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SECTION I

1. THE JU-188

A specimen of the Ju-188, twin-engine bomber, which is currently being encountered in small numbers over England, has been examined, and a number of probable differences from its predecessor, the Ju-88, are described below.

The nose appears to have been re-designed to accomodate the increased armament and provide better pilot vision, showing a smoothly curving line in place of the usual angular faceted nose and stepped-up windshield.

The wing span is believed to be approximately 72 feet 6 inches and the wing tips nearly pointed, although those of the stabilizer and elevators are square. The fin and rudder are higher and wider than the Ju-88 and square in appearance, resembling somewhat the Ju-87. A large trimming tab is a noticeable feature of the rudder. Some modification of the top line of the fuselage is effected by a power-operated gun turret which is incorporated in the cockpit, similar to the installation in the Do-217. The landing gear is of the standard oleo-pneumatic retractable type and the tail wheel is also fully retractable. The leading edge of the wings were fitted with balloon cable cutters.

The aircraft is powered by two BMW 801 G-2 14-cylinder aircooled radial engines, fully rated and fitted with three-bladed metal propellers. The fuel tank installation is the same as in the Ju-88 with a normal capacity of 446 U.S. gallons in the wing tanks. Possible additional capacity of 325 gallons in the forward bomb compartment and 181 in the rear bomb compartment gives a maximum supply of 952 gallons. The fuel of any individual tank may be jettisoned through the operation of a selector switch on the instrument panel. Performance estimates, which are approximately 15 per cent higher than corresponding figures for the Ju-88 equipped with Jumo 211 J engines, include maximum emergency speeds of 285 mph at sea level and 325 mph at 20,000 feet. Ranges, with 771 gallons of fuel are 800 miles at cruising speed of 254 mph and 1,200 miles with a weak mixture economical cruising speed of 232 mph. Service ceiling is estimated to be between 33,000 and 34,000 feet.

The armament is considerably more powerful than that of the Ju-88. There are two 13-mm MG 131s, one in a dorsal power-rotated turret with a perspex dome, similar to that installed in the Do-217, and the other in a manually-operated ring fitted with a bullet-proof glass shield in the dorsal rear of the cockpit. One 20-mm MG 151, with limited movement, is mounted in the nose and twin 7.9-mm MG 81s are installed in the ventral position, firing aft.

As the forward bomb compartment was apparently fitted with a long-range tank, the bomb load probably consisted of ten 110-pound bombs carried in the rear bomb compartment and two 2,200-pound and two 1,100-pound bombs in four carriers, two fitted externally under each wing. The bomb doors are operated by an electric motor, a new feature in German aircraft.

The armor found consisted of plate protection for the back, shoulders, and head of the pilot, a bullet-proof windshield for the radio operator, another

plate behind the radio set, and a curved plate on the floor.

The presence of A.S.V. (air-to-surface vessel apparatus) may indicate the use of the aircraft for antishipping operations.

The Ju-188 has participated in the recent hit-and-run raids over England and may be encountered by convoys in the near future.

ANTIAIRCRAFT

2. GERMAN 37-MM AA GUN

The German 37-mm (1.46 in) AA gun (3.7-cm Flak 18 and 36) is the smallest of the German medium AA artillery. In addition to the data published in "German Antiaircraft Artillery," MID Special Series, No. 10 (8 Feb 1943), the following information has become available.

a. Characteristics

Muzzle velocity (HE)	2,690 f/s
" " (AP)	2,625 f/s
Max horizontal range	7,200 yds
Ceiling	15,750 ft
Effective ceiling	6,560 ft
Weight in action (Flak 18)	1.72 tons
" " " (Flak 36)	1.53 tons
" draught (Flak 18)	3.39 tons
" " (Flak 36)	2.36 tons
Weight of complete round (HE)	3.3 lb
" " " " (AP)	3.5 lb
" " projectile (HE)	1.4 lb
" " " (AP)	1.5 lb

A preliminary examination of this equipment has been made and the following information obtained:

Length of barrel, including flash hider	128.75 in
Length of bore	71.2 in
Rifling	RH plain section, increasing 1 in 50 to 1 in 40
No. of grooves	20
Elevation	- 8° to + 85°
Traverse	360°
Rate of traverse, fast	35.5 turns = 360°
" " " slow	89 turns = 360°
Height of trunnions on ground	35.43 in

b. The Gun.

The gun has a monobloc barrel. The firing mechanism appears to be operated by barrel recoil and residual pressure of gas in a manner essentially similar in principle to the 2-cm Flak 38.

c. The Mount

The mount is of the trailer type and consists of two complete units-- the chassis and the mounting.

The chassis appears to be identical with that of the 2-cm Flakvierling 38, consisting of a U-shaped hollow rectangular steel frame mounted on 2 pneumatic tires.

The mount is a complete unit which is detached from the chassis by operating the 2 winches and dropping the front 2 pads; by depressing a locking handle at the rear the remaining pad may be freed by withdrawing the chassis.

(1) The base consists of a triangular platform on 3 adjustable supports by means of which the equipment may be levelled correctly. A spirit level is provided on the righthand side. A circular plate is fitted to the base on which the body rotates.

(2) The body is built up of a base and 2 roughly triangular side pieces which have a raised portion on each side for the trunnion bearings. On the left side is a lever by means of which the gun is pulled back. There are 3 adjustable seats, one on the right for the gunner, one on the left rear for sight number 1, and one on the left side for the loader. There is also a small folding platform on the left side. At the rear is fitted a dust tray.

(3) The cradle is trough-shaped and has a bracket at the forward end and a receiving slot at the rear to take the piece. The recoil mechanism is inside the cradle, recoil cylinder above, recuperator below. The elevating rack is in one piece with the cradle, and has fitted to it a scale reading from -8° to 85°.

(4) Compensators are fitted, consisting of 2 spring-loaded cylinders, one on each side.

(5) The traversing mechanism is operated by the left wheel of 2 parallel mounted handwheels, situated at the upper right rear of the body.

(6) The elevating gear is operated by the right wheel of the 2 handwheels.

(7) The firing mechanism operates by means of a foot pedal to the right of the layer's footrest connected by a system of levers to the trigger.

(8) The sight used on this equipment is known as the Flakvisier 36 "KF".

GERMAN
37-MM ANTIAIRCRAFT GUN

No complete specimen was available for examination but it is a fairly simple course-and-speed sight. Flakvisiers 33 and 35 are also used with the gun.

3. RUSSIAN AA ARTILLERY METHODS

Russian methods of repulsing enemy air attacks were recently outlined in an article published in the Red Star. A translation of the article follows:

* * *

The first enemy air raids were characterized by concentrated attacks on small targets. Dozens of Ju planes, one after another, made diving attacks on specific objectives,dropping their bombs on small areas. Under such conditions great endurance is required of the antiaircraft crews.

Intensive counterfire is necessary to prevent the success of concentrated enemy raids. In combatting one air attack our gun crews fired long salvoes at a definite point where the German planes went into their dives. If, however, the leading plane did succeed in getting through the wall of fire and dropped its bombs, the following planes were sure to get into the zone of fire. Following these tactics, one of our batteries brought down three bombers during the first day.

The Germans began to employ other tactical methods which were carried out at different altitudes. For instance, they made the so-called "star raids" in which the bombers approach the target from all directions. The Germans began to bomb large areas, attempting primarily to disperse our antiaircraft fire. The effectiveness of our antiaircraft artillery during such raids depends to a great extent on how completely reconnaissance is organized. Detecting enemy planes on time and destroying their combat formation before they drop their bombs is of prime importance. The antiaircraft gunners call this "saving a second of time".

In addition to the regular reconnaissance personnel, each crew in a battery has a constant observation post. In this way it has been possible to maintain reliable observation in all directions. To begin with, the men learned to identify the different German planes; they also learned to determine the speed of the Ju-87s and -88s with and without a bomb load.

The men were taught to determine, both with the naked eye and with instruments, the distance to enemy planes. This so-called "constant concentric observation" permits each battery to quickly maneuver its fire.

During the German "star raids" no attempt was made to score hits on all the attacking planes that appeared over the battlefield but instead attention was concentrated on those groups of planes which threatened most. On one occasion our battery threw up a wall of fire at a group of Ju-87s and forced them to change their course. At that very moment the observation post of one of our guns reported

six Ju-87s approaching from the rear. The crews immediately transferred their fire to this group, aiming, as is usual in such cases, at the leading plane. The plane caught on fire and went into a tail spin before the bombs could be dropped. This broke up the combat formation of the whole group and the enemy planes jettisoned their bombs and turned back.

In training the men and junior commanders, our higher officers paid special attention to developing ability in determining whether the enemy planes were continuing on their appointed course or were resorting to evasive antiaircraft maneuvers. The fire accuracy of small caliber antiaircraft guns depends largely on how well the course of the enemy plane has been determined.

In the majority of cases our battery employed dispersion fire, and always made sure that there was a line of shell bursts in front of the leading enemy plane. This was a psychological maneuver. In order to get out of the zone of antiaircraft fire, the pilot sometimes increases his speed but this is very difficult when he faces a continuous stream of fire.

ARMORED

4. GERMAN 6-WHEELED ARMORED CARS

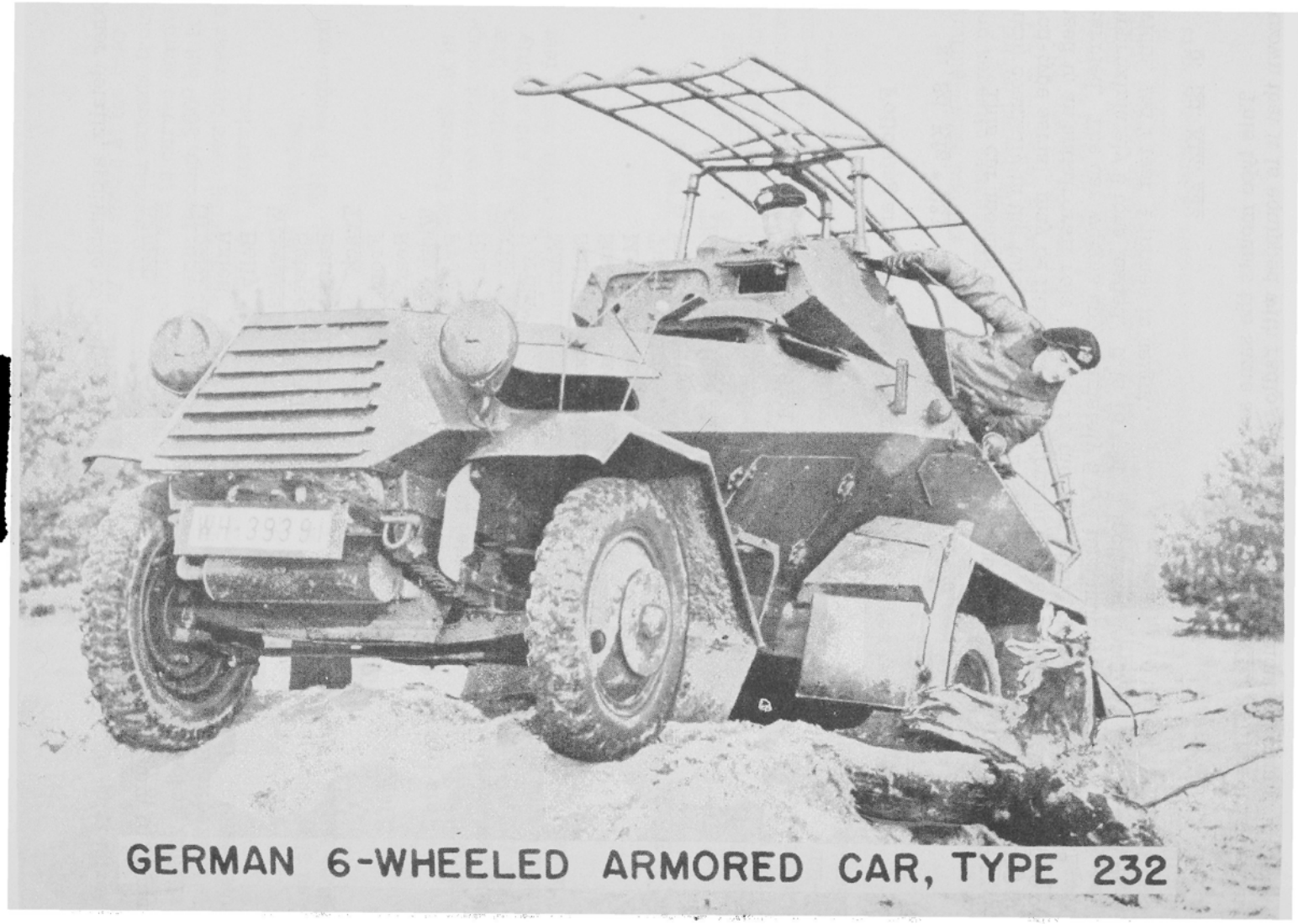
German armored cars, in general, may be divided into three major classes: the 4-wheeled light (see Tactical and Technical Trends, No. 38, p. 10), the 8-wheeled heavy (see Tactical and Technical Trends, No. 32, p. 8), and the 6-wheeled medium. It is reported that the 6-wheeled vehicles are no longer being manufactured but inasmuch as many are still in use and unquestionably will be encountered in the European theater, the following information is presented.

The 6-wheeled armored car was produced in three basic types. It is believed that all types are similar in chassis design and that only the superstructure was modified in each type to meet its requirements.

The chassis and engine were built by Bussing-NAG and the superstructure added by Deutsche Werke, Kiel. Six-wheel drive is employed and the vehicle may be driven from either end, duplicate controls being fitted. Steering is by front wheels only.

The rear wheels are dual double wheels, sprung by half-elliptic leaf springs. Special gripper chains are available for fitting over the rear wheels, giving each pair on each side in effect, the function of a track. Slightly smaller wheels may be fitted outside the existing front wheels for the purpose of obtaining extra traction in soft ground. As the additional wheels are smaller than the normal front wheels they do not interfere with the steering of the car.

The car is powered by a gas engine of approximately 70 brake horsepower.



GERMAN 6-WHEELED ARMORED CAR, TYPE 232

[redacted]

Other details, applicable to all 6-wheeled types are:

Armor	Ranging from 5 mm to 15 mm in thickness
Ground clearance	
Axles	9 in
Belly	8 in
Wheelbase	
Between axles 1 and 2	8 feet, 3 in
Between axles 2 and 3	2 feet, 11 in
Track	
Front wheels	5 feet, 7 in
Rear wheels	6 feet, 7 in
Width of wheels	
Front	7 in
Rear	14 in
Performance	
Fording	2 feet
Maximum gradient	12 degrees
Stability, longitudinal	50 degrees
Stability, lateral	32 degrees
Maximum speed, approx	50 mph
Turning circle, outside	52 feet
Fuel capacity	22 gallons
Theoretical fuel consumption	
Roads	6.9 mpg
Cross-country	4.2 mpg
Theoretical radius of action	
Roads	156 miles
Cross-country	93 miles

Following are individual descriptions of the three types of vehicles:

a. Sd. Kfz.* 231

This car mounts a 20-mm automatic cannon and a M.G. 34 (7.92-mm--.31-inch) coaxially in the turret with 360° traverse. A small radio set, employing a rod-type aerial, may be fitted. An attachment which permits a machine gun to be used in an antiaircraft role is fitted to the roof of the turret. A crew of 4 is carried. The car weighs approximately 5 1/4 tons unloaded, and approximately 6 tons loaded. It is 18 feet 5 inches in length, 6 feet 1 inch in width, and 7 feet 4 inches in height.

b. Sd. Kfz. 232

This type mounts the same armament as the Sd. Kfz. 231 but it is definitely known that it is equipped with radio. The vehicle is surmounted by a grid type

*sonder Kraftfahrzeug -- special motor vehicle

[redacted]

aerial lying in a horizontal plane and held in position by two struts at the rear of the car and a pivot coupling on the top of the turret. The aerial extends from the rear to two-thirds of the way to the front of the vehicle and is curved down slightly at the rear and front. The turret can still traverse through 360° but it is limited in that the guns may shoot the aerial away when firing over the rear of the vehicle. There is no antiaircraft mounting. A crew of 4 is carried.

The weight of the vehicle is approximately 5 1/2 tons unloaded, and slightly over 6 tons loaded. It is the same as the Sd. Kfz. 231 in length and width but is 9 feet 6 inches in height.

c. Sd. Kfz. 263

This type has a fixed turret with one machine gun firing forward. It is equipped with radio. A grid aerial is fitted, mounted on 4 struts, no pivot coupling being necessary above the turret. There is no antiaircraft mounting. The crew numbers five. The car weighs slightly over 5 tons unloaded, and slightly under 6 tons loaded. It is 18 feet 4 inches in length, 6 feet in width, and 9 feet 6 inches in height.

5. GERMAN FLAME-THROWING TANK, PZ KW 2 (F)

The German flame-throwing tank has been discussed in the Intelligence Bulletin No. 9, p. 62, but not until recently has an accurate illustration or diagram of the vehicle become available. This apparatus consists of 2 large flame throwers mounted on the front ends of the trackguards of a PzKw 2 tank--the 30- to 34-mph, 12-ton vehicle with a radius of perhaps 155 miles--now used largely for reconnaissance purposes.

a. General

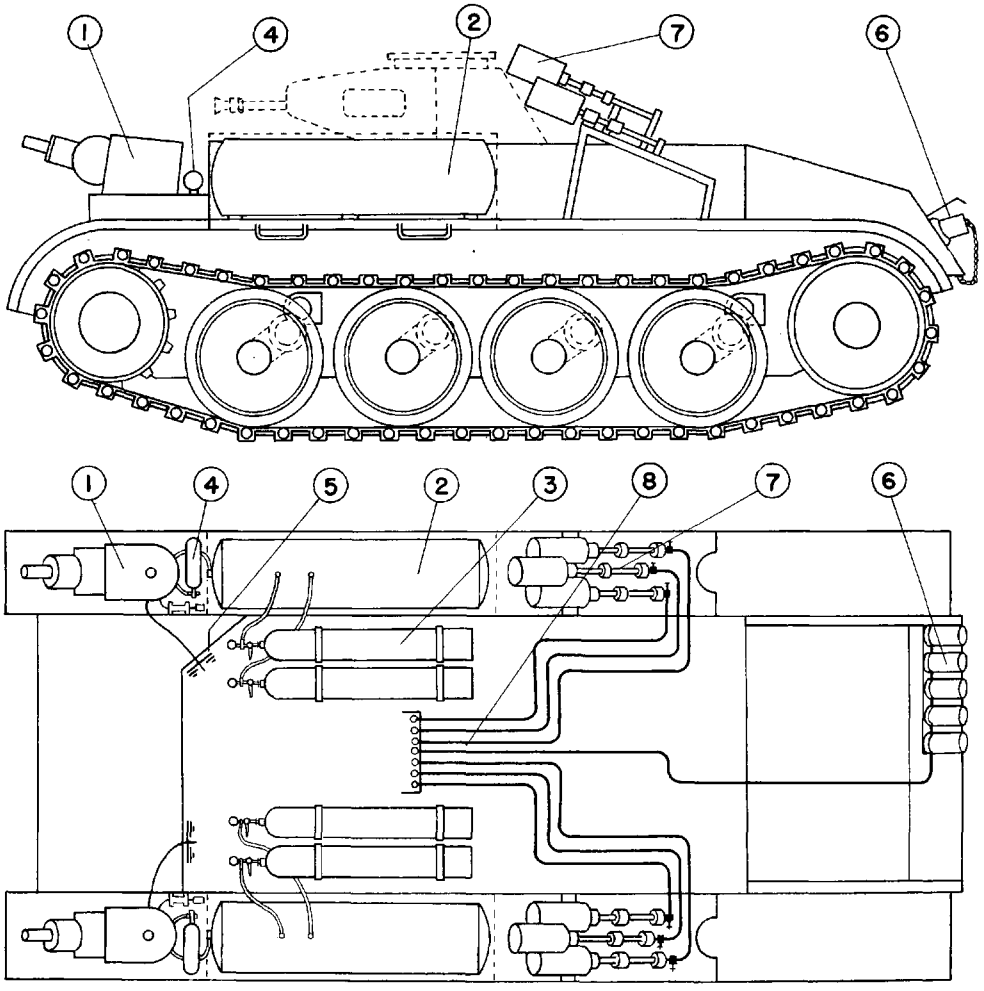
The fuel capacity for the flame throwers is about 35 gallons each--sufficient for about eighty projections of 2 or 3 seconds duration. Compressed nitrogen provides the propellant, and a tank of either acetylene or hydrogen is placed behind the projector for the igniting gas. Refuelling the flame throwers takes from one half hour to an hour. While the range of the flame throwers is not known, it is thought to be about 30 or 35 yards, which makes the tank a close assault vehicle, although the armor protection for such a purpose is not impressive. The armor, reported to be proof against 25-mm weapons at 656 yards, suggests frontal armor of 20 + 15 mm. (.79 + .59 in) although another source gives a single thickness of 30 millimeters or 1.18 inch. A machine gun with 1,800 rounds of ammunition is mounted in the revolving turret.

b. The Chassis

The chassis employed is that of the PzKw 2, either D or E, which are easily recognizable by their 4 large bogie wheels, each touching both the top and

bottom of the track. The tracks are of a different type from those fitted to the PzKw 2, model F, and have a much greater pitch--6 3/4 inches as against 3 5/8 inches.

The flame-thrower tank, PzKw 2 (F) Sd. Kfz.* 122 (this is the old Model B)



GERMAN FLAME THROWER TANK

PzKw 2 (F)

should not be confused with the PzKw 2 model F which is a normal type chassis having 5 medium-sized bogie wheels and 4 return rollers. The flame-thrower type of chassis appeared in 1939 with a normal armament, a 20-mm gun and a

*sonder Kraftfahrzeug--special motor vehicle

[redacted]

machine gun mounted in the turret, but is no longer seen in this form.

c. Flamethrower Equipment

The layout of the flame thrower is shown in the lower of the accompanying sketches. The flame thrower projectors (1) are mounted externally on the front of track guards, protected by armored shields, with a traverse of 180 degrees. The fuel is supplied from two tanks (2) mounted externally on the track guards and provided with armored shields, with the nitrogen gas for propulsion drawn from four cylinders (3) located inside the tank below the turret. Two small cylinders (4) mounted just behind the projector turrets contain the ignition fuel--acetylene or hydrogen. The flame throwers are controlled electrically from panels (5) in the turret.

d. Smoke Equipment

Since this tank is a close combat weapon, it is fitted with a smoke generator rack (6) attached to the rear; but on each track guard behind the fuel tanks are triple smoke generators and dischargers (7) aimed to fire forward by means of the cables (8) controlled from the turret.

ARTILLERY

6. GERMAN USE OF CAPTURED 120-MM MORTARS

It has been established that certain German units are being equipped with 120-mm mortars. In one instance the mortars are known to be Russian. It is possible, however, that the Germans will also use the French "Brandt" or the Finnish "Tampella" mortars. Brief data on the Russian, French (Brandt) and Finnish (Tampella) mortars are as follows:

	Russian	Finnish	French
Weight in action	588 lbs	560 lbs	1,792 lbs
Mounting	Bipod and baseplate	Bipod and baseplate	Fired from 2-wheeled carriage and baseplate
Method of firing	ML, percussion fired	ML, percussion fired	ML, trigger fired
Weight of bomb	35 lbs	27 1/2 and 47 1/2 lbs	37 lbs
Types of bomb	H.E.	H.E. and Smoke	H.E. and Smoke
Maximum rate of fire	-	12 rpm	6 rpm
Maximum range	6,500 yards	7,550 yards	8,000 yards
Carriage	2-wheeled, rubber tired	2-wheeled, rubber tired	-

[redacted]

7. GERMAN 128-MM SP GUN

A brief and not too satisfactory account of a brand-new, rather mobile, German 128-mm SP gun has been supplied by an allied source. The gun-caliber is a newcomer in the list of German artillery, and appears to be one of the ultra-modern long weapons which have been recently turned out by the Rheinmetall Company. No specifications are yet available concerning it.

Present data indicate the gun-and-mount assembly is an improvement on the rather cumbersome, 70-ton "Ferdinand", which mounts only an 88-mm (3.46 in) weapon rather than the new 128-mm (5.03 in) piece, and carries massive hull armor running from 4.33 to 7.87 inches (see Tactical and Technical Trends No. 35, p. 16)--a plating heavier than that carried at sea by most heavy naval cruisers. The hull armor on the 128-mm gun varies from 30 to 45 millimeters (1.18 to 1.38 in) over the fighting compartment and 15 to 30 millimeters (.59 to 1.18 in) on the lengthened PzKw 3 hull and chassis. The weight is thereby cut to about 35 tons and the speed has been stepped up from the 6 to 9 mph of the "Ferdinand" to about 15.5. Whether the added mobility is justified at the cost of stripping down the armor to a thickness that may be pierced by many small-caliber antitank guns, is an open question, and is certainly a reversal of trend. Perhaps "Ferdinand" was too massive to be thoroughly practical in mobile warfare. It is believed that the "128" may be used for the most part against fixed fortifications, in which case protection would be supplied by other means, which is further indicated by the fact that no machine gun is reported as part of the equipment. Only 18 rounds of separate-loading ammunition are carried. While the type of shell is not yet reported, mixed AP and anticoncrete projectiles may be expected. The crew is five.

CHEMICAL WARFARE

8. JAPANESE FLAME THROWER TYPE 93 (MODIFIED)

The Japanese Type 93 modified flame thrower is very similar to the small flame thrower of the same type number (see sketch) described in Tactical and Technical Trends No. 18, p. 8. For the sake of simplicity in comparison, the flame thrower described in this article has been designated "Type 93 Modified". It is not known whether this is a later or earlier model of the Type 93 or even an entirely separate type. However, the shorter length and slightly lighter weight of the nozzle of the modified model plus other mechanical improvements discussed below indicate that it is probably a later model.

The fuel tanks and rubber hoses of the two models are identical. The differences are found in the nozzle assemblies as shown on the following page.

GERMAN 128-MM SELF-PROPELLED GUN

[redacted]

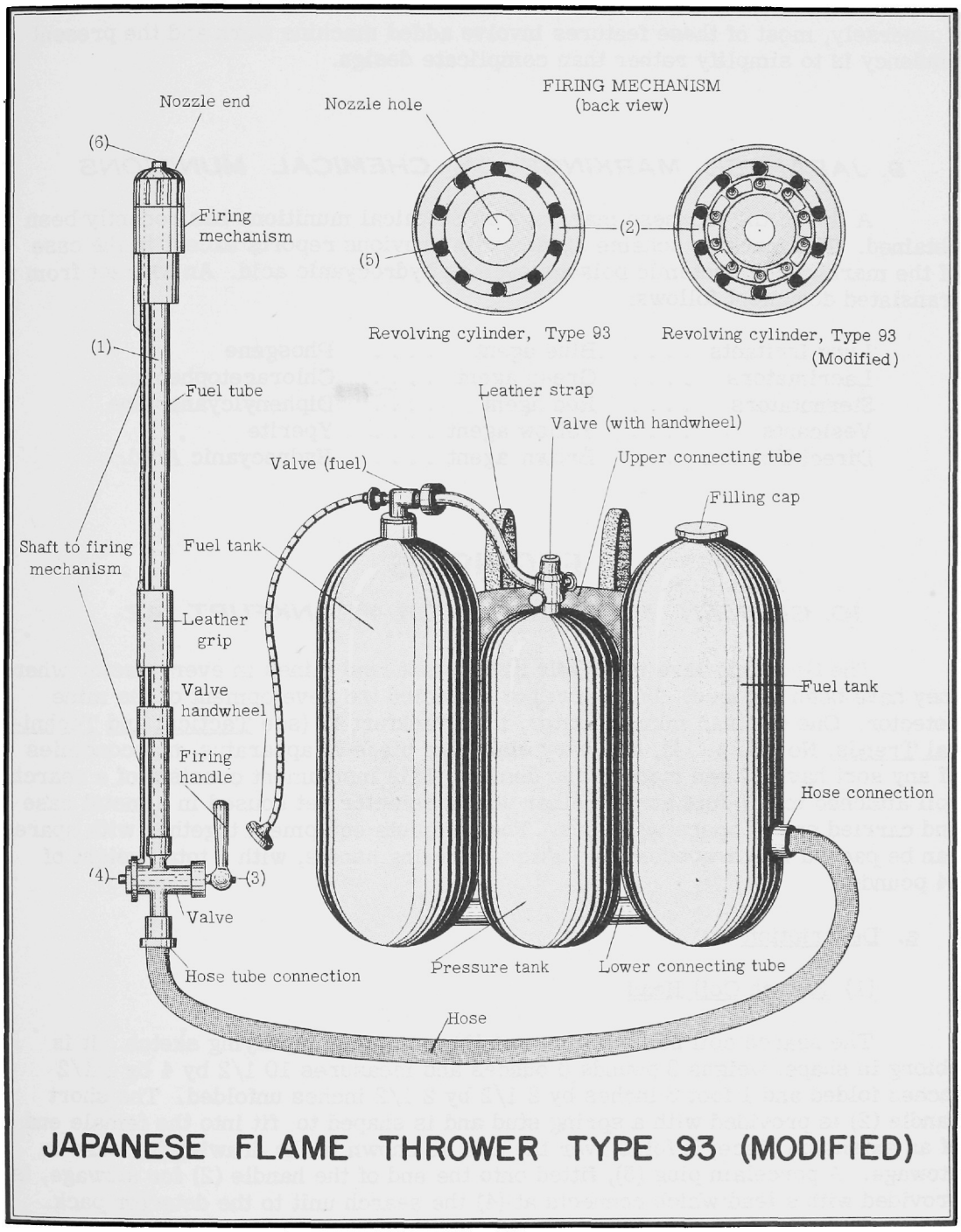
	Type 93	Type 93 Modified
Overall length of nozzle assembly (1)	47 1/8 in	35 1/2 in
Weight of nozzle assembly	10 lbs	8 1/2 lbs
Retaining nut on firing mechanism (inside nozzle outlet)	No locking screw	Has locking screw
Ratchet track (2) on back of revolving cylinder	Single ratchet	Double ratchet
Nut (3) on firing handle	No lock	Has tapered locking pin
Nut (4) on firing mechanism operating crank	No lock	Has tapered locking pin
Cartridge chambers (5) in revolving cylinder	0.44 in diameter (for Japanese cartridge)	0.484 in diameter (for U.S. cal. .30 cartridge)
Firing handle, fuel pipe and other fittings	Brass	Plated steel
Nozzle outlet tip (6)	Not detachable	Detachable

On the "Type 93 Modified" flame thrower, the pin, which actuates the revolving cylinder, operates in the inner track, and the firing pin and locking pin operate through the outer track. This feature makes it possible for the slots in each track to be tapered in opposite directions and thereby eliminates some wear on the locking pin and the track itself.

It is very likely that subsequent to the capture of this flame thrower the chambers were enlarged to permit the use of a cartridge improvised from U.S. caliber .30 cartridge cases.

The following points tend to indicate that "Type 93 Modified" flame thrower is an improvement or a more recent model of the Type 93 previously reported:

(1) The shorter length and slightly lighter weight of the nozzle give it a better balance, making it much easier to handle;
(2) Should the nozzle outlet tip be damaged, the old Type 93 nozzle would have to be sent to the rear for repair, while the part is replaceable in "Type 93 Modified."
(3) The inclusion of several locking pins offers definite mechanical and safety advantages. (In a recent test of the flame thrower not so equipped, the retaining nut on the firing mechanism came loose, resulting in a failure to fire.)
(4) The double ratchet design of the revolving cylinder is mechanically better than the single ratchet of Type 93.
(5) The replacement of various brass parts with steel, while not an advantage, may indicate a more recent date of manufacture.



JAPANESE FLAME THROWER TYPE 93 (MODIFIED)

[redacted]

Conversely, most of these features involve added machine work and the present tendency is to simplify rather than complicate design.

9. JAPANESE MARKINGS ON CHEMICAL MUNITIONS

A list of the Japanese markings on chemical munitions has recently been obtained. The marking scheme agrees with previous reports except in the case of the marking for systemic poisons such as hydrocyanic acid. An extract from the translated document follows:

Lung Irritants	Blue agent	Phosgene
Lacrimators	Green agent	Chloracetophenone
Sternutators	Red agent	Diphenylcyanarsine
Vesicants	Yellow agent	Yperite
Direct Poisons	Brown agent	Hydrocyanic Acid.

ENGINEERS

10. GERMAN MINE DETECTOR--FRANKFURT 42

The Germans have made effective use of land mines in every sector where they have been engaged. They have not neglected the development of the mine detector. One German mine detector, the Frankfurt 42 (see Tactical and Technical Trends, No. 24, p. 14), is a very elaborate piece of apparatus, no economies of any sort having been made in the design. This instrument consists of a search coil attached to a 7-foot arm together with a detector set housed in a metal case and carried on the operator's back. The complete equipment together with spares can be packed into a wooden case with a carrying handle, with a total weight of 54 pounds.

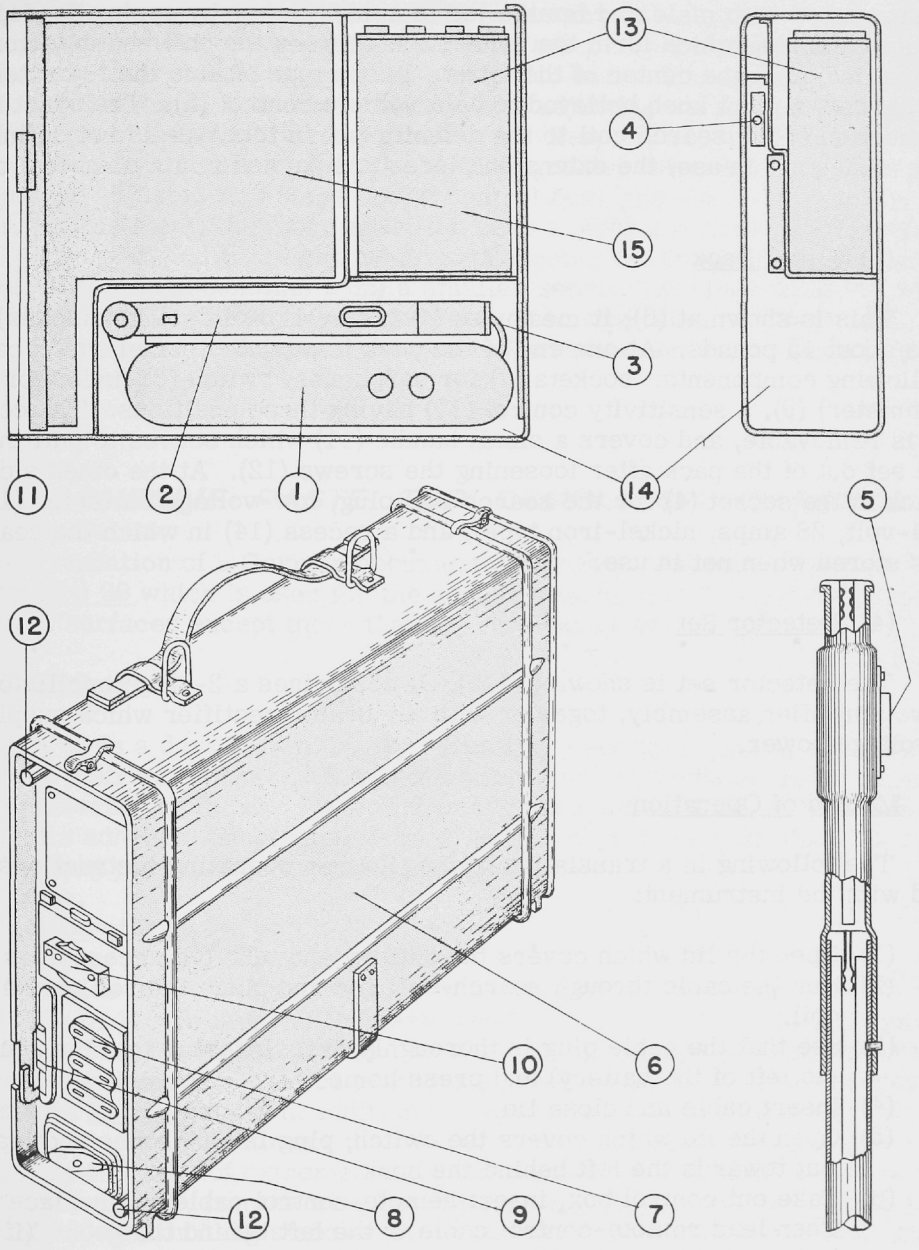
a. Description

(1) Search Coil Head

The search coil head is shown at (1) in the accompanying sketch. It is oblong in shape, weighs 3 pounds 6 ounces and measures 10 1/2 by 4 by 2 1/2 inches folded and 1 foot 8 inches by 2 1/2 by 2 1/2 inches unfolded. The short handle (2) is provided with a spring stud and is shaped to fit into the female end of an extension piece; it folds over the coil as shown in the drawing for ease in stowage. A porcelain plug (3), fitted onto the end of the handle (2) for stowage, is provided with a lead which connects at (4) the search unit to the detector pack.

(2) Extension Pieces

The search coil is carried at the end of a 7-foot rod made up of 3 duralumin



GERMAN FRANKFURT 42 MINE DETECTOR

[redacted]

extension tubes with male and female joints held together by spring-loaded studs. The cable and plug which form the connection between the coil and detector set are threaded down the center of the tubes. In one type of arm the top extension piece carries a pivot knob believed to be a volume control (5). The exact method of connection of the search coil to the detector set in this type is not definitely known. When not in use, the extension pieces are packed in a cylindrical canvas case.

(3) Metal Pack

This is shown at (6); it measures 13 3/4 by 11 3/4 by 4 1/4 inches and weighs about 15 pounds. At one end of the pack is a control panel which carries the following components: sockets (7) for earphones, switch (8), indicator (possibly ammeter) (9), a sensitivity control (10) having three positions. The control panel is removable, and covers a small handle (11) which serves to pull the detector set out of the pack after loosening the screws (12). At the other side of the pack is the socket (4) for the search coil plug, low-voltage batteries (13) (two, 4-volt, 28 amps, nickel-iron type), and a recess (14) in which the search coil is stored when not in use.

(4) Detector Set

The detector set is shown at (15). It comprises a 2-valve oscillator and 2-valve amplifier assembly, together with a vibrator rectifier which supplies high voltage power.

b. Method of Operation

The following is a translation of the German operating instructions enclosed with the instrument:

(1) Open the lid which covers the battery and take out accessories.
(2) Run the cable through search-coil rod and place the rod on the search coil.
(3) See that the cable plug is thoroughly dry. Insert it into the socket (to left of the battery) and press home.
(4) Insert cable and close lid.
(5) Open the lid which covers the switch, plug in earphones and lead cable out towards the left behind the hook.
(6) Take out control box, insert remote-control cable and replace box. Then lead remote-control cable to the left behind the hook. (If it is intended to work with only one predetermined range of sensitivity the control box may remain in the case.)
(7) Put on lid and close.
(8) Attach back support from below.
(9) Place the apparatus in the back support and canvas carrier and sling over the shoulder. Put on earphones. Fix the control box to the belt;
(10) Turn switch to the right to position "Ein" (one).

[redacted]

(11) Grasp search coil and hold it in the air; only a high pitched singing note should be audible. The real lower pitched signal occurs only if the search coil approaches a metallic body. If the signal is audible beforehand, it can be eliminated by adjusting the screws on the search coil by means of the key fixed to it. Keep the search coil well clear of buckle and other metal parts. The greater the sensitivity used (it can be adjusted in 3 steps on the control box) the more exact is the zero adjustment; the more exact the zero adjustment the better the detection. If the signal increases while approaching the ground (for instance, if the ground contains iron) a smaller sensitivity range must be chosen.

(12) Search by slowly moving from side to side close to the ground. When the search coil passes over metallic bodies the signal increases in volume.

11. ADHESIVE PASTE FOR DEMOLITION CHARGES

A translation of a German document describes a substance known as Kat (Kaltklebekitt) 39 which is used for the speedy attachment of demolition charges to all kinds of surfaces except those that are thoroughly wet.

a. Description

Kat 39 is a dark brown, sticky substance made up in 1/2-kg tins with a spatula and instruction sheet. It will not adhere to wet surfaces under water. It must be protected from frost, which makes it hard and useless until it is thawed. It retains its adhesive properties as long as it is at body temperature. It can be stored for long periods and is unaffected by weather.

b. Method of Use

The side of the charge which is to be attached to the target is smeared with a 1/16- to 1/8-in layer of the paste and the charge pressed firmly against the target with a slight back and forward motion. If the surface to be attacked is wet or excessively damp it should be previously dried with a cloth. All charges attached with Kat 39 should in addition be secured with wire if time permits, as it is impossible to ascertain whether the whole or only part of the surface is adhering. Only in cases of extreme emergency, and if the demolition is to be carried out immediately, can the wire be omitted. Kat 39 can also be used to join a number of 200-gm or 1-kg slabs together to form concentrated charges, (geballte Ladungen;) these too must be further secured by wire. Heavy charges can be prevented from slipping down by lengths of 3/4-inch plank stuck to the surface of the target below the charge.

[redacted]

12. GERMAN WOODEN BOX MINE 42

The following information concerns a new type of mine which was first encountered in Sicily and which will probably be used by the enemy in other theaters of war. It is difficult for U.S. mine detectors to detect this device at a distance of 6 to 8 inches under normal conditions.

The German designation of the mine is "Holzmine 42" (wooden mine, 1942 pattern). Although the mine appears to be of base workshop manufacture, it has probably been constructed according to generally issued specifications. This surmise is given credence by the fact that it is described in detail in Italian documents.

Drawings of the Holzmine 42 which accompany this article are reproductions of drawings in the Italian printed material. However the reproductions have been slightly modified in a few details to conform with the dimensions of the 200-gram prepared charges -- Sprengkorper 28 (detonating charge)--which are used as primers. Both the accompanying illustration and description must be regarded as provisional. Definitely accurate information will be presented as soon as it can be obtained.

a. Description

(1) Casing

The mine is contained in a wooden box (1) of 5/8-inch boards, measuring 13 inches by 16 inches, external dimensions. The box is sub-divided internally into 4 compartments, of which the 2 at the sides contain the main explosive charge (2), while the central compartment (3) contains the primer charges, and the end compartment (4) the operating mechanism. The central compartment contains 2 small wooden blocks, one (5) fixed to the front (in some cases replaced by a leaf spring) and the other (6) to the back; these serve to hold the primer charges firmly in place.

The two slats (7) are removable. The end compartment (4) contains a shear flange (8) secured to the outside wall by two 3/8-inch wooden dowels; this flange is provided with a central slot (9) which receives the head of the igniter. A second wooden block (10) at the base of the inner wall supports the pressure block (11) while the mine is being transported. A pocket for the igniter is formed by two parallel pieces (12) and a slot in the partition (13). The lid (14) measures 13 inches by 12 3/4 inches. It is secured to the mine at front and back by metal hooks (15) and is located by side dowels (16). At one end is a rectangular hole (17) for the pressure block (11), and at the other end a handle (18). Two small pieces of wood (19) are provided on the underside of the lid; their exact purpose is not known. The pressure block (11) measures six inches by two and four-tenths inches by two and four-tenths inches and carries two locating pieces (20) which, when the mine is armed, rest on the shear flange (8), in which position the head of the pressure block projects about two inches above the lid. When the mine is being transported the pressure block is reversed so that the locating pieces rest on the block

(10): in this position the pressure block protrudes about three-quarters of an inch.

(2) Filling

The main filling consists either of two charges of 50/50 amatol, each of approximately five pounds and five ounces, in the compartments (2) as shown in the illustrations, or of 22 standard 200-gram prepared charges, in which case the slats (7) are removed. In specimens found in Sicily the main charges were covered with pitch, presumably as water-proofing.

The primer charges are situated in the central compartment (3), and appear to consist normally of three 200-gram charges, of which one or two may be replaced by blocks of wood.

(3) Igniter

This is described in a report from Sicily as consisting of a bakelite tube, two-and-a-half inches long by a half-inch in diameter, containing a spring-loaded striker. The metal striker spindle has two holes, of which the one at the end is probably designed to hold a ring, while the inner one takes the "winged" actuating pin. A brass nipple with washer is screwed into the other end of the casing so as to permit it to be screwed into a prepared charge.

(4) Anti-Lifting Devices

At (22) are holes in the base of the mine through which, presumably, igniters can be screwed into explosive charges, their other ends being anchored to the ground. The report from Sicily states "there may be as many as five prepared charges, all of which may be actuated"; this presumably includes the main primer charge with the igniter. To insert an anti-lifting igniter into one of the charges in the center compartment (3) the position of the charge would have to be changed so that the igniter socket lies downward, in which case there would only be room for two charges in the compartment instead of three. It was reported from Sicily that of the mines encountered in one area, 35 per cent were fitted with anti-lifting devices.

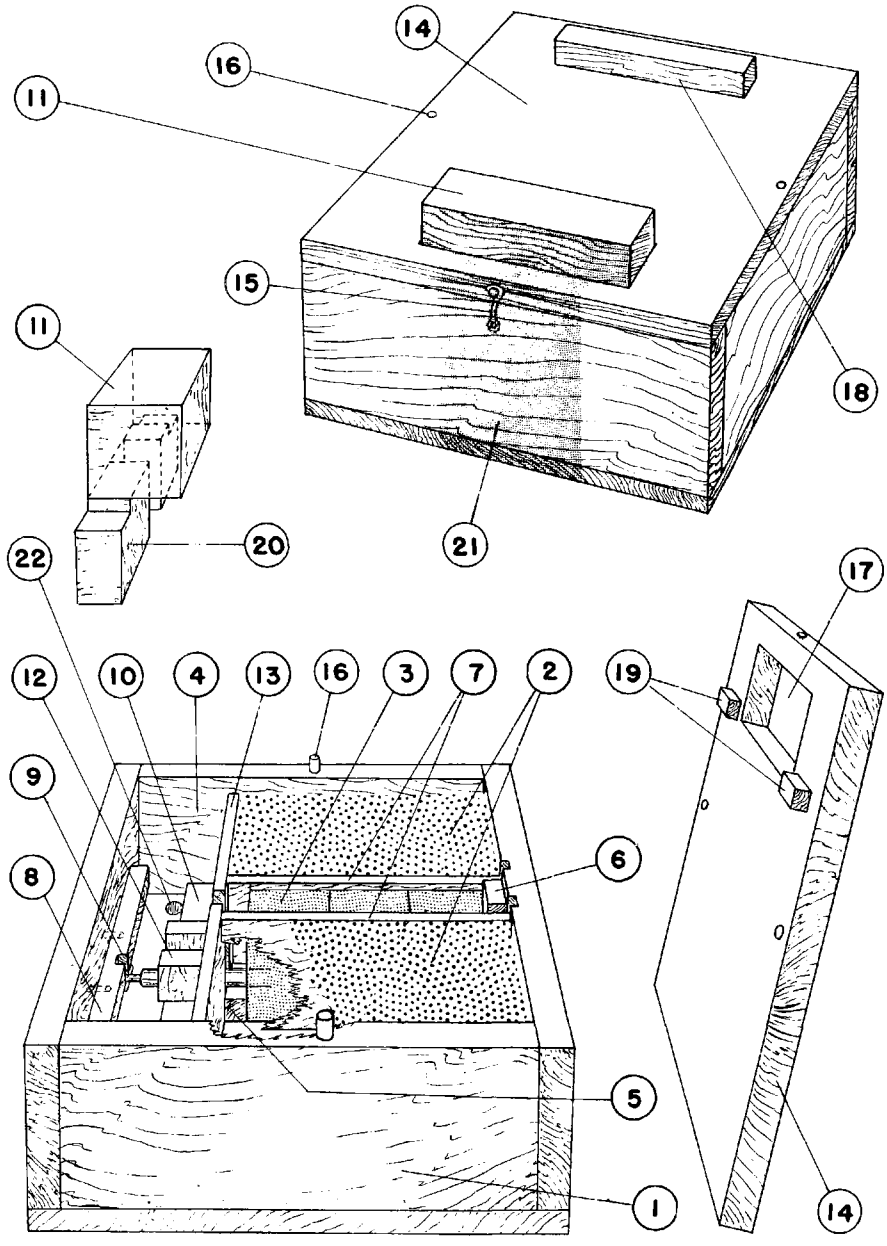
(5) Dimensions

The report from Sicily gives the following figures:

Total weight of explosive	11 1/2 pounds
Total weight of mine	18 pounds

(6) Coloring and Markings

A vertical red band (21) is painted down the center of one end of the box, and is continued on to the lid. The side of the pressure block (11) facing this band is also painted red. The mine is marked as follows:



GERMAN WOODEN BOX MINE 42

I
HOLZMINE 42
bestehend aus
zwei Ladungen zu je etwa 2.4 kg. Fp. 50/50
zwei Füllkörper o. Bohrung
einem Sprengkörper 28 m. Bohrung
gue
eingehörige Zündungen in besonderem Packgefäss.

(Translation)

I
WOODEN MINE 1942 PATTERN
consisting of
two charges each of approximately 2.4-kg 50/50 amatol,
two explosive charges without igniter socket,
one 1928 pattern 200-gm charge with igniter socket,
relevant firing assembly in a special packing container.
(The meaning of the word "gue" is not known.)

b. Method of Operation

Pressure on the pressure block (11) shears the 3/8-inch dowels securing the shear flange (8) to the outer wall and forces the flange down on to the sides of the igniter actuating pin, which withdraws from the igniter and frees the spring-loaded striker.

c. Firing Pressure

It is reported from Sicily that the mine will fire under a pressure of 200 pounds. The Italian document states that pressure of from 440 to 600 pounds is required. However, the diameter of the shear dowels indicates that in all probability a pressure of 200 pounds is sufficient to cause explosion of the mine.

d. Method of Laying

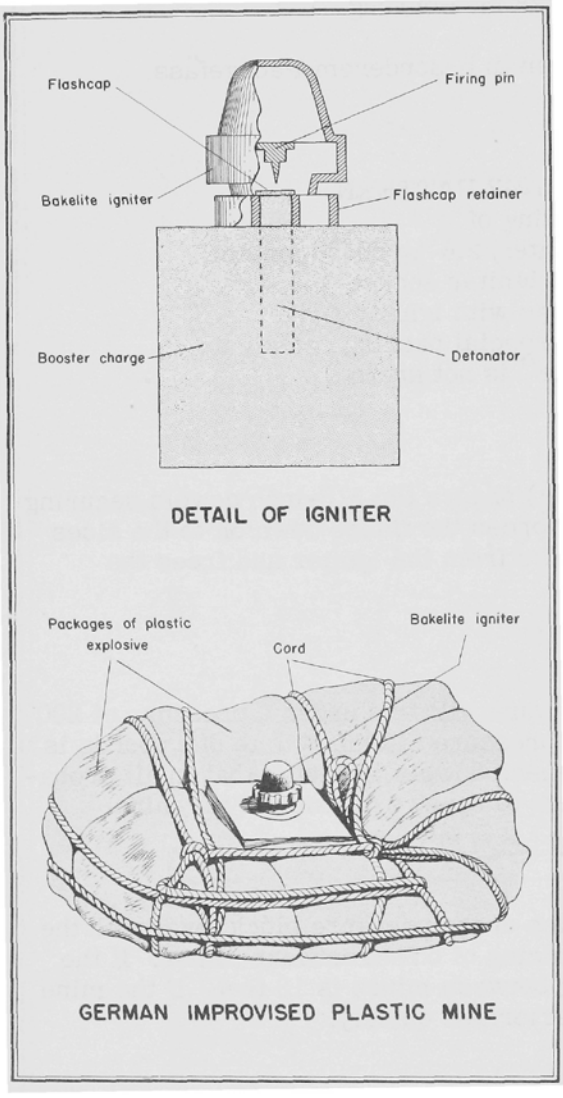
The mine is usually laid with the top of the pressure block level with the surface of the ground, with a minimum spacing of 6 feet between mines. If the mine must be laid on the surface, spacing between mines is 13 feet. If the mine is laid in water or in damp ground, it deteriorates quickly.

e. Disarming

Remove the lid, being careful to exert no pressure on the pressure block. Then lift the pressure block clear of the shear flange; examine the mine for anti-lifting devices. Unscrew the igniter and carefully remove the primer charges.

13. IMPROVISED PLASTIC MINE

Discovery of a new, non-metallic mine, which is difficult to detect and has been laid within allied positions by infiltrating German troops, has been reported.



The mine, obviously improvised, contained no metal other than the aluminum cap and a striker pin in the bakelite igniter. The metal striker pin is picked up by mine detectors at only 1 1/2 inches, and prodding is ineffective. Therefore detection is extremely difficult if the mine is well laid.

Some of the mines encountered were found on the shoulders of roads which had been in use by allied troops for about 6 days. These roads had been clear of mines previously. One mine was found in a path on the shoulder of a road. Prints of heavy, hob-nail boots were noted near the mine and on a path leading from it. Another mine was found on the shoulder on the opposite side of the road. An empty cigarette package, of a popular American brand, had been placed on top of the firing mechanism. All mines were placed on a sharp curve in the road.

The mine (see accompanying sketches) is made by tying packages of plastic explosive around an ordinary 1/2-pound block of cast explosive of Italian manufacture. Ordinary twine is used for tying. The firing mechanism consists of a bakelite igniter containing a metal striker pin and with a detonator complete with flash cap attacked. The detonator is inserted in the cast explosive as a booster charge. Firing pressure of the mine is less than 75 pounds. The preliminary drawing from which the accompanying sketch was made is not sufficiently detailed to show how the firing pin is retained in the igniter.

To disarm, examine the mine for trip wires that may be attached to the cord and carefully remove the firing mechanism from the booster charge.

[redacted]

INFANTRY

14. GERMAN MOTORIZED INFANTRY DIVISION

(Panzer Grenadier Division)

German organizations have consistently shown a trend toward conversion of infantry divisions into motorized infantry divisions (Panzer Grenadier Divisions) which in turn have been converted into armored divisions (Panzer Divisions). The German motorized infantry division represents a definite step in the direction of the armored division as shown by its organization:

Strength:
Approximately 15,000 officers and enlisted men.
Organization:
Division headquarters
Armored reconnaissance battalion
Signal battalion
Panzer battalion, including 4 tank companies.
Two motorized infantry regiments.
Divisional artillery regiment
Antitank battalion
Engineer battalion
Divisional services

It is apparent that the German panzer grenadier division is extremely mobile and flexible.

Each weapon is employed to the fullest advantage while maintaining the maximum mobility. The motorized infantry is particularly strong in the attack because of its mobility, high fire power and armor protection. It is able to carry out independent tasks because of the high allotment of heavy weapons. Its main roles are: cooperation with tank units in quick mopping up and consolidation of terrain penetrated by the tanks, supporting the tank attack by overcoming nests of enemy resistance, removing obstacles, establishing bridgeheads, and protecting assembly and bivouac areas.

a. Training

(1) Without Motor Transport

Troops must be trained in endurance by systematic marches up to 25 miles (at night, through woods, in all weather and with equipment and ammunition) and in winter bivouac conditions. Six men from each company will be given a short course as radio operators for use at company headquarters.

(2) With Motor Transport

In every section 3 men will be thoroughly trained as drivers. Others will be trained as drivers if there is sufficient time and fuel allowance. All must be

competent to carry out motor transport maintenance. Drivers must be able to withdraw quickly from enemy fire and to find good fire positions. All types of firing from the vehicle at halt and on the move must be practiced, especially at targets of opportunity. The sections consist of 12 men with the following weapons:

3 LMGs -- one mounted.
2 Submachine guns.
7 Rifles

b. Approaching the Enemy

All weapons are to be ready to fire and men detailed for all around observation. When under rifle or machine gun fire move forward, when in an area under artillery and mortar fire make a detour if possible, otherwise continue at normal speed.

c. Fighting from the Armored Personnel Carrier *

The chief weapon of the section in fighting from the vehicle is the fixed machine gun. This will generally be fired when the vehicle is at halt. Halts for firing should not be longer than 15 to 25 seconds.

d. Fighting Dismounted

The fixed machine gun will be used to cover the section as it dismounts. The vehicle must be kept ready under cover. If the enemy offers strong resistance and when support from adjacent sections or heavy weapons is lacking, strong machine-gun fire is necessary to allow the rest of the section to move forward.

e. Patrols

The armored vehicle is useful for reconnaissance tasks with limited objectives, but in view of its insufficient radio equipment it is not suitable for long-range operations. A patrol is usually organized as follows: commander and 3 riflemen with 37-mm antitank gun in one vehicle and a section, including riflemen trained in gas detection and engineering, in another vehicle, together with 1 or 2 messengers.

Unnecessary fighting is to be avoided but a weaker force may be destroyed if this does not interfere with the original mission. If the enemy is in force, contact should be quickly broken. Smoke can also be used in these circumstances.

When taking up a position for observation two alternative positions must be chosen; one for the night and another for occupying before daylight. The vehicles must be off the road, under cover, but kept in readiness for battle. Reports should be made on all mined areas marked by the enemy. If the patrol does not have time to remove mines, the area must be marked and a detour made. Ground reconnaissance is always to be linked with the main reconnaissance. A detour

*The number of armored vehicles per unit is unknown. Where fighting from vehicles is mentioned above, it is presumed that it is from armored personnel carriers.

should be made of inhabited places unless the execution of the order makes driving through them absolutely necessary.

If the enemy is presumed to be present, a part of the patrol must go forward on foot under cover of the weapons on the vehicles. When making a reconnaissance of a river sector an approach with the vehicle right up to the river must not be made. Speed should be reduced and the vehicle driven off the road to avoid causing dust clouds and noise. When used as a point, messengers will be allotted.

f. Assault Troops

When used as assault troops and also in wood fighting the weapons carried should consist mostly of submachine guns, plenty of hand grenades, smoke grenades and demolition charges. Often only one machine gun will be taken but plenty of ammunition distributed among several riflemen. The latter can, instead of taking their rifles, be given submachine guns.

g. Division Organization

In the German Panzer Grenadier Division, each of the 2 panzer grenadier regiments is composed of the following units:

Regimental headquarters
Headquarters company
3 panzer grenadier battalions
13th company (infantry howitzer)
14th company (antitank)
Light infantry column

The panzer grenadier battalion, according to previous information, consists of:

Battalion headquarters, with communication section
3 rifle companies
1 machine gun company and the battalion trains.

The rifle company breaks down into:
Company headquarters
3 platoons
Antitank rifle section

Each platoon breaks down into:
Platoon headquarters
4 squads
1 light mortar section, each squad having:
1 light machine gun

The machine gun company breaks down into:
Headquarters
3 machine gun platoons
1 medium platoon

Each machine gun platoon has 2 sections of 2 heavy machine guns each, the medium mortar platoon having 3 sections of two 81-mm mortars each.

New reports indicate a trend within the organization of the panzer grenadier battalion of the panzer grenadier division toward that of the panzer grenadier battalion of the panzer division. According to these reports each panzer grenadier battalion would break down into 3 to 4 companies, each of 3 light platoons and 1 heavy platoon. Each light platoon is reported to consist of 3 squads, each armed with 2 light machine guns; in the heavy platoon, 2 heavy machine gun sections, each with 2 heavy machine guns and 1 heavy mortar section of two 81-mm mortars.

h. March

Over level country, average speed of 15 miles per hour can be maintained. Maximum speed under favorable conditions is 18 to 22 miles per hour. An average of 94 to 125 miles can be covered in a day if there is no contact with the enemy.

Intervals between the point squad and support platoon are generally one minute and between the support platoon and the company, 2 minutes. If the company has under command a heavy antitank weapon it should be placed forward. Other heavy weapons are normally placed in the rear. The company commander with commanders of allotted heavy weapons and artillery observers normally travel together behind the support platoon. Each platoon will detail observers to watch the flanks.

When contact is made the command must decide quickly whether the enemy can be attacked on the move or whether the company has to take cover and prepare for the attack. Obstacles covered by antitank weapons will necessitate an attack dismounted, if a detour cannot be made to take the enemy in the flank or rear.

i. Halts

Twenty-minute halts every 2 hours should be made if the situation allows. These halts must be utilized for making small repairs and refuelling vehicles. Rests are normally taken every 4 to 5 hours. If a meal is taken during this period the full time allowed should be 2 to 3 hours. All available sheds, barns, farm buildings, etc., must be used. Vehicles must be backed in so that they can resume the march quickly without having to turn around.

MEDICAL

15. GERMAN SWAMP STRETCHER

To move sick and wounded through the almost impassable marshlands of the Kuban front, the Germans adapted the Finnish plywood "akja" sled (see

[redacted]

GERMAN SWAMP STRETCHER

[redacted]

Tactical and Technical Trends, No. 19, p. 28) as shown in the accompanying illustration. In a terrain where to attempt to carry wounded in an ordinary stretcher would have been exhausting to the point of impracticability, this sled provided an easily-handled and reasonably-comfortable vehicle. At a later stage, the patients were moved in shoal-draft, outboard-motor skiffs.

ORDNANCE

16. JAPANESE HEIGHT FINDER

The Japanese height finder is a self-contained stereoscopic optical instrument used to measure both range and height on the principles of triangulation. It is dependent upon magnification and base length, the two basic conditions which serve to increase the stereoscopic sense of the observer. The greater the base length of the instrument and the greater the magnification, the greater amount of depth perception will be attained. This enables the observer to read with greater accuracy the distance to targets of extreme range or height.

a. General

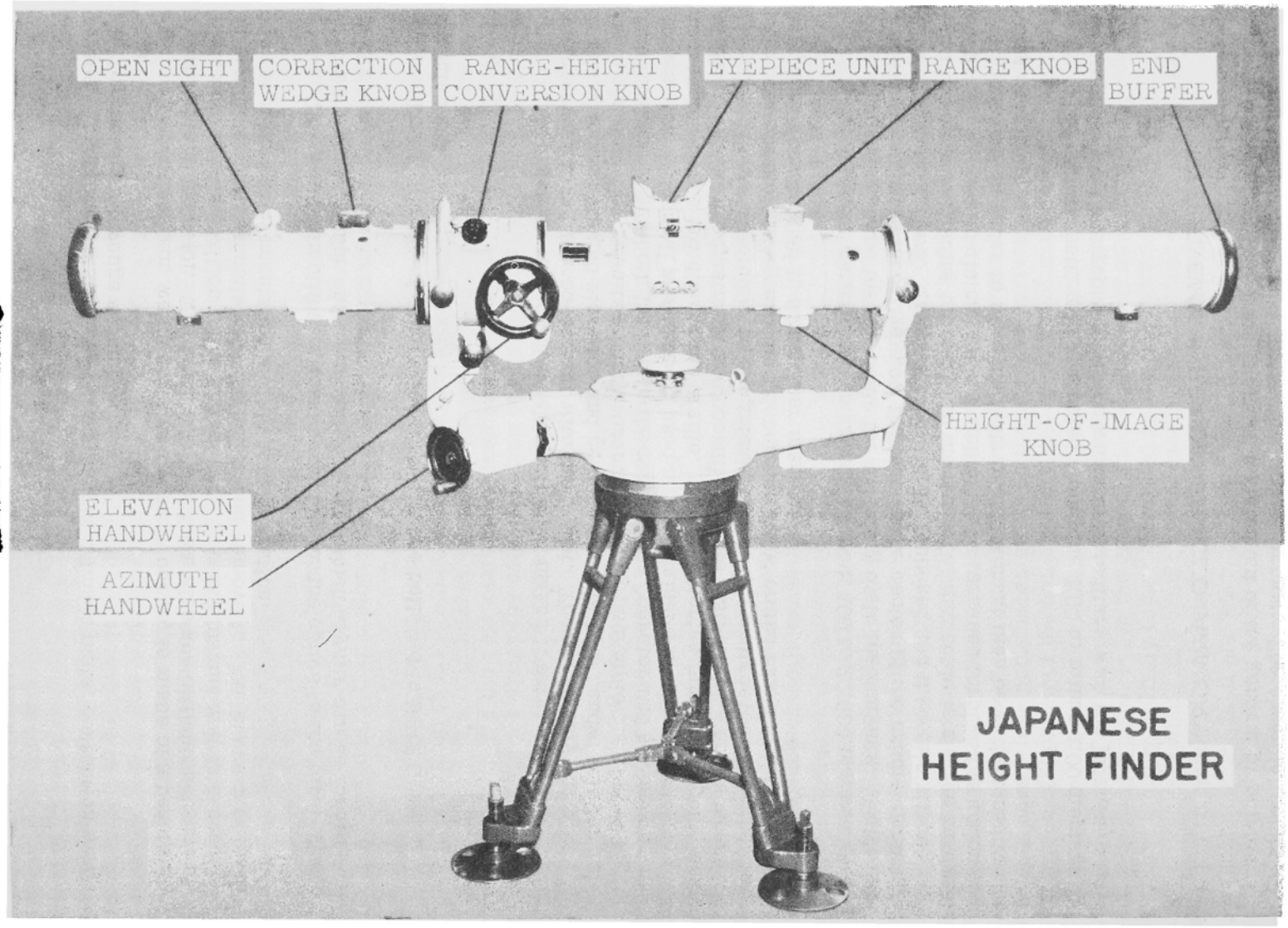
The Japanese instrument has a base length of 7 feet 2 1/2 inches and can operate on only one range of magnification--20 power with a field of 2° 15'. Its total weight is about 500 pounds and it disassembles into three major units: the tripod, cradle and tube. These units are packed separately in steel containers for transportation. The Japanese instrument has only an outer tube and optical bar. In adjusting its measuring wedges, the Japanese height finder depends solely on external targets of known ranges or altitudes. However, it has an adjusting lathe of such construction and dimensions that when it is set about 50 yards from the instrument it can be used as an infinity target. At night this lathe is rendered useless so that it is necessary to adjust the height finder on a visible astronomical body such as the moon or a star. These bodies being at an infinite distance the measuring wedges are adjusted at their infinity setting.

b. The Wedges

There are two rotating and one sliding measuring-wedges, and a mechanism for concerting the wedge to read either range or height during operation. The correction wedge assembly is machined out of brass. It employs a system of stop rings to control complete movement of the glass wedge.

c. The Optics

The main optics of the Japanese height finder are extremely small in diameter so that the field of view is greatly decreased and the light transmission reduced. However, the instrument contains all the optics usually found in stereoscopic instruments, namely: 2 end windows, 2 end reflecting units, 2 objective lenses, 2 erecting systems, 2 ocular prisms, 2 reticles, 2 eye lenses, 2 field



JAPANESE
HEIGHT FINDER

lenses, 2 rhomboid prisms, ray filters, height if image plate, correction wedge and the measuring wedge assembly.

The optical bar, which contains the main optics, is made of a beautifully finished stainless steel. The adjustments of the optics are difficult because of their undesirable position in the optical bar. In many instances it is necessary to completely disassemble the instrument and remove the bar in order to make the necessary adjustments for satisfactory operation.

There is a simplified method of drying out the optics in the tube. There are two plugs on either end of the tube through which dry air can be forced periodically but not during actual operation.

The optics are of excellent quality but are believed to be of German manufacture.

d. Operation

The Japanese method of tracking a target makes it extremely difficult for the observer to get stereo-contact with the target. They have only one man tracking in azimuth and elevation and he must operate both handwheels for azimuth and elevation simultaneously observing through a simple metal open sight. The handwheels are both located to the right of the operator and are only a few inches apart. A small wooden box, used as a container for several batteries, is mounted on the left side of the cradle. These batteries furnish the only means of illumination for adjustment and operation of the instrument. The Japanese height finder has absolutely no electrical connections whatsoever with other instruments in the battery and the information found on the range drum is either telephoned or signaled in some other manner.

The Japanese range drum is graduated from 400 to 20,000 meters. However, the Japanese use the mil scale for orienting their instruments. A circular mil scale is located directly below the tube in the center of the cradle, secured with two small screws. These screws can be loosened and the scale slipped until the desired reading is found. In the center of this scale is a large handwheel connected to the slip clutch plates which must be loosened through the action of the handwheel in order to slow the instrument; it must then be retightened to continue operation.

The diopter setting is graduated from plus 2.00 to minus 4.00 diopters to compensate for the myopic condition which is hereditary with the Japanese soldier.

17. ENEMY USE OF SPACED ARMOR

A recent British study provides a statement of the general principles governing the attack of, and defense by, spaced armor. The essential points bearing on the use of spaced armor by the enemy, that follow, are taken from

the British report.

* * *

Two separated homogeneous plates attacked by A.P. shot, or 2 separate plates in loose contact, are less effective in defense than a single plate of the same total thickness. This is because there is no shearing resistance over the internal free surfaces.

A front cemented (face-hardened) plate separated from a rear homogeneous plate attacked by A.P.C. (armor-piercing capped) shot will, for the same reason, offer less resistance than a single cemented plate of the same total thickness.

A front homogeneous plate separated from a rear cemented plate offers increased resistance to A.P.C. shot as the front homogeneous plate destroys the cap of A.P.C. shot and so diminishes the effectiveness of the projectile against the cemented surface of the rear plate. The important point in this construction is that by the use of spaced plates the cemented face can be made to be an interior surface of the system, and so afford protection against an A.P.C. shot de-capped by the front plate.

For the same reason a rear cemented plate offers increased protection against a tungsten carbide cored shot, unless the core is very well protected by a cap and some form of cushion.

A rear cemented plate will also offer greatly increased protection against an A.P. shot because the nose of the A.P. shot will be partly damaged by the front homogeneous plate, and so will have a still further diminished power against the cemented surface of the internal plate.

From the point of view of attack, the effectiveness of capped (A.P.C.) and uncapped (A.P.) projectiles varies in different calibers owing to a differing balance of advantages and disadvantages. Though a cap tends to preserve the point of the ogive (the curved and pointed head of the projectile) during perforation of the front plate, the cap itself is destroyed by the same action, and thus kinetic energy is wasted. In one caliber the reduction of energy due to loss of the cap before reaching the interior plate may result in failure to perforate, whereas in a larger caliber the loss may have a less pronounced effect on the ultimate performance, resulting in perforation of 2 plates of the same quality and equally well matched.

It is true that an A.P. or A.P.C. shot tends to turn towards the normal on perforating a plate, but in the case of spaced armor any advantage which might be gained thereby is likely to be neutralized by the acquisition of a transverse angular velocity which may result in increased yaw. For this effect to be appreciable, plates should be separated by a distance of at least one caliber.

[redacted]

18. TRACK-WHEEL VEHICLES

Experimentation by Austrian automotive engineers to produce for the German army a dual-purpose vehicle which will be capable of quick conversion from wheel to caterpillar traction is reported in an article printed recently in the German technical publication "Wehrtechnische Monatshefte". A translation of the article follows:

* * *

A suitably-built caterpillar vehicle is fully capable of cross-country travel, but has only a limited cruising radius. The caterpillar track cannot be used for travel on highways at great speed without excessive wear and tear.

Vehicles on wheels, on the contrary, develop great speed and have a great cruising radius, but are poorly suited for cross-country travel, even when equipped with all-wheel drive.

It was quite natural, therefore, to think of creating a vehicle which would be adequate for both cross-country and road travel, that is, caterpillar motion with motion on wheels.

Practical development of this idea has for more than two decades been the subject of research and experimentation. To some extent the creation of tanks is closely associated with that development. Worthy of mention in this connection is particularly the Christie type of construction, such as Russia is using for light battle tanks. Unquestionably, however, this principle involves certain technical and tactical disadvantages, due to the fact that the vehicle's crew requires half-an-hour for the work of removing the caterpillar chains, and must leave the vehicle to do this. One of the advantages, however, is that the width of the vehicle remains unchanged. In the Kolo-Housenka tank of the Vollmer type, developed by Skoda, 4 wheels have to be attached from the side, and the method of driving the vehicle into position on blocks involves much additional difficulty. There was an advantage, however, in the simplicity of construction of that type of vehicle, so that these Skoda vehicles were regarded favorably for a considerable period of time.

Of real importance were the wheel-caterpillar vehicles of Landsverk, Sweden. The wheel running gear is built solidly into the car, and can be lowered on the outside by means of a spindle joint. Change from caterpillar to wheel operation, and vice-versa, can be effected while the vehicle is in motion. Both, the French and the English have attempted similar types of construction, but due to its practical adaptability for military purposes the Swedish type of construction was considered superior.

[redacted]

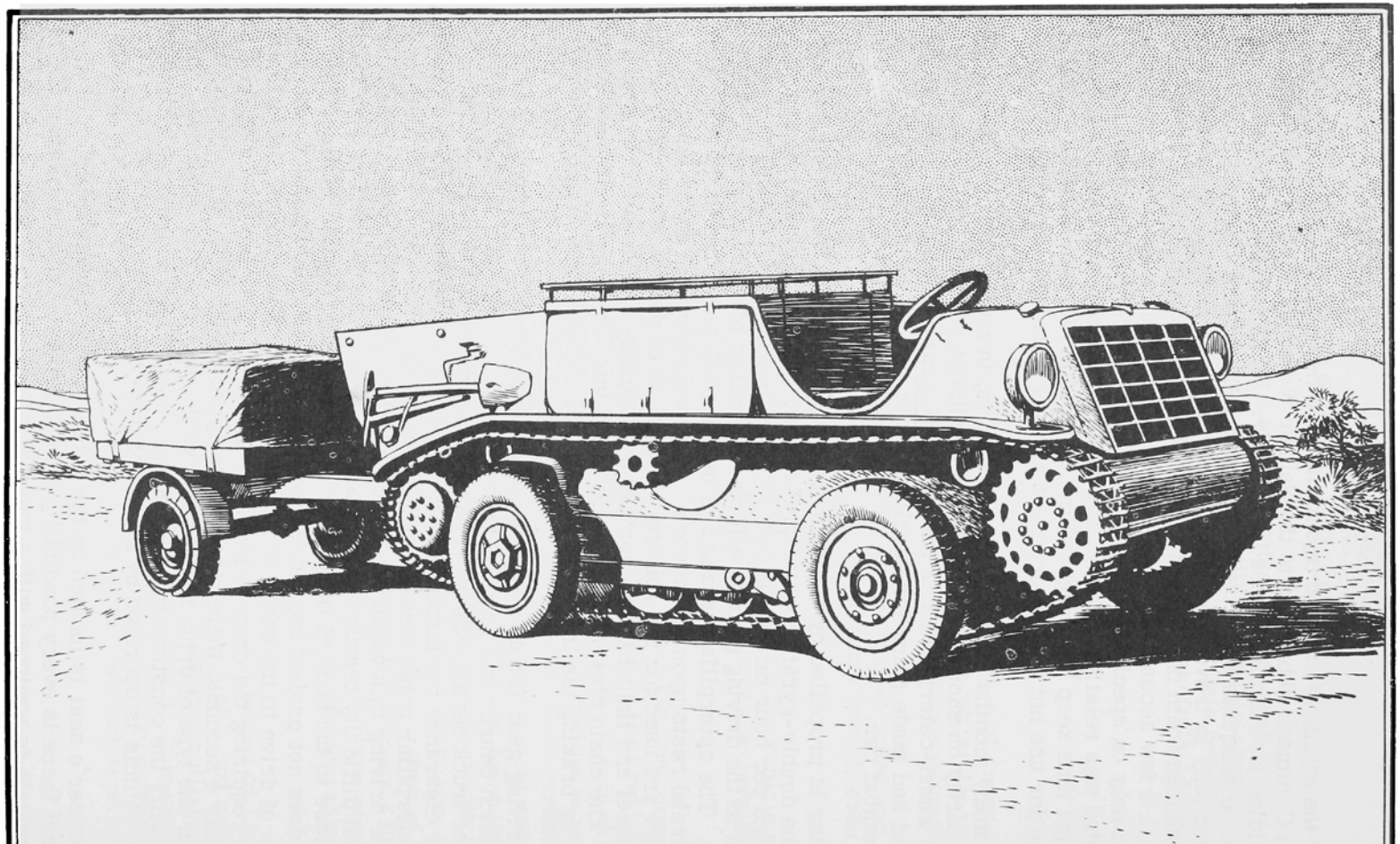
Under the stimulus of experimentation in other countries, the former Austrian High Command submitted to the Saurer Works (Vienna) a list of requirements for building a caterpillar-tread wheel car. While traveling on wheels, the vehicle was to be adequate for cross-country travel, and the caterpillar treads were to be used only in traversing particularly difficult terrain. This was taken to imply that change from one type of drive to the other could be done from the driver's seat in a few seconds of time. Consequently, since the caterpillar treads are to be used only on special occasions, and since, therefore, the wear and tear to be anticipated was relatively slight, it would be possible to avoid large structural design and thus keep the weight of the car within close limits. The vehicle must be suited for use not only in draft but also for carriage of heavy loads.

After many months of trial on level terrain, in mountains of moderate and great height, partly on snowy ground, with and without attached loads, Saurer developed his wheel-caterpillar car RR (Räderraupenwagen) Type 7. The Austrian High Command had made plans for developing this vehicle as carrier, prime mover, and combat car.

This car is propelled by a Diesel motor located in front. The motor is operated on the double-gyration principle, and the speed with trailer is approximately 45 miles per hour on wheels and 12 miles per hour on caterpillar treads. Transmission to the driving gear is effected by means of a dry-operated, single-disk coupling. The caterpillar treads are moved by 2-drive wheels located in front. Each tread rests upon 6 uncovered, stamped rollers of sheet-metal. Helical springs are used for the rollers. The joints of the tread are made of alloyed cast steel and linked to one another by specially hardened bolts of chromium nickel steel. The chain cleans itself while in motion. Steering is effected through a differential by braking the movement of the inside tread when taking a curve.

The driving gear for use on wheels embodies a number of structural innovations which Saurer had previously found satisfactory upon testing in the construction of truck series. Since it was necessary for wheel driving to provide the necessary clearance for turning of the wheels, the front wheels placed laterally outside the caterpillar tread entailed a corresponding extra width of vehicle; and for caterpillar driving this width has to be reduced sufficiently to enable the car to pass without difficulty through narrow sunken roads. As the wheels are drawn up, they fit close to the body of the car; in fact, the lower part of the wheels in this position does not project beyond the outer edge of the caterpillar tread. Change from one type of drive to the other is effected by an auxiliary motor through a worm gear, without requiring the crew to leave the vehicle. Since the time required for changing is only 4 seconds, there was no attempt to insist on an arrangement for changing from one type of drive to the other while the vehicle is in motion. This helped to simplify the construction and reduce costs. Only the rear axle is motorized when the vehicle is operated by means of the wheel drive.

The driver's seat is located by the side of the motor, at the front of the vehicle, so that there is every possibility of modifying the superstructure further back. This vehicle is equipped with a cable winch.



GERMAN DUAL TRACK AND WHEEL CAR

[redacted]

Further details follow:

Motor	4 cylinder Diesel, type CRDV
Continuous output (with brakes)	70 HP at 2,000 rpm
Gear ratio	4.91:1, 3.03:1, 1.72:1, 1:1, 0.75:1, reverse 4.58:1
Rear axle reduction	5.9:1
Tank capacity	Approx 18 gals
Fuel consumption (wheels)	Approx 5 gals per 100 miles
Fuel consumption (treads)	Approx 2 quarts per mile
Dead weight	Approx 8,800 pounds
Useful load	Approx 4,400 pounds
Total length	14 feet, 3 in
Height on treads	5 feet, 3 in
Width on wheel drive	7 feet, 2 in

Circumstances did not permit the planned far-reaching adoption of this vehicle in the Austrian Army in 1938. But development of the type is being continued.

Comment: Vehicles of this Austrian type were reported by observers as in use by the German Army in the Middle-East theater.

SIGNAL CORPS

19. NEW GERMAN EMERGENCY TRANSMITTER

The German Emergency Transmitter NS-4 is a 2-tube, self-contained, battery-operated, air sea rescue transmitter, apparently replacing the NS-2 prototype of the Gibson girl transmitter. The apparatus is colored bright yellow, is buoyant and water-tight, and a length of cord and a hook enable the instrument to be secured to a person or small boat.

The estimated life of the battery on intermittent use is about 4 hours. The instrument is preset in the frequency band of 53.5 to 61.0 megacycles and radiates a modified continuous wave note of approximately 400 c.p.s.*

The equipment is well-designed, its special features being its compactness and light weight. It has a limited life however, and gives evidence that it was designed to replace the NS-2 which uses far more critical materials.

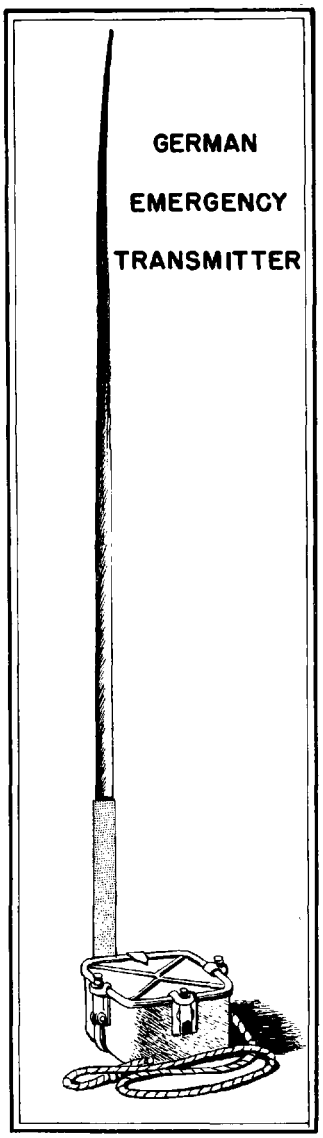
a. Construction

The equipment is housed in an aluminum box measuring 6 1/4 x 6 1/4 x 3" and weighs 3.5 pounds. The base and lid of the box are stiffened by 2 ribs made

*Cycles per second

diagonally in the material and the lid is secured by 4 screw fittings which are rivetted on the outside of the box. A rubber gasket ensures a watertight joint.

The transmitter is secured in the box by means of 4 captive screws, one of which is used as a connector to the aerial. Two of the screws are located beneath the batteries which must be removed before the screws can be loosened.



The chassis is not of the usual die cast construction but is of sheet aluminum spot-welded together. No tube holders are used, the connection being made by soldering directly to the pins of the valves. The coils and condensers are of ceramic material with the exception of paper smoothing condensers in the vibrator pack.

b. Antenna

The antenna is of particular interest. It is a 3 ft 5 in strip of copper-plated steel tape similar to that used in pocket rules, and is wound around the box when not in use.

The antenna system might be used on vehicles or pack sets but would not be suitable for aircraft use. The base of the antenna is 1 inch tapering to 3/16 inch and has been sheathed in rubber for the last 10 inches to avoid shorting due to heavy rain or spray.

The antenna may be swivelled in one plane and is wrapped round the instrument and held in position by 2 clips when not in use.

Two press switches fitted with rubber covers are located under one of the antenna retaining clips; when the antenna is unwound the transmitter is automatically switched on. In the sample examined one press stud marked K was not used, the contacts of the switch not being fitted. This is probably used to key the transmitter for sending Morse and conserve the battery life.

c. Vibrator Unit

The vibrator is of the non-synchronous variety and is particularly interesting as the frequency is approximately 810 c.p.s. The armature is of unusual design being a light, flat strip at right angles to the reed. The magnetic circuit is smaller than in the conventional vibrator although the driving coil is a good deal larger. A separate driving contact is used and the whole contact assembly is considerably smaller than usual.

[redacted]

No rectifier is used, the raw A.C. being applied to the transmitter so that the carrier will be modulated at the frequency of the vibrator and its harmonics.

d. Batteries

The 2-volt lead acid batteries used for power supplies are 1 1/4 x 1/2 x 1 3/4" and weigh approximately 1 1/2 ounces each. Eleven are used in all, 3 in parallel for the 2-volt filament supply and 8 in series parallel for the 8 volt vibrator supplies. These make up 1 pound of the 3 1/2 pounds which is the total weight of the equipment. These batteries were originally developed for the meteorological balloon transmitters.

A discharge test was carried out and the 2 volts fell to 1.7 volts in 2 hours 40 minutes and the 8 volt to 6 volts in the same time. A translated enemy document indicated that the batteries last 4 hours if switched on for 3 minutes and off for 1 minute.

GENERAL

20. SOME ASPECTS OF SECURITY

In all branches of the intelligence service, the source of information determines its value. It is the origin that must be tested first, and not the information. Some interesting points about this general subject of security and certain of its related aspects are contained in the following article presenting ideas expressed by the noted military critic, Liddell Hart, excerpts of which were published in Military Intelligence Pamphlet, Vol. IV, No. 8, Union of South Africa.

* * *

The fear of treachery, among the people of a country attacked, is one of the best weapons that an invader could devise, with the aim of creating confusion and distraction among the armed forces and the people behind them. The term, "Fifth Column" is recent, but the underlying idea is one of the oldest in the history of warfare. Yet there are few important examples in history of successful betrayals in wars against a foreign foe as distinct from civil wars.

On the other hand, there is much evidence of the damage caused by the fear of treachery. In the Franco-German War of 1870-1, the cry of "Nous sommes trahis"* played havoc with the defense of France. The same fear, intensified by being embodied in the new term "Fifth Column", played an even larger part in the collapse of France in 1940. The general state of suspicion went far towards paralysing all resistance to the invader. It was fear of the Fifth Column, rather than the activities of Fifth Columnists that did the damage. This is a danger we have to guard against in our security measures. We must keep our balance, lest in over-zeal for security, which is the negative side of war, we hamper our positive efforts. By an exaggerated use of the term "Fifth Column," we not only play

*We are betrayed

the enemy's game but put a master-card in his hand, the joker. Do not be too quick to suspect anyone, but develop an attitude of critical doubt towards everyone. The line which a good intelligence officer should take is to maintain an attitude of discreet observation, while taking care to avoid generating an atmosphere of suspicion.

a. Working Rules for Intelligence Officers

The attention of the ordinary public tends to focus on anyone-

(1) who has a foreign accent;
(2) who is eccentric in behavior;
(3) who voices unpopular opinions.

It is a good working rule for intelligence officers to start by asking whether a particular suspect comes in one of these categories, then to ask whether suspicion was first aroused by the man himself, or by something particular he has done. Cases where no suspicion had been aroused prior to some particular incident are far more likely to be worth serious investigation. Even then a cool-headed judgment based on thorough military knowledge for sifting such cases is required, in order to gauge whether an incident reported could, in its setting, have a real military bearing.

Do not always use the same methods in attempting to apprehend the enemy agent. The more uniform the methods, the easier it will be for the enemy agent to avoid them by refraining from the obvious things that excite suspicion. There is just as much need to practise surprise in security work as there is on the battlefield.

The most serious leakages of information come from the top. Lower down in the scale of rank and position there is indeed often a tendency to run to the other extreme, and to withhold information that ought to be known by those concerned for the efficient performance of their job.

Such over-caution usually arises from an inability to discriminate between what does and does not matter--a lack of discrimination due to lack of knowledge. The real art of security is to be so open in discussing most things that the very existence of the few things that really matter is not even suspected.

In dealing with cases of careless talk, it is better to rely on admonition than on punishment. Most people who err in this way would be horrified if they thought that they were doing anything detrimental to the national war effort. A traitor sells his information privately, he does not broadcast it.

All security issues tend to be a compromise between the conflicting claims of mobility and security. It is a good general rule that when in doubt mobility should be given preference, as the offensive and time-winning factor. The Germans have profited greatly by sacrificing security on occasions, in order to gain time and ensure that personnel act in the light of the fullest possible knowledge. The

[redacted]

German principle is that it does not matter if the enemy learns where you are going so long as you get there first.

b. Gathering Information

The positive side of intelligence work, namely the process of gathering information, is more of an art, and less of a technique, than the negative or security side.

Important as is the capacity to collect information, still more important is the ability to sift and evaluate it, to draw the right deductions from it. An intelligence officer who cannot see the wood for the trees is of limited help to his commander.

The qualities for the collection and interpretation of information are listed hereunder:-

(1) Knowledge--The importance of military knowledge, as the basis of intelligence, and thus in turn of generalship, has been emphasized by every great commander before and since Napoleon. The more military knowledge you have, the better your chances of appreciating the significance of something that, to an untrained mind, would seem trivial or irrelevant.

The need for being acquainted with the enemy's methods, especially his tactical methods, should be emphasized.

This is a side of intelligence where we [British] compare badly with some other armies, notably the German. Lawrence of Arabia once said: "The enemy I knew almost like my own side. I risked myself among them, many times, to learn."

(2) Sense of Relativity--The power of relating one thing to another, and the bits to the whole; a capacity for seeing the wood at the same time as the trees.

(3) Inquisitive Sense-- Inquisitiveness or curiosity springs from the vital instinct to discover the truth about things. By this is meant "intellectual curiosity", which is the source of the scientific spirit.

(4) Accuracy-- The greatest possible care must always be taken to ensure that your data is correct, that it is precisely worded and objectively presented.

Moreover the good intelligence officer must be able to gauge the reliability of the evidence which he assembles. While careful to discredit nothing without examination, he should doubt everything until he has verified it. This is particularly important as a guard against being deceived by the enemy--and remember that deception is the main instrument of strategy.

(5) Receptiveness-- Having the quality of receiving or taking in what is actually communicated, as distinct from what you would wish to hear communicated.

This quality is equally important on the part of the commander.

Advice tendered by Intelligence should be based strictly on scientific inquiry. Any encouragement given to wishful thinking on the part of the commander, out of mistaken loyalty, is the greatest disservice which can be rendered to a commander.

(6) Creative Imagination-- (the power of projecting your conceptions of what is going on behind the enemy's lines and in the enemy's mind.) Closely linked with this is the power to visualize a map, or rather the ground represented by that map. Sir John Monash (by general recognition perhaps the ablest commander we produced in the last war) had the power of creative imagination strongly developed, so that he could get a clear picture of the battle-front although remaining at rear headquarters.

c. Organization

Good information cannot be expected unless there are adequate personnel to obtain it, and of high enough rank in their particular sphere to enable them to make their voices heard. It is natural that commanders should feel that the number of officers and men allotted to intelligence duties is a subtraction from fighting strength. But experience shows that the subtraction is more than compensated by the value of having better and quicker information on which to act.

In periods of active fighting, you cannot expect to get information back in time to be acted upon, from commanders actually engaged in the fighting. They and their staffs will be occupied in thinking about what the enemy is doing. The principle of "liaison forward" should be adopted.

Every superior HQ should have its own qualified observers forward with the subordinate HQ to send back continuous and immediate reports of the development in the situation, instead of relying on reports received from the subordinate HQ. This system of "liaison forward", highly developed by the Germans, revives Napoleon's expert aide-de-camp system.

Every system of intelligence has the two problems to solve, that of obtaining information, and obtaining it in time. An intelligence staff must go out and seek information; but it must also locate itself where information is likely to be received. Much can be learned by applying the system adopted by the spider in spinning his web for catching flies.

SECTION II

GERMAN FIELD DEFENSES

[redacted]

GERMAN FIELD DEFENSES

As in the case of attack, the final goal of defense is victory -- the destruction of the enemy. One of Germany's great military writers states the following: "A fundamental principle is never to remain completely passive . . . the act of entrenchment shall serve the defender not to defend himself more securely but to attack the enemy more successfully."

Tactical and Technical Trends has already included previous references to German defensive methods in various theaters of war. However, it is thought that the following summary of Russian experience, particularly concerning enemy troop dispositions and the use of appropriate fire power, which appeared in an allied publication, may provide interesting material at this time.

* * *

a. General

The Germans base their defensive systems on inhabited localities, on commanding heights and on the exploitation to the uttermost of tactically advantageous types of terrain. The German principle of basing defenses on inhabited localities is particularly strongly marked during the winter.

The Germans' defensive system is principally formed of separate zones of resistance laid out for all-around defense with mutually supporting fire. The ground between the defense areas is covered by fire, often protected by obstacles and invariably patrolled.

However, it has been noted recently that at some points on the Eastern front the Germans are endeavoring to create a continuous defensive belt by filling in the gaps between defense areas with several lines of communication trenches, extended along the whole length of the front.

When organizing a defensive system the Germans attach great importance to the nature of the ground. Weapons are located after consideration of the possibilities of camouflage and enfilading fire.

Tactically speaking, the German defense zone generally consists of two defensive areas with a total depth of from 5 to 10 miles. The main elements of the defense are concentrated in the first defense zone, which the Germans term the "main defensive belt". On an average this zone is from 4,000 to 6,000 yards deep, and includes the artillery positions. The second defense zone gives added depth but, as a rule, is thinly held. Under certain conditions it is occupied by reserves who prepare it in advance should it seem that the defense will be forced to withdraw.

According to the Germans, the defense will be withdrawn from the first to the second zone when the resistance of the troops in the "main defensive belt" is

broken and when the bringing up of reserves to the "main defensive belt" is likely to lead to disproportionately heavy losses.

Individual defense areas and fortified positions are set up in the area between the two defense zones; their purpose is to safeguard the rear of divisions and headquarters against the attacks of Russian guerillas and of the Red Army units which have penetrated to the rear. In addition, the two defense zones are connected by switch lines.

Experience has shown that whenever the Germans decide to put up a stiff resistance on a given sector, they put all their forces, including army reserves, in the "main defensive belt" and that they even transfer units from other sectors for the purpose.

German strategic defense includes defensive areas in depth; these are generally prepared in advance by forced labor. The defenses are finally completed by the troops themselves, as soon as it seems imperative to withdraw to the new areas.

In addition antiaircraft artillery in separate zones of resistance for the protection of important military objectives - bridges, railway junctions, communication zones - is situated within the depth of the German strategic defense. The frequent attacks by Russian guerillas on important military objectives in the rear of the enemy have forced the Germans to provide strong protective forces and often to put up special field fortifications for the protection of these objectives.

b. "Main Defensive Belt"

The German main zone of defense is generally selected on the basis of the terrain advantages and invariably includes inhabited localities. The immediate front of the main zone of defense must be easy to cover by observation and cross-fire.

The main zone of defense consists of the company defense areas incorporated into the battalion defense areas. The ground between these defense areas is covered by a system of enfilading cross-fire from automatic weapons and, if time permits, by artificial obstacles. In addition, this ground is kept under the fire of artillery and mortars, located in the defense zone.

The foundation of the "main defensive belt" is the battalion defense area. The battalion defense area can fight independently and is prepared for prolonged, all-around defense.

A company defense area includes two or three platoon defense areas, and in addition to automatic infantry weapons, antitank guns and mortars.

The German army considers the principal weapons of the defense to be LMGs, HMGs, mortars and antitank guns. Artillery fire is also used extensively.

[redacted]

The Germans prefer the following ranges in defense:

Rifles and LMGs	400 yds or under;
HMGs	1,000 yds or under;
Mortars	1,000 to 3,000 yds.

As a general rule, firing points are located in buildings adapted for defense; sometimes timber and earth firing points are built. Machine guns are frequently found in trenches, covered over with camouflage. Obstacles, and mines if available, are located in accordance with the fire-plans of adjacent defense areas, and are invariably kept covered by fire from the defense areas.

Roads and approaches to defense areas are carefully mined. A system of barbed wire entanglements, up to four poles wide, [probably 30 to 40 feet] concertina wire, etc., is put up forward of the front line. A less developed system of wire entanglements (up to 20 feet) is put between defense areas. Within the system of defense areas, besides the antitank weapons, antitank minefields are laid on corridors of approach which tanks are likely to use; antitank ditches and other static antitank obstacles are less frequently employed.

It should be noted, however, that the German command realizes the value of antitank ditches. Referring to the instructions of the Führer, an order dated 8 Sept. 1942 from the Inspector General of Engineers, points out the necessity of digging ditches one behind the other. It is indicated that these ditches should be dug sufficiently deep to make them effective in winter also.

The antitank defense of the German "main defensive belt" is based on the fire of:

(1) supporting artillery, intended to block the approach of attacking tanks, opening at from 3,000 to 4,000 yards (this is principally armor-piercing shell);

(2) antitank guns in the defense areas, and brought forward to form "antitank islands";

(3) antitank rifles, large caliber machine guns and also machine guns and rifles using armor-piercing ammunition against vision slits.

Attacking tanks, which have penetrated deep into the defenses (according to German instructions, those which have penetrated the "main defensive belt") are counterattacked from ambushes by tank destroyer detachments.

The Germans believe every infantry company should include one tank destroyer detachment, consisting of a sergeant, 4 privates and 2 snipers. This detachment is equipped with five 3-kg explosive charges, 4 antitank mines, 6 smoke and incendiary grenades. The detachments operate in the company sectors, co-operate with the antitank guns and generally take up their positions forward of the latter.

[redacted]

The defenders try to prevent penetration of their front line by concentrated fire and counterattacks.

When laying out the defense, the Germans generally create "fire-pockets", the purpose of which is to give the impression of a weak defense in a certain sector, encourage the attacking units to penetrate into that sector and then, having cut off their lines of withdrawal to destroy them.

"Fire-pockets" are generally located between defense areas, in flat open country bordered by woods, heights or buildings.

German fire-plans are normally based on the principle of concentration of fire; cross-fire in enfilade from automatic weapons; concentrated fire of mortars (see Tactical and Technical Trends, No. 38, p. 47); fire of antitank weapons; artillery fire from deep within the position. The average weight of fire-power per thousand yards of front is up to 5 infantry and antitank guns and 1 to 2 divisional artillery pieces.

It may be concluded from an evaluation of a number of translated German documents that German defensive positions are laid out on the following principles:

(1) The object of the position is to attain maximum results with minimum expenditure of manpower and weapons;

(2) Each defense area and each position should have all-around defense. No standard model of layout should be followed; close attention should be given to choice of ground for location of defensive positions;

(3) The guiding principle in the location of defense areas should be mutual support by infantry support weapons;

(4) The fire-power of defense areas should be reinforced by the laying of antipersonnel and antitank mines;

(5) All positions built should at least protect those inside against shell and mine splinters; whenever possible they should be capable of supporting the weight of tanks; shelters and command posts should be laid out for all-around defense; observation posts should be set up on ground covered by fire from the various positions; the separate positions should be welded into fire-units of at least a reinforced battalion in strength;

(6) Company defense areas should be combined into battalion defense areas. The distance between company defense areas depends on the ground and the situation;

(7) In the initial stages simplified constructions should be built; these can be strengthened later as time and resources permit;

[redacted]

(8) Existing buildings and local materials should be used as much as possible in setting up defensive positions; special consideration should be given to the use of cellars in houses and barns as shelters;

(9) Concealed positions (on reverse slopes behind buildings) should be selected for mortars which should be dug in; the positions should be changed frequently; roving guns and mortars should be employed;

(10) Special attention should be given to the selection of artillery positions, and to the protection of gun detachments and ammunition;

(11) Camouflage screens should be provided to enable the troops to occupy their positions quickly when alerted.

c. Field Engineering

The German engineers make extensive use of existing houses and industrial buildings, road embankments and fences. For heavy and light machine guns, automatic weapons, and artillery, special positions are built or existing ones adapted, where available. The Germans build dugouts for sections (seldom for platoons) on reverse slopes; some of the dugouts are given a field of fire; entrances are constructed on the side facing the enemy so as to get the infantry into action quickly. The Germans favor the construction of a very dense network of communication trenches, if time is available and ground suitable. A frequent German device to reinforce the defense is to dig in tanks, thus turning them into virtual pillboxes.

Many German field fortifications are built of timber and earth and in the majority of cases, are of a light type. Heavy works are very seldom encountered. They use such types of obstacles as wire barricades, wire entanglements stretched between trees, houses and fences, knife-rests, concertina wire, trip-wires.

They also use barricades in woods and on roads. In the winter they may resort to icing slopes. As a rule they mine their wire entanglements and barricades with trip-mines, booby traps, antipersonnel mines, and less frequently with antitank mines. In addition the Germans lay antipersonnel mines to protect their antitank minefields; minefields containing only antipersonnel mines have also been noted.

As antitank obstacles the Germans make wide use of various odd antitank mines and explosive devices, locating minefields at points threatened by tank attack. It should be noted that the Germans lay minefields not only in defense but also in attack for the rapid consolidation of an occupied area.

The scale of German mining operations may be judged from the fact that on the front of one army up to 15,000 mines and explosive devices were cleared in the course of three months.

[redacted]

An order issued to one German infantry division defense sector, stated that not less than three mines should be laid per yard of front.

All obstacles both infantry and antitank are covered by fire. Minefields are generally laid 200 to 500 yards from the forward edge of the forward defense line. There seems to be no systematic method of laying mines within the minefields.

The Germans, as is well-known, make extensive use of booby traps, setting them up in dugouts, houses, abandoned equipment of all kinds and even mine the corpses of their own men.

As has been pointed out above, the local population is pressed into service in the construction of their [German] defenses; their engineers are employed as fighting soldiers in cooperation with infantry and at critical moments even instead of infantry.

Special attention should be paid to the way in which the Germans adapt inhabited localities for defense (see Tactical and Technical Trends, No. 37, p. 36). As a rule the forward edge of the defenses does not run along the outskirts of the inhabited locality but is pushed forward about 150 to 200 yards. Projecting salients in inhabited localities are used for enfilading fire.

In addition to putting up the usual field works the enemy turns all the houses, barns and other buildings he needs into firing-points; all remaining buildings blocking the field of fire are burnt down.

The most common method of adapting houses for defense is to deepen the basement for use as a dugout, cut embrasures in the basement and reinforce the roof by means of logs and earth. In houses, especially of stone, the embrasures are generally cut in the walls; windows and doors are also made into embrasures. Barns and dwelling houses are likewise adapted for gun positions. For this the Germans generally pull down one wall and then place the gun inside. Attics are frequently used for machine guns and automatic weapons. Wire entanglements (knife-rests) are put up in the streets; sometimes these entanglements are intersected by deep ditches. Mortars are generally put up in open positions behind buildings in the outskirts in the rear of inhabited localities.

[redacted]

CORRECTIONS

No. 36, p. 12: The sketch of the artillery piece designated "A German 105-mm SP Howitzer," should have been described as a 15-cm s.FH 18 (Schwere Feldhaubitze) -- medium field howitzer on the PzKw4 chassis as indicated. This sketch was not intended as an illustration of Article 6 -- German 105-mm SP Assault Howitzer 42.