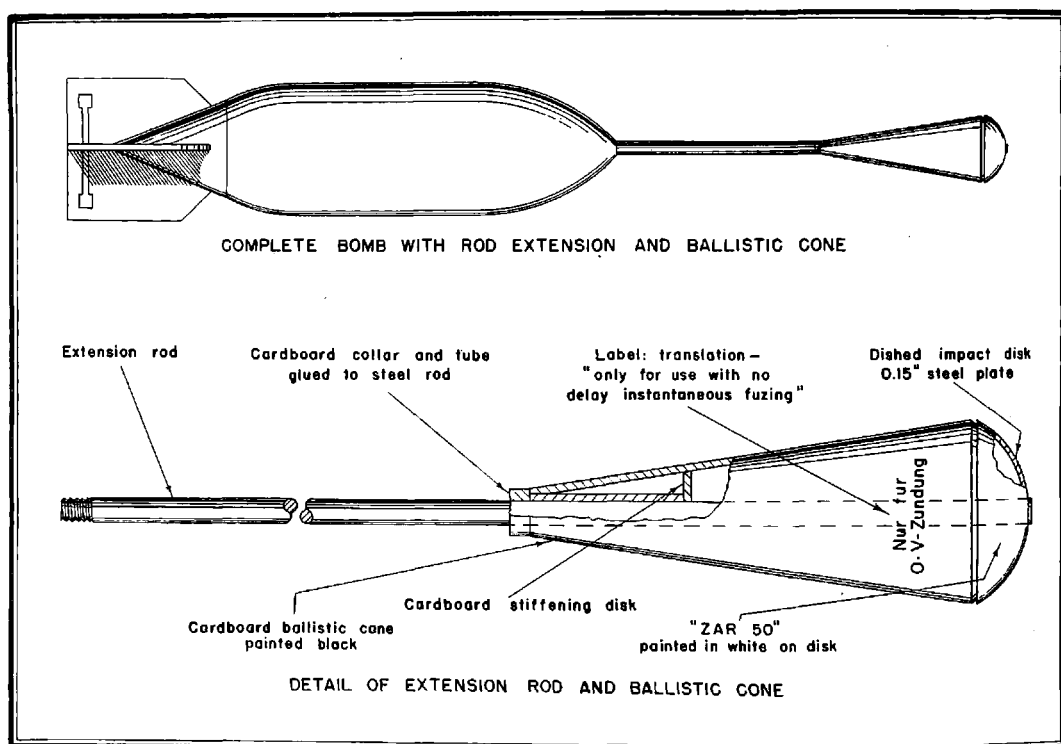
Often, in this phase of the fighting, the Japanese used no preparatory fire. After contact was made, their skirmish line hit the ground while overhead fire by machine guns and mortars fell on our positions. Under cover of the barrage, supports would try to crawl close enough to put down a hand-grenade barrage to protect the advance. It was not uncommon during such attacks for the enemy to replace tired forward troops with fresh reserves. This change-over was accomplished efficiently, and without confusion. *Incidentally, the Japanese will advance under a white flag and shoot at anyone coming out, disguise himself as a native or a civilian, and in retreat, litter the trail with cast-off garments and equipment to give the impression of a disorderly flight, and then ambush the pursuit.

* The description of these skirmish line tactics corresponds closely with accounts of Indian fighting in Kentucky and Ohio in Daniel Boone's day.

ORDNANCE

13. GERMAN BOMB WITH NOSE EXTENSION ROD

While the German airplane bomb usually detonates below the ground level forming a crater, and permitting persons in the vicinity to get some protection by lying down, a new type of bomb with an extension rod screwed into the nose to give a "daisy-cutter" air-burst has been discovered in Libya. Against such a bomb, both vertical and horizontal cover is needed. There is evidence that similar rods are used in the 250-kilogram (550-lb), 500-kilogram (1,100-lb), and 1,000-kilogram (2,200-lb) bombs in attacks on buildings and small craft.



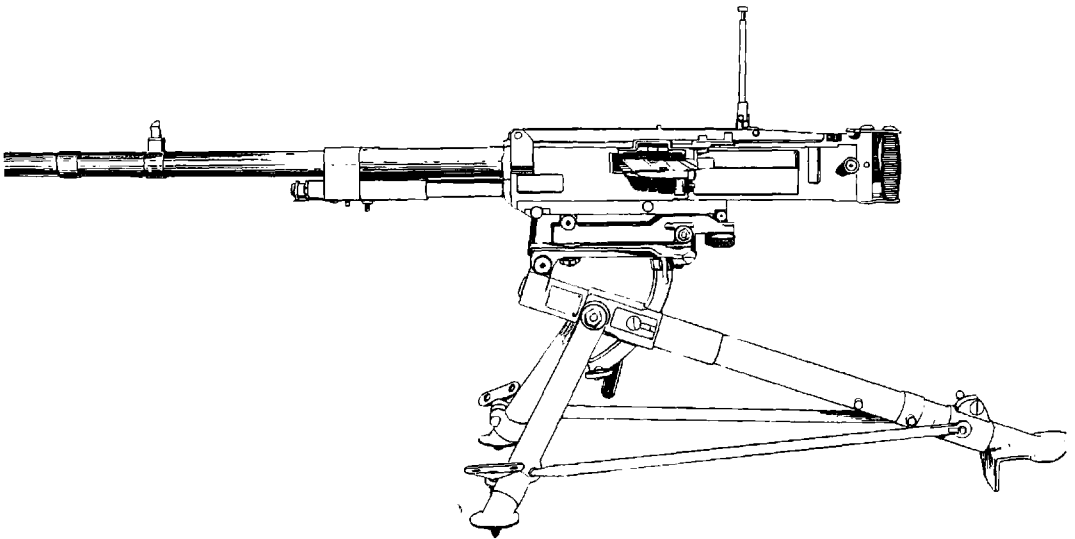
The rod adapted to a 250-kilogram bomb, shown in the accompanying sketch, lacked a cardboard ballistic cone, but there is no doubt that one was fitted to it. From Malta have come reports of "dumbbell bombs," and probably bombs fitted with these rods would have such an appearance when viewed from the ground while falling, particularly if they wobbled a bit.

14. ITALIAN 8-MM BRED A MEDIUM MACHINE GUN, MODEL 37

a. General

This machine gun is not dissimilar to the French Hotchkiss, with the exception of the thumb trigger, like the British Vickers. From the following report, prepared at the Aberdeen Proving Ground, it appears to be an excellent gun.

The gun is gas-operated, air-cooled and has a quick-change barrel. The cartridges are fed from plate chargers holding 20 rounds, each round being housed in a separate compartment (see sketch). After firing, the empty cases, instead of being ejected, are replaced in the compartment of the plate charger.



BREDA MG, MODEL 37

The gun uses ammunition very similar to our own with the exception of the case which is shorter and the caliber which is .015 of an inch larger. It is made in ball, tracer, and incendiary tracer armorpiercing. The German 7.92-mm ammunition can also be used.

b. Description

Following are characteristics of this gun:

Caliber	8 mm (.315 in)
Weight	44 pounds
Length over-all	50 in
Weight of barrel, complete	17-3/4 pounds
Length of barrel, complete	33-1/4 in
Rifling	4 lands, right hand twist
Rear Sight:	
Elevation	300 to 3,000 meters
Windage	0 to 8 mils plus or minus (0 to 2-1/4" plus or minus)
Cyclic rate of fire (maximum)	450 rounds per minute*
Effective rate of fire	Unknown
Muzzle velocity	2,600 feet per second*
Maximum range	6,500 yards*
Cooling	Air
Mounting	Tripod
Feed	20-round plate charger
Provision for single-shot fire	None
Safety	Shift safety catch on top of rear cross-piece to S for "safe" and to F for "fire".

The accompanying range table covers the Breda Model 37 and also the Fiat Model 35.

c. Tripod Mount

The mounting is provided with elevating and traversing gears, which can be used in conjunction with the open sights for direct laying, or with the elevating and traverse scales for indirect laying.

Elevation is adjustable from 360 mils (20 degrees) depression to 360 (20 degrees) elevation, with a micrometer adjustment from the 46 mils (2 degrees 30 minutes) depression to 36 mils (2 degrees) elevation.

The main traverse scale is graduated from 450 mils (25 degrees) to 1,150 mils (65 degrees) in 10 mil steps, the central position being at 800 mils (45 degrees). An additional 150 mils (8 degrees 30 minutes) traverse is provided by an independent micrometer adjustment.

Comment: The gun is quite simple in its operational features, and is extremely easy to disassemble. The breech is positively locked at the moment

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

RANGE TABLES FOR ITALIAN 8-MM MGS--FIAT MODEL 35 AND BREDA MODEL 37,
FIRING MODEL 35 BALL AMMUNITION

Range (yds)	Fiat 35 Elev. (mils)	Breda 37 Elev. (mils)	Range (yds)	Fiat 35 Elev. (mils)	Breda 37 Elev. (mils)	Range (yds)	Fiat 35 Elev. (mils)	Breda 37 Elev. (mils)	Range (yds)	Fiat 35 Elev. (mils)	Breda 37 Elev. (mils)
100	1	1	1200	19	19	2300	68	66	3400	150	148
200	2	2	1300	22	22	2400	74	72	3500	159	158
300	3	3	1400	25	25	2500	80	78	3600	168	168
400	4	4	1500	29	28	2600	86	84	3700	178	179
500	5	5	1600	33	32	2700	93	91	3800	188	190
600	6	6	1700	37	36	2800	100	99	3900	199	202
700	8	8	1800	41	40	2900	108	107	4000	210	214
800	10	10	1900	46	45	3000	116	114	4100	221	226
900	12	12	2000	51	50	3100	124	122	4200	234	239
1000	14	14	2100	56	55	3200	132	130	4300	247	253
1100	16	16	2200	62	60	3300	141	139	4400	261	266

Standard conditions: barometer 750 mm (29.5 in) of mercury, temperature 15° C (59° F), humidity 0.5
(half-saturated air).

of firing, the breechblock being forced up (without tilting) by the action of inclined surfaces on the piston extension, so that a projection on its upper surfaces engages in an opening in the top of the body. The barrel is sufficiently heavy (17-3/4 pounds) to enable it to fire a large number of rounds in quick succession without overheating.

QUARTERMASTER

15. GERMAN CONVOY-CONTROL SIGNALS

The following is an extract from German rules for convoys in the desert.

* * *

a. To Vehicle Following:

Blue flag waved	Caution - difficult country
Blue flag held straight out	Stop where you are until I have reconnoitered
Red flag held straight out	Come on

b. To Vehicle in Front:

Blue flag waved	You're driving too fast - can't keep up
Blue flag held straight out	Am stopping - bad going or breakdown
Red flag held up	Have stopped for a moment but need no help

SECTION II

GERMAN CLOSE-IN TACTICS AGAINST ARMORED VEHICLES

GERMAN CLOSE-IN TACTICS AGAINST ARMORED VEHICLES

The following is a translation of a German document issued early in 1942. While some of the methods of attack discussed may have since been altered, it is thought that it reflects the essentials of current German doctrine. The preface explains the scope and purpose of the document.

* * *

Current Instructions For Close-in Tactics Against Armored Vehicles

Preface

These directives are based on experiences of the German Army in close-in combat against Russian tanks on the Eastern Front. The Russian tactics so far as known have been taken into consideration.

New doctrines of our own are in process of development and will be available to the troops after completion, together with directions as to their use. First, the Eastern Army will be equipped with incendiary bottles. Presumably the troops at the front use means of fighting about which, at the time of publication of these directives, no description is yet at hand. In addition, new enemy methods will appear, which will be adapted to our own fighting.

These directives, therefore, present only preliminary instructions. Co-operation of the troops in the field is needed for their completion. To this end, new fighting practices of our own and of the enemy should be reported, with drawings and descriptions of battle conditions at the time. Communications should be sent through the service channels to the General of Infantry and to the General of Mobile Troops in the Army High Command.

The importance of close-in fighting against tanks makes it imperative that individual tank hunters be trained immediately in all the arms. The state of training in the Reserve Army will be tested by recruit inspections.

These directives apply to combat against all kinds of armored vehicles. For simplification, only tanks are mentioned in the text.

I General

1. If there are no armorpiercing weapons at hand, or if their fire does not show sufficient result against attacking tank forces, specially trained, organized, and equipped tank hunters will have to assault and destroy tanks by close-in combat, making use of their special assault weapons and without waiting for specific orders. All other available arms will lend their support as strongly as possible.

Experience proves that with proper training and skilled use of close-in weapons, all classes of tanks can be destroyed by individual soldiers.

2. Close-in combat against tanks demands courage, agility, and a capacity for quick decision, coupled with self-discipline and self-confidence. Without these qualities, the best combat weapons are of no use. Proper selection of personnel is therefore of decisive importance.

3. Thorough knowledge of enemy tank types and of their peculiarities and weaknesses in battle and movement, as well as complete familiarity with the power and use of our own weapons in every terrain, is necessary for successful combat. This will strengthen the self-confidence of the troops. It will also make up the crucial points in training.

4. Close-in combat against tanks may be necessary for all situations and all troops.

In the first place the combat engineers, and tank hunters are the main-stays of this type of fighting. It must be demanded that each member of these arms master the principles and weapons of close-in antitank combat, and that he use them even when he does not belong to an antitank squad.

5. Over and above this, soldiers of all the armed services should be selected and grouped into close-in tank-hunting squads consisting of one leader and at least three men. They must continually be ready for close-in combat with tanks.

Where special close-in weapons are not at hand, expedients should be devised.

Combining tank-hunting squads into tank-hunting groups may be useful under certain conditions.

6. The equipment for close-in tank hunting consists of the following: incendiary bottles and Tellermines, TNT, automatic weapons (our own or captured), submachine guns, Very pistols, hand grenades, smoke bottles, and camouflage material, as well as hatchets, crowbars, etc., to use as clubs for the bending of machine-gun barrels projecting from the tank. Of this equipment the useful and available weapons for blinding, stopping, and destroying the tank should always be carried along. In the interest of maximum mobility, the tank-hunting soldiers must be free of all unnecessary articles of equipment.

II Combat Principles

7. Careful observations of the entire field of battle, early warning against tanks, as well as continuous supply and readiness of tank-hunting equipment of all kinds and in ample quantity, will insure against surprise by enemy tanks and will permit their swift engagement.

8. It should be standard procedure continually to observe the movements and the action of tank-hunting squads and to support them by the combined fire of all available weapons. In this connection, armorpiercing weapons must direct

their fire on the tanks while the remaining weapons will fight primarily against infantry accompanying the tanks. It will be their mission to separate the infantry from the tanks.

Sometimes tanks carry infantrymen riding on them, who protect the tanks at forced or voluntary halts against the attack of tank hunters. These security troops must be destroyed by supporting infantry before the tank hunters attempt to assault the vehicles. Should the tanks arrive without infantry, the fire of all the available weapons will be concentrated against the vulnerable places of the tank. The shorter the range and the more massed and heavy the fire, the greater the physical and moral effect.

Fire by sharpshooters is always of special value.

The activity of tank-hunting squads should not be hampered by the supporting fire. The mission of such supporting fire is to split up tank forces, to blind and put the crews out of action, and to have a demoralizing effect on them, thereby creating favorable conditions for close-in assault.

In case fire support by other weapons is impossible, the attack by tank-hunting squads must proceed without it.

9. The basic principles of close-in assault are the same in all battle situations. In defense, knowledge of the terrain and of the time available will be profitable for the preparation and the attack.

10. The carrying out of close-in combat will largely depend on the immediate situation. The number, type, and tactics of the attacking tank force, the terrain, our own position, and the effect of our own defensive fire will always vary, and this variation will demand great adaptability and maneuverability on the part of our tank hunters.

11. Only one tank can be assaulted by a tank-hunting squad at one time. If several tanks attack together and if only one tank-hunting squad is available, then that tank is to be assaulted which at the moment appears as the most dangerous or whose engagement promises the quickest success. In general, the choice must be left to the tank-hunting squad.

If there is a sufficient number of squads available, it is advisable, particularly in defense, to hold one or more squads ready in the rear for the destruction of tanks which may break through.

12. Generally speaking, the procedure will always be: first, to blind the tank, then to stop it, and finally to destroy the vehicle and the crew in close-in combat.

13. Whether the tank-hunting squads advance at the beginning of a tank attack or whether they leave their foxholes only during the engagement or whether the whole assault goes on from under cover depends entirely on the situation.

The behavior of the squads depends on whether the tank is moving or is voluntarily or involuntarily halted.

The attack on a heavy or super-heavy tank will often be easier than on a light tank, because the former in general is clumsier and has poorer observation. But the destruction of heavy tanks generally demands the use of more powerful weapons.

14. It is important in every case to make full use of the dead space around each tank.

In general, tanks should be attacked from the side or the rear. Any moment of weakness of the enemy tank should be utilized (i.e., impeded vision, halts, climbing and overcoming of obstacles, etc.).

15. Tanks should be approached by crawling and stalking, making full use of cover and concealment.

16. The foxholes of tank hunters must be narrow and have steep walls. They must be built without parapets and must not be recognizable by enemy tanks. They may be camouflaged either by canvas strips or branches. Whenever possible they should be protected by a belt of mines.

17. The tank hunters will remain motionless in their foxholes observing their targets and waiting in readiness for the favorable moment to assault. They must face the enemy tank calmly and must have the nerve to "let it come." It is always wrong to run away. While moving, the single soldier is inferior to the tank. In hiding, on the contrary, he is usually superior. He is safest inside the dead area around the enemy tank.

In villages, close-in assault of tanks is usually easier than in open terrain because of the abundant possibilities for hiding and cover (as by roof-snipers).

Often the corner of a house, a bush, or a fence are sufficient as hiding places.

By the use of obstacles of all kinds, dummy mines and guns, and signs like "Warning -- mines!", enemy tanks may be guided into terrain unfavorable to them, but favorable for the assault squads and antitank weapons.

18. When attacking moving tanks, the tank hunters at first must be well concealed and permit the tank to come close to them (7 to 20 meters); then they try to stop the tank by blinding it, or at least they force it to slow down. A strong blinding effect is obtained through the massed fire of all weapons. By using explosive charges, tank hunters destroy the tracks of the tank and cripple it. They will then assault it and destroy it and its crew with their close-in weapons.

In the case of halted tanks, the squad stalks up on it using the terrain to its best advantage.

19. Around every tank there is a dead area which it cannot cover with its principal weapons. The higher a tank, the larger, usually, is its dead space. In general, this space has a radius of about 20 meters (see figure 1). To combat

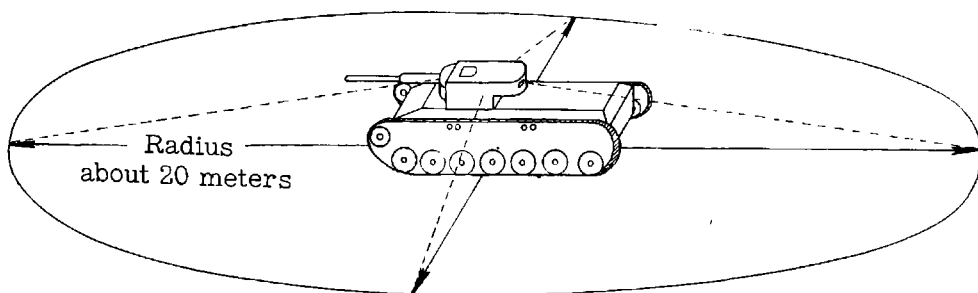


Fig. 1

targets in the dead space, tanks have slits through which pistols and submachine guns can be fired. Frequently a machine gun is found on the rear side of the turret.

When assaulting a tank, the tank hunters must make use of the dead space. They should approach the tank from the direction which is opposite to the direction of its principal weapons. This is also opposite to the direction of its principal observation (see figure 2). Should this approach be impracticable

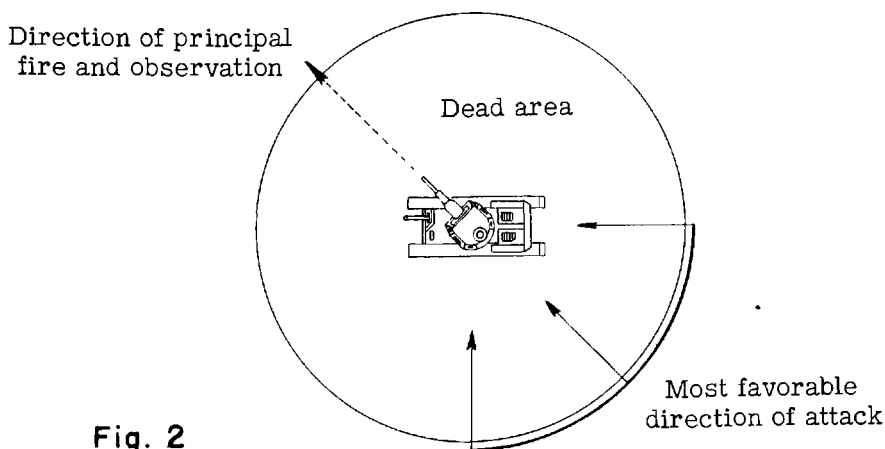


Fig. 2

because of a machine gun in the back of the turret, the squad will attack from the side or diagonally from the rear.

20. The tank hunter with the principal close-in weapon will use it against the tank while the other tank hunters support him with their fire. Should he be impeded by that fire, it must cease. When the crew of the tank becomes aware of the assault, they will open the turret hatch so as to defend themselves with hand grenades. That instant will be used by the observing tank hunters to fire against the open turret and to wound the crew. Crews of stalled or burning tanks who do not give themselves up when getting out will be destroyed in close combat. If the tanks are still undamaged, they are made useless by removal of the breech-blocks, by destroying the machine guns, and by setting fire to the gasoline tanks.

21. Neighboring units support the attack by rifle and machine-gun fire against the vision slits of the attacking tanks as well as against accompanying infantry which might endanger the tank hunters. The tanks are blinded and prevented from taking accurate aim, and the enemy infantry is forced to take cover. Weak places of the tank are taken under fire with armorpiercing ammunition and antitank weapons. Lead-sprays entering through the shutters into the inside of the tank will wound the crew. The cooperation of the tank-hunting squads with other troops in the area must be previously arranged, and all signals decided upon.

III Close-in Combat Weapons and Their Use

22. There are several kinds of short-range media (blinding, burning, and explosive) which allow many variations of use. The type of armored vehicle, its position, and the terrain determine which of the available weapons are to be used, or if several should be combined. The leader of the tank-hunting squad will have to decide quickly which medium to adopt under the circumstances.

According to the doctrine "Blind, halt, destroy," the tank-hunting squad has to be equipped with blinding, explosive, and incendiary materials. Explosives have the double purpose of stopping and destroying the tanks.

Blinding Agents

Smoke Candles and Smoke Grenades

23. Smoke candles or several smoke hand grenades, thrown in front of the tank with allowance for wind direction, minimize its vision and force it to slow up.

Smoke

24. Common smoke is used like smoke from candles. To be able to obtain it at the right moment, distribute straw or other highly inflammable material in the probable avenue of approach, drench it with gasoline or kerosene, and ignite it with signal rockets at the approach of tanks.

The detonation of grenades and artillery shells also creates clouds of smoke. Moreover, the firing of armorpiercing grenades against the vision slits promises success.

25. When smoke is used, the tanks are hidden also to our antimechanized weapons, and they are unable to aim accurately. Therefore, smoke should be used only when the vehicles have come so near that they cannot be covered by fire any longer without endangering our own troops, and therefore have to be destroyed at close range.

Signal Rockets

26. Signal rockets shot against vision slits have a blinding effect, particularly at dusk and in the dark; also, the vehicle is illuminated for our antitank weapons. Note that signal rockets only begin to burn at a distance of 25 meters.

Covering of Vision Slits

27. For this purpose one man jumps onto the tank, preferably from the rear, or approaches the tank closely from the side, and covers the vision slits or periscopes with a blanket, overcoat, shelterhalf, etc., or applies mud, paint, or grease. This is possible only if the tank is moving slowly or is halted, and if it is not protected by the fire from other tanks or following infantry. Any tank crew will be strongly demoralized by the presence of an enemy on top of their tank.

Incendiary Agents

Flame-throwers

28. Flame-throwers are aimed at vision slits, weapon openings, ventilators, and engine cover.

Incendiary Bottles

29. Incendiary bottles are a combat weapon used against tanks, armored scout cars, and other cars. In street and house fighting, they can also be used against living targets. They are thrown against the front part of the tank for blinding purposes, over the engine for incendiary purposes.

The contents of an incendiary bottle (not self-igniting) are $\frac{2}{3}$ gasoline and $\frac{1}{3}$ fuel oil. Ignition of the incendiary bottles takes place (when it has broken after hitting a hard surface) by the use of special safety matches.

The incendiary bottles are packed in wooden boxes in damp sawdust. The boxes also contain adhesive tape for fastening the matches to the bottles. The safety matches are packed in batches of twenty with 3 scratch pads in containers of noninflammable material. Two safety matches are taped to the bottle. The heads of the safety matches can be pointed either toward the neck or to the

bottom of the bottle (see figure 3). The matches are lighted immediately before throwing the incendiary bottle, by friction with any rough surface or the match box. See that both matches are burning properly.

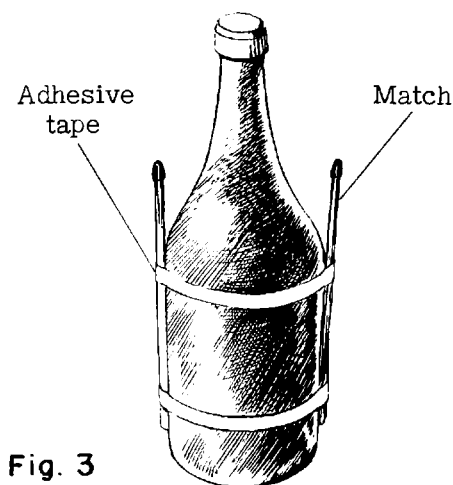


Fig. 3

The bottles can be thrown in two different ways; throwing by swinging the arm, holding the bottle at the neck (see figure 4), or throwing by pitching, like putting a shot, grasping the bottle at its heaviest point (see figure 5, following page).

Either of the two ways is practicable. In general, the position of the thrower will determine the type of throw. In a prone or similar position he will not be able to swing his arm, and therefore will have to pitch it. Whenever possible it should be thrown like a stick hand

grenade, because the accuracy of aim is greater and the possible range will be increased.

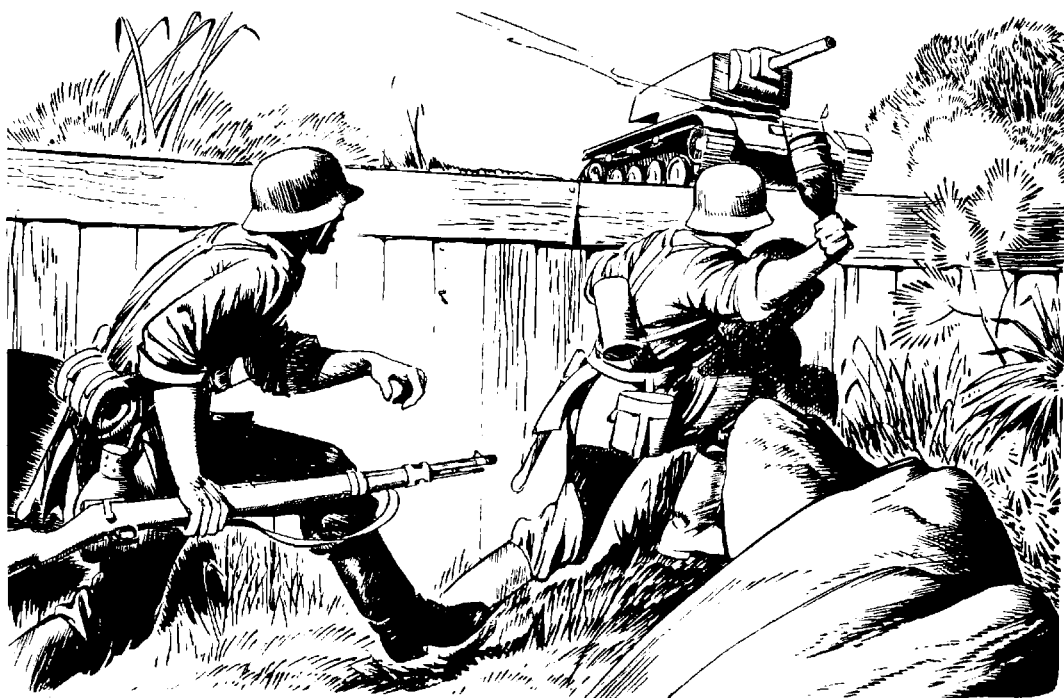


Fig. 4

The most vulnerable parts of a tank are: the engine (ventilation -- on tanks usually in the rear), the vision slits, and imperfectly closed hatches.

Should an incendiary bottle miss and remain intact, it is better to leave it until the matches have burned out, as the heightened pressure might cause an



Fig. 5

explosion. The bottles should be handled with care. They should not be bumped together or against hard objects.

Improvised Incendiary Bottles

30. Any bottle can be filled with an inflammable liquid, preferably mixed with wool fiber, cotton, or torn rags. A good mixture is two-thirds gasoline and one-third oil. Note that Flame-oil #19 is not freeze-proof. A mixture of gas and fuel oil can be used instead.

To ignite it, the bottle is equipped with an improvised lighter. It is constructed in the following way:

A wick is passed through a hole in the cork of the bottle, so that one end hangs in the liquid. To the free end are attached several matches. Several wicks may also be used without the cork, if they completely close the opening

of the bottle and are well drenched in the fluid (see figure 6).

At the approach of the tank, the wick is lighted and the bottle thrown. When it breaks, the fluid is ignited by the wick and is distributed over the tank and its engine. Generally the tank catches fire. If further bottles are thrown

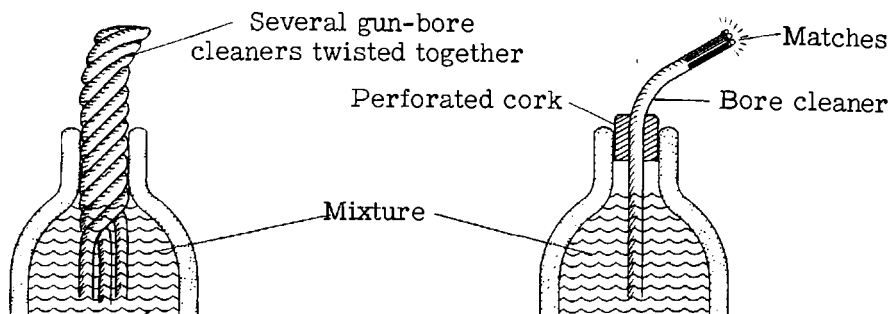


Fig. 6

against the tank, they do not have to be ignited before throwing. Even initially a bottle without an ignition device can be used. After breaking the bottle on the tank, the liquid can be ignited with signal rockets, hand grenades, smoke candles, smoke grenades, burning torches, or burning gasoline-drenched rags.

Captured Enemy Incendiary Bottles

31. Bottles with a self-igniting phosphorus mixture (so-called Molotov cocktails) are used as explained in paragraphs 29 and 30. If large numbers of these weapons are captured, they should be collected and reported, to enable distribution among as many troops as possible.

Gasoline

32. Several quarts of gasoline are poured over the engine housing of the tank, and ignited as in paragraph 30. Gasoline can also be poured into a tank. It is then ignited by a hand grenade which is also pushed in.

Hand Grenades

33. Quite frequently an enemy is forced to open the hatch for better observation. This opportunity can be used to throw grenades in a high arc into the interior of the tank. The crew can thus be eliminated and the tank set afire. Sometimes it may be possible to open the hatches with crow bars or bayonets and throw grenades into the interior.

Smoke Candle or Smoke Grenade

34. When thrown (as in paragraph 33) into the interior of the tank, they start the tank burning, or at least force the crew to get out because of the thick smoke.

Signal Rockets

35. Signal rockets shot into open hatches with a Very pistol can also start a tank burning.

Explosives

Hand Grenades

36. Several hand grenades can be combined into one concentrated charge (see paragraph 38).

One-Kilogram Blasting Slab

37. A slab of 1 kilogram [2.2 pounds] of explosive, placed on top of a tank, has about the same strength as a concentrated charge of 7 hand grenades and gives the crew a severe shock. Two such concentrated charges damage the turret hatch considerably and for a short time make the crew unable to fight because of the high concussion. Two or three such charges combined into a multiple charge can so severely damage the tracks of tanks that they will soon break under use. Even better are two such concentrated charges combined into an elongated charge. For this purpose, two to three 1-kilogram charges are tied to a board with wire and equipped with a short piece of fuze (see figure 7).

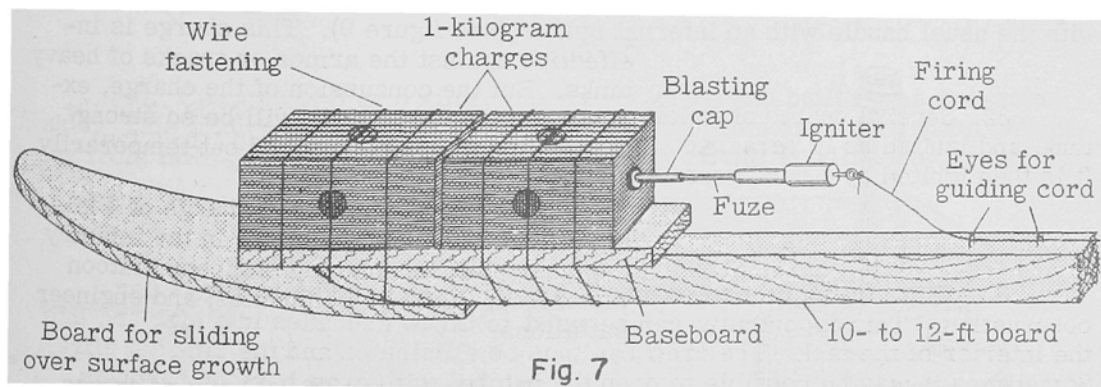


Fig. 7

Fasten igniter system firmly to the charge.

To destroy machine-gun and cannon barrels protruding from the tank, two 1-kilogram charges are tied together, hung like a saddle over the top of the barrel, and detonated (see figure 8). Machine-gun barrels are torn by the ex-

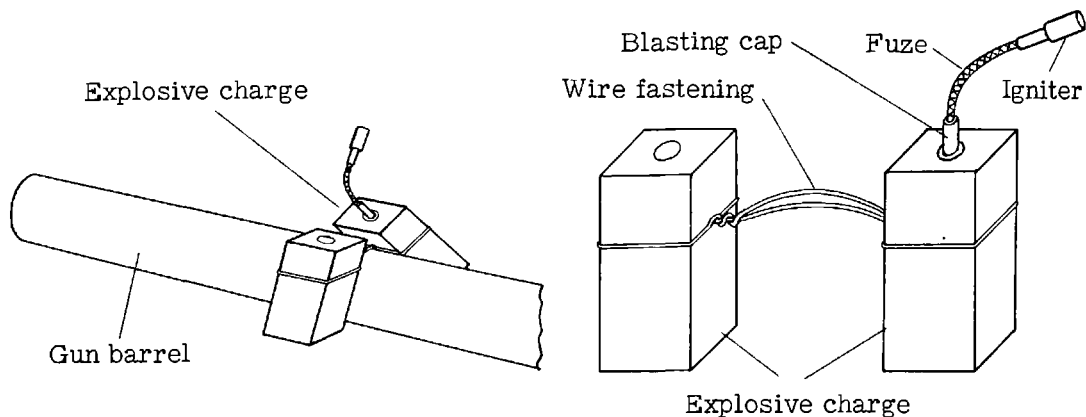


Fig. 8

plosion, and cannon barrels bent sufficiently so that an attempt to fire the gun will completely destroy it. Inserting hand grenades into the muzzle of the guns also has good results against cannon and crew. Shells will also burst in the barrel if stones, wood, or earth are rammed into it. Placing hand grenades in the vision slits is also effective.

Several 1-kilogram charges can be tied together as a field expedient in case of lack of finished multiple charges.

Concentrated Charges

38. The bodies of seven stick grenades are tied together securely with wire so that they will not fall apart when used. Only the middle grenade is fitted with the usual handle with an internal igniter (see figure 9). This charge is ineffective against the armor or tracks of heavy tanks. But the concussion of the charge, exploded on top of the tank, will be so strong that the crew will be knocked out temporarily.

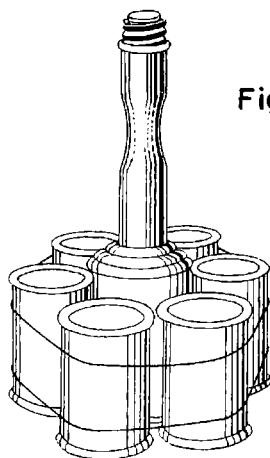


Fig. 9

39. The concentrated charge of 3 kilograms, is found ready for use in the infantry engineer platoon, infantry engineer platoon motorized, engineer companies, and engineer battalions.

It will pierce about 60 mm of armor and is best placed over the engine or the driver's seat. The crew will be badly wounded by small fragments of the inner walls spattering off. The concussion is unbearable. To

destroy the tracks, the charge must fully be covered by them.

Even greater effect will be obtained by combining several 3-kilogram charges.

40. The throwing radius for a concentrated charge is 10 to 15 yards. When throwing it, the soldier must consider the length of the fuze (about $\frac{1}{2}$ inch burns in 1 second). The thrower aims at the tracks or at the belly of an approaching tank.

41. The concentrated charge can also be used as a multiple charge or as a slide-mine as described in paragraph 37 above.

42. If the charge is supposed to be used on top of the tank, it must be secured so it will not fall off. For this purpose, its bottom is painted with warmed tar. If the charge is primed, be careful! A charge thus prepared will adhere to horizontal and even to slightly inclined surfaces. Putty can be used also for this purpose, but it is not reliable on wet surfaces.

Charges may be held on a tank by using an anchor made of strong wire, which is hooked into openings or protuberances of the vehicle (see figure 10).

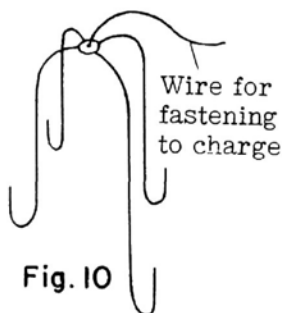


Fig. 10

43. The ignition for paragraphs 39 to 41 is provided by preparing short fuzes with detonating caps (to burn in $4\frac{1}{2}$ to 15 seconds), time fuzes, prima-cord, an improvised pull igniter, or a pressure-igniter. The latter is best suited for the destruction of tracks.

If the charge is thrown, a short fuze is needed (but at least $4\frac{1}{2}$ centimeters* long, like a hand-grenade fuze). If it is placed on the tank, a 15-cm fuze is used for the security of the man placing it.

Sliding Mines

44. Charges of 3 or 6 kilograms can be made and built into a two-sided skid. This sliding mine has to be secured against premature detonation, resulting from falling or turning over, by the insertion of two wood blocks (figure 11).

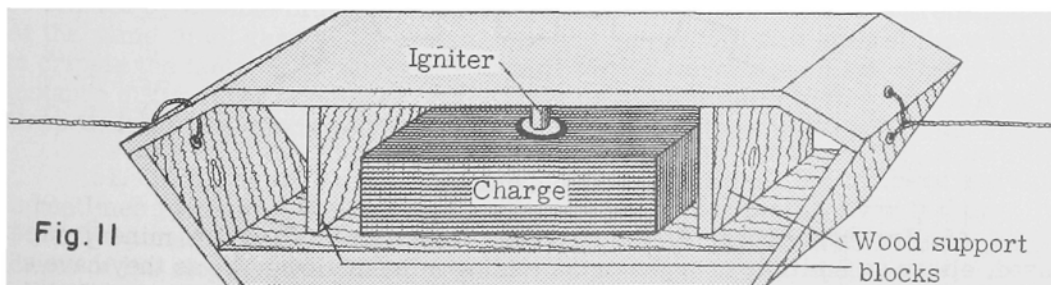


Fig. 11

[*As stated above 1 centimeter of fuze burns in about 4 seconds.]

Two to four sliding mines are linked together and at each end of a given group is a 20-meter cable or rope.

Tank hunters sit in two foxholes about 20 meters apart. The sliding mines are camouflaged and placed somewhere between the holes so that they can be pulled in either direction. At the approach of a tank, they are pulled under its tracks (figure 12).

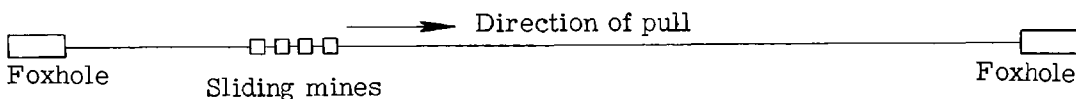
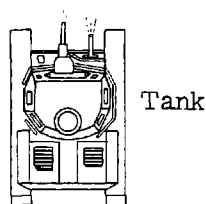


Fig. 12



Several pairs of soldiers in similar foxholes can protect a larger area, for instance a key-point of resistance (figure 13).

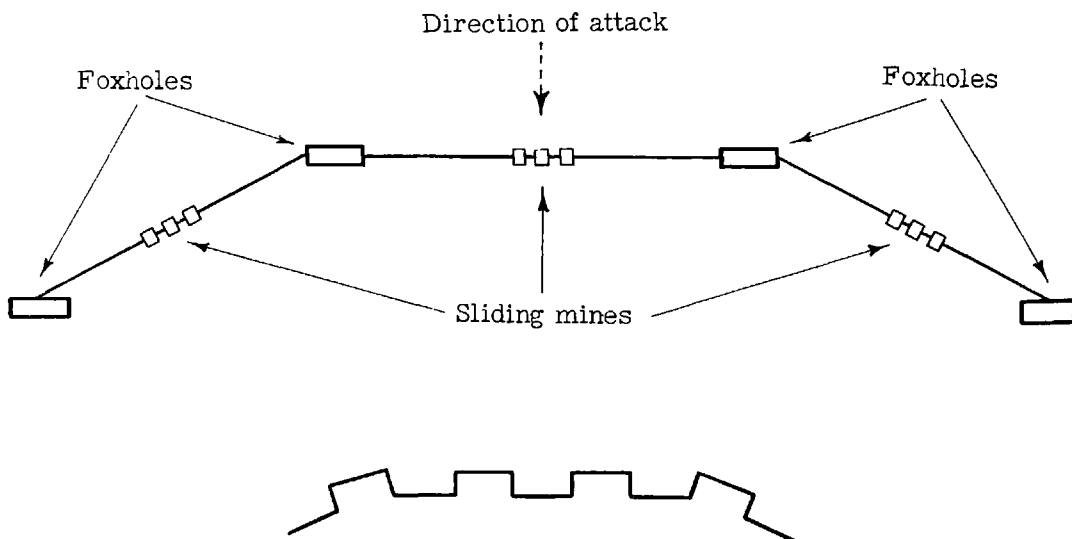


Fig. 13

Tellermines

45. Instead of concentrated charges, Tellermines [antitank mines] can be used, either as multiple charges or as sliding mines. However, as they have a high radius of fragmentation, they can only be worked from splinter-proof positions.

IV Close-in Combat with Firearms

46. There should always be close cooperation between the tank-hunting squads and the other combat elements in the area. Discussion between the leader of the tank-destroyer squad and the leader of the other available arms is advisable in order to fix the beginning and end of the fire attack against a tank.

47. New [Russian?] tanks have especially strong armor at some points. But they have many weak spots, against which even the fire of weapons which are not armorpiercing can be successful. It is therefore imperative to hit the tank not only as a whole, but especially at those weak spots.

48. For this purpose, it is necessary that the rifleman, conscious of the power of his weapon and of his superiority over the tank, should keep cool. He must be able to open fire on the tank as late as possible, surprising it at the shortest possible distance. Courageous riflemen with rifle or antitank rifle, making full and skillful use of terrain, should crawl up to the best range.

The shorter the range, the greater the accuracy of the weapon. Also, the armorpiercing capacity of the ammunition will be increased.

When using armorpiercing ammunition, in order to ensure its successful use, it is important to follow closely the instructions found in the ammunition boxes concerning the aiming points and the effective range.

Opening fire as late as possible has the further advantage of keeping the weapon concealed from covering tanks and observers up to the decisive moment.

49. Frequently it will be advisable to concentrate the fire of several similar or different weapons on one tank e.g., rifles, a light machine gun, a heavy machine gun, an antitank gun, and a light infantry cannon. Ambush-like concentration of all weapons to surprise the tank is preferable. The physical and moral effect will be heightened by such concentration. If only a few tanks appear, it is preferable to assault them successively according to the danger presented by individual tanks. In the case of a massed attack, rigid fire control must insure that the most dangerous tanks are attacked simultaneously.

50. When several different weapons are combined against it, the tank will be blinded by the use of heavy machine-gun fire and small explosive grenades. At the same time, guns of 75-mm caliber and larger will fire against the tracks to cripple the tank. It is necessary to wait for a favorable moment, when for instance difficult terrain slows up the tank, or when it halts to fire. Once it is stopped, it will be destroyed by combined fire or by close-in assault.

51. Weapons with armorpiercing ammunition of smaller calibers are sometimes ineffective against tanks with sloping armor plates, even if their power of penetration would be great enough to pierce the plate if vertical. Because of the slope of the plates, the ammunition ricochets from the tank. On such tanks it is necessary to aim at the vertical parts.

Even in the case of vertical armor plates there will be an oblique angle of impact if a tank approaches at a sharp angle. In that case the angle of impact is also such that the projectiles will ricochet. Therefore, the tank should be fired upon at right angles. If the tank appears at an unfavorable angle, firing will be withheld until it assumes a more vulnerable position, either by revolving the turret or by actually turning and maneuvering.

52. It is possible to increase the effect and accuracy of fire by the selection of a flanking position, because the tanks are usually less strongly armed on the sides, and also offer a bigger target. Furthermore, vertical armor is more common on the sides than on the front.

53. Weak parts of tanks, against which fire from all arms is effective, are: vision slits, openings for hand weapons, periscopes, hatches, shutters, turret rings, ventilator openings, track, belly (the part of the hull between the tracks), and the engine cover (usually in the rear). The accurate location of these parts in the individual types can be found in the manuals.

54. Severe physical and moral effect can be achieved with the rifle, the light machine gun, and the heavy machine gun by firing heavy ball ammunition and armorpiercing ammunition at less than 300 yards against the weak parts of the tank, or by firing with submachine guns and armorpiercing grenades from a grenade discharger at very close range.

Projectiles hitting the vision slits or periscopes blind the crew, and prevent them from aiming or driving accurately. Also, small particles of molten lead and lead fumes penetrate into the interior of the tank and may injure the crew. Some bullets might jam the turret ring or weapon shutters so that revolving of the turret or firing the weapons will be made impossible.

As tanks are more poorly armored on top, attack from high points such as trees or houses will get better results.

The demoralizing effect on the crew of the noise of bullets hitting the tank surface should not be underestimated.

55. HE and armorpiercing grenades (impact fuzes) fired with the rifle grenade-launcher (flat trajectory), antitank guns up to a caliber of 50-mm, the 75-mm infantry howitzer, and the 150-mm infantry howitzer directed against the weak parts of a tank will have about the same results as described in the preceding paragraph. Furthermore the power of impact will cause the inside surface of the armor plates to splinter off and wound the crew. If the projectiles have high explosive charges like the heavy infantry howitzer, the crew will become casualties from the concussion, or they will be at least temporarily knocked out.

When firing against the engine cover in the rear with explosive shells of all weapons, an incendiary effect may be obtained under favorable circumstances. Light and heavy infantry howitzers attack the tracks most effectively.

The ranges for individual weapons have to be selected so that great accuracy of aim can be achieved. For small dispersion and flat trajectory the light and heavy infantry howitzers should use the maximum charge.

The turret, the side, and the rear of the tank are considered weak parts for armorpiercing ammunition. Armorpiercing weapons, unable to use armorpiercing ammunition, can effectively assist in the assault against tanks with high-explosive ammunition.

57. Destructive results in combat against armor are obtained with the 37-mm stick grenade or bomb. Its short range, however, results in success only at close distances.

V Training

58. Training in close-in attack on tanks includes the knowledge of the weak parts, of the construction, use, and effect of close-in weapons, and of combat principles. To this purpose, instruction (using sand-table models and captured enemy tanks) and practical exercises are necessary. After the individual fighter has been trained, the cooperation of the squad and group in terrain exercises will be practiced. Combat exercises with live ammunition against large dummies or captured tanks will complete the training.

59. To improve accuracy in antitank fire, riflemen and gunners of all the arms (machine gun, antitank, infantry howitzer, field artillery) must know all vulnerable parts against which their weapons can be used effectively, and they must perform daily aiming exercises against tank models. Special practice is needed for the use of the Very pistol and rifle grenade. By the use of sub-caliber fire with antitank guns and practice firing with rifles and machine guns against tank models, and by combat exercises, marksmanship is to be developed to the utmost.

60. Each rifleman, whether he is part of a tank-hunting squad or the gunner of an individual weapon, must be thoroughly convinced that, if he fights skillfully he and his weapon are superior to any tank. He has to know that he is the hunter and the tank the game. This thought is to be given great weight in the training period.

VI Assault Badge

61. The destruction of tanks in close-in combat counts as an assault. Rifemen, tank hunters, and other personnel who have fulfilled the necessary requirements in destroying tanks, will be awarded the assault badge.