[redacted]

TACTICAL AND TECHNICAL TRENDS

No. 19
February 25, 1943

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

[redacted]

CONTENTS

Readers are invited to comment on the use that they are making of this publication and to forward suggestions for future issues. Such correspondence may be addressed directly to the Dissemination Branch, Military Intelligence Service, War Department, Washington, D.C.

Other publications of the Military Intelligence Service include:

Special Series (published at least once a month);
Intelligence Bulletin (monthly);
Military Reports on the United Nations (monthly).

Requests for additional copies of all publications of the Military Intelligence Service should be forwarded through channels for approval.

* * *

U.S. task forces and overseas theaters of operations may reproduce items from Tactical and Technical Trends provided the classification is maintained and the source is cited.

SECTION I

AIR

1. JAPANESE FIGHTER AIRCRAFT

In the early stages of the war, the designation "Zero" probably was used erroneously as a generic term for almost any type of Japanese fighter aircraft, and this has resulted in a certain amount of confusion. As a matter of fact, the term "O" or "Zero" was derived from the Japanese year 2600 which coincides with our year 1940, and merely indicates that the aircraft was put into service originally in 1940.

The phrase "Zero" may refer to a single place carrier-borne fighter or to a similar version on floats. In addition, it may be used to designate a float reconnaissance-biplane or a two-engine land-based reconnaissance-fighter. As a matter of fact, Zero models of all the aircraft mentioned above have been identified. They are known today by their code names, "Zeke," "Hap," "Rufe," "Pete," and "Dinah." In addition, there is a bomber called "Gwen" and a small submarine based float biplane called "Glen," both of which bear the Zero classification.

At the present time, there are two Zero fighters, "Zeke" and "Hap." "Zeke" is designated by the Japanese as the Type Zero, Mark I, Carrier-borne Fighter, Model 2. The designation of "Hap" is the same, except that "Hap" is Mark II where "Zeke" is Mark I.

"Zeke" is the fighter which has been encountered frequently in current operations in the Southwest and South Pacific Areas. It is capable of a maximum emergency speed of about 326 miles per hour at an altitude of 16,000 feet. An outstanding feature of this aircraft is its high rate of "zoom." It can "zoom" nearly vertically, and the "zoom" can be continued for 1,500 to 2,000 feet depending upon the starting speed. This should not be considered, however, as indicative of the rate of climb of this aircraft. The maximum rate of climb at sea level has been found to be approximately 2,750 feet per minute. The service ceiling is estimated at 38,500 feet. The normal range of this airplane is believed to be about 1,100 miles, but by addition of a belly tank, which can be dropped at will, a maximum range of some 1,700 miles at economical cruising speed is believed possible.

"Zeke's" low wing loading, steep angle of climb, well streamlined structural design and exceptionally sturdy construction make it a highly maneuverable aircraft at moderate speeds. However, in recent tests where "Zeke" was flown in combat maneuvers against several of our aircraft, two points of weakness were detected in the Japanese fighter: (1) at high speeds, the rate of roll is extremely slow, and (2) the engine cuts out if the nose is lowered suddenly to enter a dive. In addition to these points, the vulnerability of "Zeke's" fuel and oil tanks is well known since these aircraft carry neither armor nor self-sealing protection for the tanks. In some instances in the past, it has been reported that wings have been torn off Zero fighters when recovering from extended dives at high speed. The model tested, however, although intentionally designed for light construction, appears capable of reasonably high diving speeds if properly handled.

There are several other types of Japanese fighters at present in operation. Prominent among these is "Hap," a new fighter with nearly square wing tips, reported as superior to "Zeke" in maneuverability and to have an even higher speed and rate of climb. It is reported that Japanese pilots of this plane have not hesitated to follow our fighters in power dives, which may indicate an increase in structural strength.

"Nate" is another Japanese fighter which has seen service in many of the Pacific areas. This is an older model (Type 97) and does not equal the speed or performance of the more recent "Zeke" or "Hap." "Nate" is believed to have a top speed of approximately 250 miles per hour at 13,000 feet altitude. With maximum fuel, at economical cruising speed, it is believed to have a maximum range of slightly over 1,000 miles.

"Oscar" (Type I) is believed to be a more recent modification of "Nate." It has greater maneuverability and a good rate of climb but is believed to be about 20 miles per hour slower than "Zeke" at top speed. Like "Zeke," "Oscar" has an exceptionally long range when carrying maximum fuel and is believed capable, under these circumstances, of obtaining approximately 1,700 miles at economical cruising speed.

In addition to the land based fighters mentioned above, there is also a Zero floatplane fighter called "Rufe." Except for substitution of the floats to replace the wheeled landing gear, this aircraft is believed to be practically the same as "Zeke" structurally. It is reported, however, to be considerably slower than "Zeke" and less maneuverable.

All of the Japanese fighters mentioned above, are powered with radial air-cooled engines. "Nate's" engine has nine cylinders and is estimated to produce about 790 horsepower at an altitude of 11,500 feet. The engines used on the other fighters are twin-row with fourteen cylinders, and are believed to produce 900 to 1,000 horsepower at about 11,500 feet. The armament of "Zeke," "Rufe," and "Hap" consist of two 20-mm Oerlikon type cannons, one in each wing, and two 7.7-mm machine guns firing through channels in the upper part of the engine cowling and sychronized with the propeller. "Oscar's" armament is believed to consist of one 7.7-mm and one 12.7-mm machine gun firing forward through the propeller disc. Wing guns for this model have been reported but not confirmed. "Nate's" armament is believed to be the same as "Oscar's," although it is reported that a second 7.7-mm gun is substituted, on some occasions, for the 12.7 mm.

Other Japanese fighters less frequently encountered include "Perry," "Claude," and "Dick." So far as known, these are little used at the present time. In addition to these fighters of native Japanese design, it is known that the Japanese Air Force has in operation a small number of Messerschmitt 109 E fighters. Whether these are copied from German models or obtained intact from Germany is not known. Up to the present, they have been encountered only in small numbers.

It is well to bear in mind that Japanese fighter aircraft appear to be used with minor alterations by both the Army and Navy Air Services. "Zeke" and "Hap," although used prominently by the Navy, have been reported in operation with Army units also. Likewise, "Nate" and Oscar," which have been reported most frequently in use by the Army, have, upon occasions of emergency, been used by the Naval Air Service.

ANTIAIRCRAFT

2. GERMAN ROPE BARRAGE

According to a German publication, the German Air Defense League has requested its members and people living in certain districts to help the antiaircraft defense by searching for and collecting parachutes and ropes the day after an enemy raid. These are to be used for "sailing shells," a kind of rope barrage, somewhat similar to the British balloon barrage. These shells have rarely been used by the Germans, who have up to the present paid more attention to the production and improvement of antiaircraft artillery and night-fighter aircraft. Now, if enemy aircraft approach Berlin, to take an example, a rope barrage may be put up around the center of the town in addition to the usual air defense barrage.

German Army testing establishments have carried out a great number of tests with these shells, which are fired as ordinary projectiles. When they explode, a rope about 200 yards long attached to a parachute unrolls and sinks slowly to the ground, forming an obstruction, which, according to German antiaircraft officers, is much more dangerous to aircraft than the more rigid British balloon barrage. At one end of the rope there is an explosive adjusted for time ignition. If no aircraft catches in the rope within 10 minutes, the explosive charge is automatically detonated.

It is reported that use of these shells has recently begun, and that they form part of the equipment of every antiaircraft battery.

Comment: The "rope barrage" is in reality, no doubt, a form of aerial minefield. This sort of thing is perfectly feasible, though such a minefield would cover only a fairly limited area. It could be utilized to defend an area which was being heavily attacked. An average height at which aircraft were operating would be determined, and the barrage fired to that approximate height. The projectile itself would almost certainly be rocket-fired. Again, there would be no difficulty in designing a rocket projectile containing a parachute and length of wire with an explosive charge attached.

ANTITANK *

3. RUSSIAN ANTITANK TACTICS

No particular reference to any specific engagement was made in the report which follows, though the subject dealt with is based on information received from the Russian front and published in the Red Army newspaper "Red Star."

Antitank tactics as practiced by the Russians are based on the essential

* Article No. 11, this issue, should be of interest to tank destroyer units.

need to separate the tanks from their supporting infantry. The German tactics of exploitation very often give opportunities of achieving this object. During the earlier phases of the war, before the Russians had realized the best methods of dealing with the enemy armored formations, the deep thrusts of the German "Panzers" actually did cause a certain amount of disintegration, but by the time the outer defenses of Moscow were reached these thrusts failed to achieve their object.

Russian infantry are trained to stop tanks if possible, but when it appears that the infantry are going to be overrun, they get into slit trenches and lie low until the waves of tanks have gone through. Then they come out and put up the strongest possible resistance against the German infantry to prevent it from maintaining contact with the tanks. The artillery is trained to operate on exactly the same lines; if the gun position is overrun, crews go to earth and re-man their guns as soon as the tanks have passed them.

Once the tanks, in rear of the Russian positions, have been cut off from their supporting infantry, every effort is made to prevent their retirement and to mop them up. Mobile antitank groups are formed to harry them, and whenever they go into bivouac, the nearest infantry are instructed to attack them, particularly at night. In fact, whenever tanks are known to be halted in the vicinity, infantry tank-hunting parties are sent to engage them. The air force is always called upon to cooperate extensively in this mopping-up phase.

4. JAPANESE ACTION AGAINST U.S. TANKS

As indicated in the previous article on antitank tactics used by the Russians, tanks must be supported by other arms. A series of incidents involving destruction or loss of American tanks in the Solomons is reported by a member of our armed forced. This report shows the importance, at least in close country, of closely supporting tanks with infantry.

On Guadalcanal a platoon of six light M-3 tanks was sent to aid the infantry forces fighting to the west of the Lunga River. Headquarters tank and tanks Nos. 1, 4, and 5 were moved forward in column to attack enemy machine guns on the edge of the jungle across a clearing from the infantry. Tank No. 4 went into the jungle and has not been found since. Tank No. 5, after entering a short way, backed out of the jungle without having found any targets. The driver of Tank No. 5 said that near the edge of the jungle, the Japanese threw grenades under the tracks. The explosion of the grenades would cause the tank to jump somewhat but did not cause any noticeable damage. This tank was stationary when it was hit on the right forward side of the turret. The shell penetrated the tank and hit the opposite turret wall where it exploded. The driver estimated that the antitank gun which hit his tanks was about 100 yards away. Filling from

the shell ran down and began to burn with a yellow flame and bluish smoke. The driver stated that the fumes were sharp and stifling and caused the mouth to dry and pucker. Almost immediately after the first hit, a second hit was received in the right side of the turret. The shell penetrated and spattered filling around, which likewise began to burn on the floor and on the top of the ammunition lockers. Efforts to put out the fire were unavailing and the survivors jumped out of the tank and started for the rear. Japanese troops were moving toward the tank and shortly after it was abandoned, the driver saw it burning fiercely, but did not know whether the Japanese had thrown gasoline on it or not.

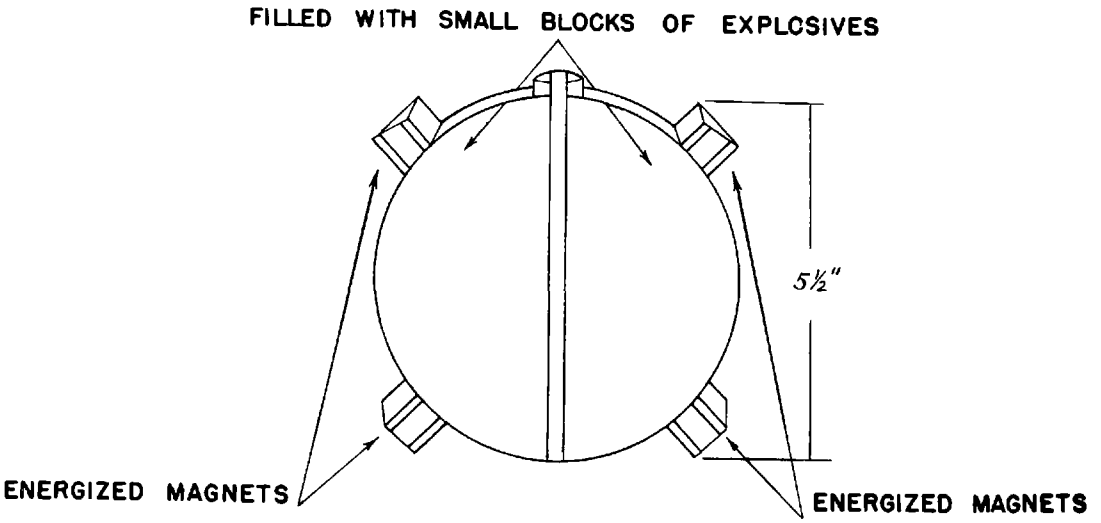
The Headquarters tank was disabled by a hit on the right sprocket wheel while about forty feet into the jungle.

Tank No. 1 was circling in the open field in rear of Tank No. 5 when it was hit in the turret. The lieutenant and radioman were killed but the tank was recovered. Fire in Tank No. 1 was extinguished without great difficulty. The diameter of the hole in Tank No. 1 was slightly larger than that of our 37-mm shell.

The company commander estimated that from the number of hits received by his tanks, and the location of the tanks when hit, the enemy had five antitank guns. The caliber of the enemy guns was believed to be 47-mm.

Comment: This is the first (at time reported) encounter with the Japanese 47-mm antitank gun. It easily penetrated turret armor of light M-3 tanks. The action of the shell after entering the tank seems to indicate an explosive filler made from a picrate derivative. The enemy apparently waited for a close range shot before opening fire.

There was no evidence of the use of the magnetic tank grenade although some had been captured previously on Guadalcanal (see sketch below).



Mutual support between tanks and infantry in close terrain is still a necessity.

5. AMMUNITION FOR GERMAN 42-MM ANTITANK GUN

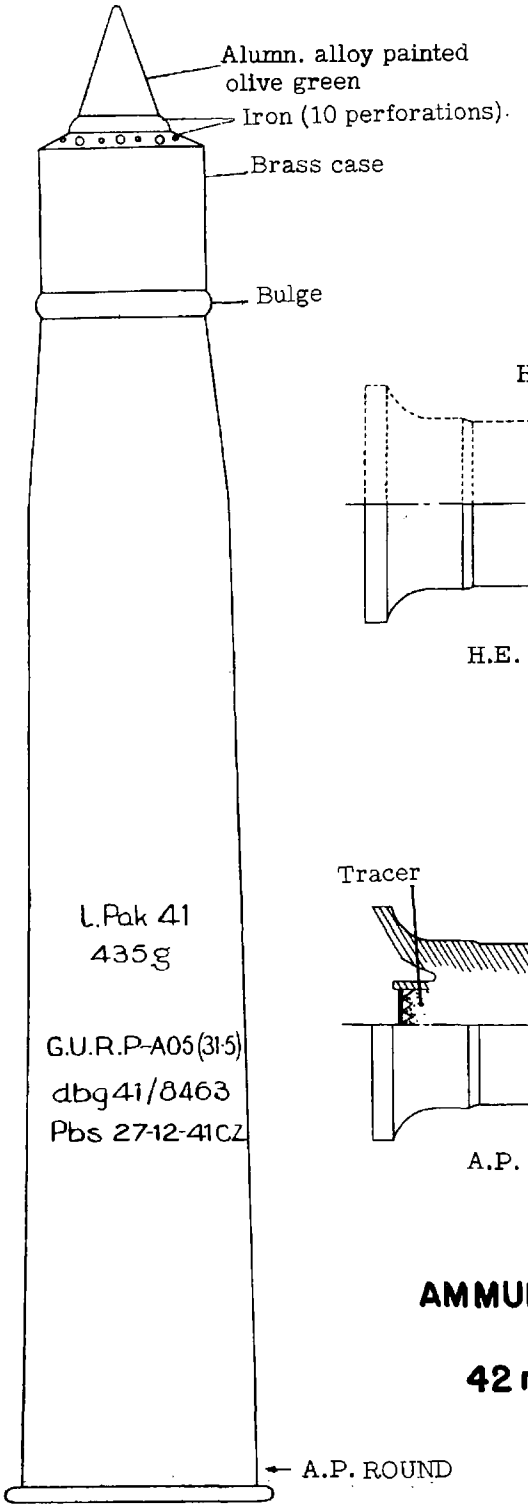
Brief mention has already been made in Tactical and Technical Trends (No. 7, p. 3) of the German 4.2-cm Pak 41 (42-mm antitank gun). This is a tapered-bore weapon, being 42 mm at the breech and 28 mm at the muzzle. High explosive and armor-piercing ammunition is provided. Both the HE and AP ammunition (see accompanying sketch) are characterized by a relatively large propellant charge and a flaring skirt or fin at the base of the projectile. The brass-coated steel shell case is 400 mm (15.75 inches) in length. The skirt of the projectile, which is squeezed down as the projectile travels through the tapered bore, serves to give a large effective base area at the commencement of shot travel. A high muzzle velocity is thus possible with a relatively light weapon. However, owing to the relatively light weight of the projectile, the velocity tends to fall off rapidly, and maximum armor-piercing performance is achieved at short ranges only. The thickness of armor penetration is considerable in relation to the weight of the gun; the hole made, is, of course, small. Barrel wear is high; just what the life of the barrel may be is not known. However, in the case of a similar German weapon, the 2.8-cm Pak 41 (antitank gun tapering from 28 mm at the chamber to 20 mm at the muzzle) the life of the barrel is thought to be not over 400 rounds. The muzzle velocity of the 42-mm is not known; that of the 28-mm is thought to be 4,700 feet per second.

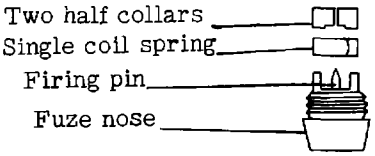
As indicated in the sketch the HE and AP projectiles are similar in shape. They are sometimes referred to as arrowhead ammunition. The perforations or holes (see sketch) are designed to decrease the mass of the skirt or fin as it is squeezed down into the recess in the projectile casing while traveling through the bore. The explosive filling of the HE projectile is blue in color, which suggests Hexagen (trimethylene trinitramine). The nose percussion fuze of the HE shell is aluminum, with the body in two sections. This fuze is of the bore-safe type; before firing, the single coil spring keeps the two half-collars squeezed against the firing pin which is thereby prevented from being depressed; in flight the centrifugal force created by the rotation of the projectile forces the two half-collars apart, and the firing pin is then free to move toward the cap on impact.

The stenciled lettering on the shell case (see sketch) has the following significance:

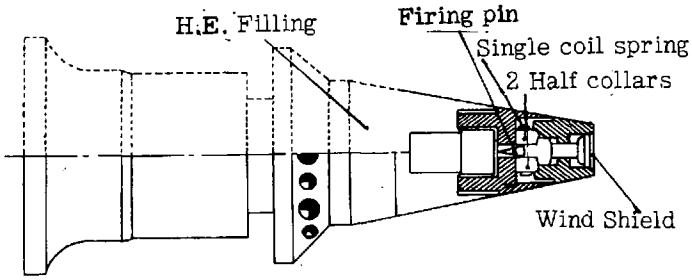
First line. . . . . .light antitank gun 41
Second line. . . . . .weight of propellant in grams
Remaining lines . . . . . .data on propelling charge

The HE shell case contains 310 grams of propellant and is so stenciled.

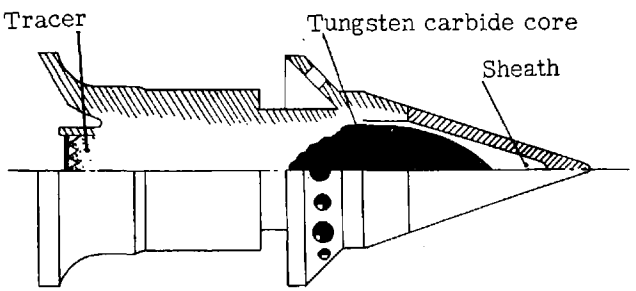




FUZE



H.E. PROJECTILE



A.P. PROJECTILE

AMMUNITION FOR GERMAN

42 mm. ANTITANK GUN

ARMORED FORCE *

6. USE OF FLAME-THROWERS ON TANKS

A German manual on tank tactics refers to the special use of flame-throwers on tanks. Usually they are employed at the halt during an advance by bounds.

Their chief use is to get at any enemy among rocks, in cellars, in dug-outs, in solidly built buildings, in wooded areas, and generally in places not accessible to tanks, and against which gun fire is of little use. The flame-thrower is also used for rapid "cleaning up" of trenches and dug-in positions. The flame-throwing tank must approach to within 50 or 60 yards of the target.

ARTILLERY *

7. GERMAN PRECAUTIONS AGAINST COUNTERBATTERY FIRE

Toward the end of September 1942, it was noted that the Germans in North Africa were increasing their precautions against British counterbattery fire. Among the methods used were these:

(1) Harassing missions by day were fired from roving gun positions in the open.

(2) Adjustments were made by using one or two guns sited on a flank.

(3) The fire of both light and medium batteries was directed into the same area at the same times in order to increase the difficulties of locating battery positions.

(4) Up to six batteries were fired simultaneously in order to confuse British sound-ranging. Dummy flashes are also reported to have been used, but this is not confirmed.

* Article No. 11, this issue, should be of interest to armored and field artillery units.

8. ENEMY MINEFIELDS AT EL ALAMEIN

Information concerning the type, layout, and marking of enemy minefields in the El Alamein area has become available from British sources. There is as yet no information as to whether this general method of mine laying was also followed in the Axis retreat from El Alamein.

a. Pattern and Spacing

The minefields were laid in belts, each belt consisting of two to eight rows of mines. Shallow minefields might have only a single belt of mines consisting of from two to four rows; deep fields might have several belts of mines with considerable distance between belts.

The belts themselves might be anything up to 200 yards deep, with an additional danger area consisting of widely scattered mines up to 250 yards in front of the belt. The back of the belt was usually marked with a fence; the distance from this fence to the front fence (if any existed) was anywhere from 100 to 800 yards.

No standard pattern for laying mines in the belts appeared to be used. However, from the mass of data that was available, it was found possible to classify the patterns broadly as follows:

(1) Regular Pattern

This is the most common. Mines in a given row are spaced at equal distances; there is an equal distance between rows; and the mines of one row are equally spaced between the mines of the previous row. A variation in this method is to vary the distances between rows. In no reported case, except for scattered mines, has the distance between mines in a row been unequal.

(2) Regular Pattern Offset

By a system of pacing, a certain variety is introduced into the regular pattern. The distance between mines in any one row is equal, but one row is slightly offset from the previous row, and the next row is again offset by a different distance. Once a few mines have been located, the pattern soon becomes apparent and mines will be found where expected.

(3) Random Mines

In front of most regular minefield belts, and particularly in front of gaps, there may be found mines scattered at random and unmarked. These are either continuous, with very wide and irregular spacing, or in clumps more closely spaced but laid to no pattern inside each clump.

The above patterns usually resulted in a density of a little less than 1 mine per yard of front. Densities up to 2 mines per yard were generally not found except when blocking roads, trails, or defiles.

The spacing between the mines in a given row is from 3 to 10 yards, with the average spacing being 6 yards. As noted in (1) above, in no reported case, except for scattered mines, has the distance between mines in a row been unequal.

The most common spacing between the rows themselves is reported to be usually about 5 yards or 10 yards.

b. Marking of Field

The front edge of forward minefields is often not marked. The rear edge normally is marked, usually with a trip wire on short stakes, though cattle-fence, concertina wire, and stone cairns are sometimes used. Cases have been reported of the rear edge being unmarked.

A common marking is a single row of concertina wire running along the center of a field parallel to the rows of mines. In a large minefield there may be several rows of mines in front unmarked, then a row of concertina wire, more mines, then concertina wire, and so on, finishing up with a row of concertina wire on the rear edge.

The marking of fields by furrows, commonly used at Tobruk, has only once been reported at El Alamein, and in that case the field was a dummy one.

Only one case has been reported of continuous wire running irregularly within a field. It is believed that skull and crossbones indicate the presence of antitank mines or booby traps.

In the rear areas, enemy minefields may be expected to be well marked with cattle-fences and warning notices in German and/or Italian.

c. Marking of Gaps

Little information is available about gaps through minefields, but the following data have been reported.

(1) Width

10 yards in one case, and 7 in another.

(2) Method of Closing

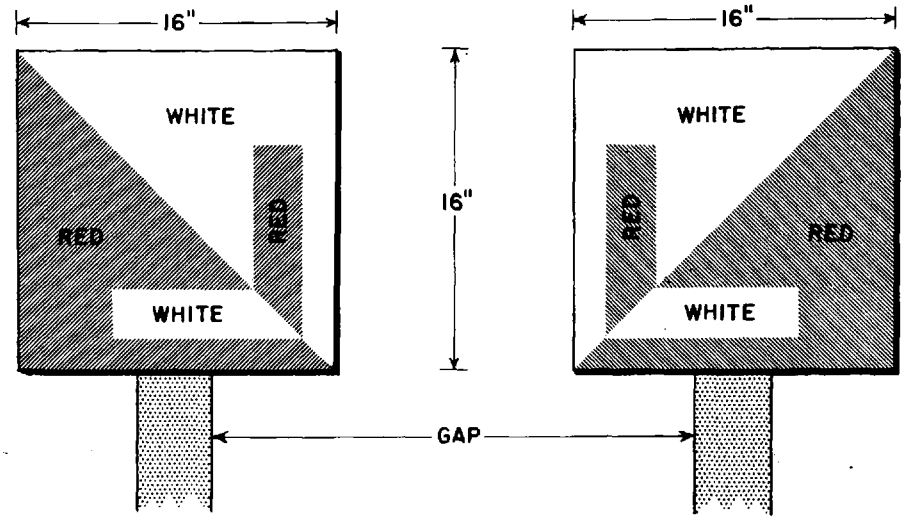
Usually two or three rows of Tellermines (antitank) with boards placed on one or all of the rows to insure detonation of mines if a vehicle

attempts to pass through the gap over the boards, which are normally concealed by a shallow cover of soil.

(3) Marking

In the northern sector, two types of gap markers have been found:

(a) Painted signs, as in sketch, on either side of the gap.



(b) Luminous tubes 1 inch long placed on the tops of mines to mark a route for patrols. These tubes are visible 3 yards away.

(4) General

It is reported that gaps are a favorite place for laying Tellermines without any marking wire or signs. Gaps are sometimes covered by groups of scattered mines laid up to 2,000 yards in front of the gap, and unmarked.

d. Types of Mines

German, Italian, French, and British mines were all used by the enemy at El Alamein. Relatively few booby traps were found in the minefields, and the traps found were almost invariably attached to German Tellermines. Antipersonnel mines (usually Italian B4's) were found at times, generally as a single row laid in front of the outer wire of a minefield. The antipersonnel mines were spaced from 7 to 10 yards apart, with wooden pegs driven between the mines, these pegs being used to attach the trip wiring from the mines on each side of the pegs.

e. Tactical Siting

One report states that the minefield is usually 200 to 300 yards in front of the MLR, and covered by fire and listening posts. In another report the distance from the MLR to the main minefield is given as varying from 200 to 1,000 yards. A listening post was also located by a patrol 100 to 150 yards behind a minefield. It can be definitely stated that it is the enemy's practice by day to cover all main minefields with small-arms fire from close range, and by night to maintain antilifting patrols, as well as listening posts often located within the minefield itself.

Comment: It should be realized that the above information applies to the enemy mine tactics at El Alamein. It is to be expected that his tactics will change from time to time as a result of experience, expediency, change in terrain, or change in command personnel.

9. CONSTRUCTION OF BRITISH ADVANCED LANDING FIELDS

The terrain of the Cyrenaican theater, over which the campaign of November 1941 to January 1942 was fought, is desolate, bare, and devoid of almost all the usual terrain features. Under such conditions, it was only natural that the work of the British engineers was of singular importance.

One of the major roles of the engineers in this campaign was the construction of advanced landing fields for both bomber and pursuit aircraft. For all engineer work, in the field or elsewhere, early warning of the requirements is needed; such warning is particularly necessary in the case of advanced landing-field construction in modern fast-moving battles under desert conditions. Broadly speaking, the advanced landing fields for fighter and other squadrons were constructed by two mobile construction parties of army engineers; these parties were reinforced as required by other engineer units of army or corps. Behind, and advancing to take over as the army moved forward, was a detachment of construction engineers.

The two mobile construction parties were formed before the operation started; each consisted of 1 officer and 50 enlisted men. These parties were attached to army corps as required. Forward liaison between RAF and army was provided by a senior RAF officer in charge of landing-field selection, and by appropriate engineer officers of field rank. The close liaison thus obtained produced very satisfactory results.

In all, during the 2 months following November 18, fourteen entirely new landing fields were constructed. All landing fields consisted of two strips 150 to 300 yards wide; the fighter landing fields were 900 to 1,200 yards long, and the bombers' 200 yards longer; the minimum should however, be not less than 150 by 1,000 and 200 by 1,200 yards, respectively.

Both of the mobile construction parties were motorized; the most suitable trucks were found to be those of the dump type, as most of the work

consisted of moving quantities of earth and stone either on to, or away from, the landing field; each party was allotted a motorized patrol. It was found that the strength of the parties was adequate, but that assistance from other engineer resources had frequently to be sought for landing-field construction and for dealing with work of a more permanent nature on landing fields. Each party should carry a small amount of explosives, materials for wind socks and for marking fields, paint for corner posts, signboards, etc.

For various reasons, the RAF adopted the policy that as many fighters as possible should use an airdrome--in some instances a fighter group of up to five squadrons. This policy necessitated large dispersal areas.

The following two examples give an idea of the minimum time required to prepare an advanced landing field. In each instance one party, organized as above, cleared two strips 1,100 yards by 300 yards; in one case work started at 0700 and fighters were operating from the field the same day, and in the other case at 1000 the next day. In general, however, it may be said that the mobile construction party or a platoon of combat engineers can clear and mark one strip a day, the landing field being completed, with two strips and all markings, in 3 days.

Another task of the greatest importance was the successful preparation of a strip 560 by 30 yards to enable 60 fighters to take off from a landing field water-logged as a result of a week's rain. This task was effected by filling up the soft spots with stone and draining away the standing water. All serviceable aircraft got off.

10. ENEMY BOOBY TRAP

A report from the Middle East states that the enemy is using a booby trap consisting of a hand grenade inside a water bottle. Explosion occurs when the cork is withdrawn. How the grenade is inserted is not known.

11. TACTICAL EMPLOYMENT OF GERMAN 75-MM ASSAULT GUN

The German 75-mm assault gun (7.5-cm Sturmgeschütz) is a weapon comparable to the U.S. 75-mm and 105-mm self-propelled guns. The gun and mount weigh about 20 tons. Its maximum speed cross-country is about 7 mph, on roads about 22 mph; it can average about 15 mph. On normal roads its radius of action is about 100 miles, cross-country about 50 miles. To move an assault-gun battery 100 kilometers (about 65 miles) requires 4,000 liters (about 1,050 gallons) of gasoline. The range of the 75-mm short-barrelled tank gun (7.5-cm KwK), with which this weapon was originally equipped, is about 6,000 yards.

It is reported that there are now apparently three types of assault guns in service. These are: the Stu.G. 7.5-cm K, mounting the 7.5-cm KwK (short-barreled tank gun--23.5 calibers*); the Stu.G. lg. 7.5-cm K, mounting the 7.5-cm KwK 40 (long-barreled tank gun--43 calibers); and a third weapon, nomenclature at present unknown, which appears to have a 75-mm gun with a bore 30 calibers in length. It seems probable, therefore, that the 7.5-cm KwK 40, which is the principal armament of the new Pz. Kw. 4 (Mark IV tank), may be primarily an antitank weapon, while the latest intermediate gun will take the place of the old Stu.G. 7.5-cm K as a close-support weapon.

While some technical details of this weapon have been known for some time, relatively little information has been available until recently concerning its tactical employment. Two German documents on the tactical use of this weapon have now been received. One is dated May 1940, the other April 1942. The second document is essentially identical in substance with the first, except that the second contains some additional information. Both documents have been combined into one for the present report, and such apparent contradictions as exist are noted in the translation which follows.

* * *

Instructions for the Employment of Assault Artillery

a. Basic Principles and Role

The assault gun (7.5-cm gun on an armored self-propelled mount) is an offensive weapon. It can fire only in the general direction in which the vehicle is pointing.** Owing to its cross-country performance and its armor, it is able to follow anywhere its own infantry or armored troops.

*Length of bore

**Traverse is limited to 20 degrees

Support for the infantry in attack is the chief mission of the assault gun by virtue of its armor, maneuverability, and cross-country performance and of the rapidity with which it can open fire. The moral support which the infantry receives through its presence is important.

It does not fire on the move. In close fighting it is vulnerable because its sides are light and it is open-topped. Besides, it has no facilities for defending itself at close quarters. As it is not in a position to carry out independent reconnaissance and fighting tasks, this weapon must always be supported by infantry.

In support of an infantry attack, the assault gun engages the enemy heavy infantry weapons which cannot be quickly or effectively destroyed by other weapons. In support of a tank attack, it takes over part of the role of the Pz. Kw. 4, and deals with enemy antitank guns appearing on the front. It will only infrequently be employed as divisional artillery, if the tactical and ammunition situation permits. Assault artillery is not to be included in the divisional artillery fire plan, but is to be treated only as supplementary, and to be used for special tasks (e.g., roving batteries). Its employment for its principal tasks must always be assured.

[The April 1942 document states that "The assault gun may be successfully used against armored vehicles, and light and medium tanks." The May 1940 document, however, states "It is not to be used for antitank purposes, and will only engage enemy tanks in self-defense or where the antitank guns cannot successfully deal with them." This apparent contradiction can perhaps be explained by the fact that, prior to the invasion of Russia in 1941, this weapon had been used in limited numbers only. Experience on the Eastern Front may have shown that it could be successfully used against tanks, although Russian sources refer to it as essentially an infantry support weapon. A more logical explanation perhaps lies in two German technical developments since 1940: namely, hollow-charge ammunition, which is designed to achieve good armor-piercing performance at relatively low muzzle velocities, and the reported replacement of the short-barreled low-velocity 75-mm with the long-barreled high-velocity tank gun (7.5-cm KwK 40) on some of the newer models.]

b. Organization of the Assault Artillery Battalion and Its Batteries

The assault gun battalion consists of battalion headquarters and three batteries. The battery has six guns--three platoons, each of two guns.* The command vehicles for battery and platoon commanders are armored. They make possible, therefore, movement right up to the foremost infantry line to direct the fire.

*The April 1942 document states that a battery has 7 guns, the extra gun being "for the battery commander."

c. Principles for Employment

(1) General

Assault gun battalions belong to GHQ artillery. For the conduct of certain engagements, battalions or separate batteries are attached to divisions, or to special task forces. The division commander should attach some or all of the assault artillery batteries under his control to infantry or tank units; only in exceptional circumstances will they be put under the artillery commander. Transfer of batteries from support of one unit to another within the division can be carried out very quickly in the course of a battle. Close liaison with the batteries and within the batteries is of primary importance for the timely fulfillment of their missions. The assault artillery fires from positions in open ground, hidden as far as possible from ground and air observation. Only when employed as part of the divisional artillery will these guns fire from covered positions.

Splitting up of assault-gun units into small parts (platoons or single guns) jeopardizes the fire power and facilitates enemy defense. This should occur only in exceptional cases when the entire battalion cannot be employed, i.e., support of special assault troops or employment over terrain which does not permit observation. If employed singly, mutual fire support and mutual assistance in case of breakdowns and over rough country are not possible.

As complete a picture as possible must be obtained of the enemy's armor-piercing weapons and the positions of his mines; hasty employment without sufficient reconnaissance might well jeopardize the attack. Premature deployment must also be avoided. After an engagement, assault guns must not be given security missions, especially at night. They must be withdrawn for refuelling, overhauling, and resupply. After 4 to 5 days in action, they must be thoroughly serviced. If this is not possible, it must be expected that some will not be fit for action and may fall out. When in rear areas, they must be allotted space near repair shops so that they are readily accessible to maintenance facilities, etc.

Troops co-operating with assault guns must give all support possible in dealing with mines and other obstacles. Artillery and heavy infantry weapons must give support by engaging enemy armor-piercing weapons.

Surprise is essential for the successful employment of assault-gun battalions. It is therefore most important for them to move up and into firing positions under cover, and generally to commence fire without warning. Stationary batteries fire on targets which are for the moment most dangerous to the infantry (especially enemy heavy infantry weapons), destroy them, and then withdraw to cover in order to avoid enemy fire. With the allotment of smoke ammunition (23 percent of the total ammunition issue),* it is possible to lay smoke and

*According to the April 1942 document, the issue is only 10 percent smoke. It is probable that the ammunition issue depends on the particular operations involved.

to blind enemy weapons which, for example, are sited on the flank. Assault artillery renders support to tanks usually after the hostile position has been broken into. In this role, assault-gun batteries supplement Pz. Kw. 4s, and during the fluid stages of the battle direct their fire against enemy antitank weapons to the direct front. They follow very closely the first waves of tanks. Destruction of enemy antitank weapons on the flanks of an attack will frequently be the task of the Pz. Kw. 4.

Against concrete positions, assault guns should be used to engage casemates with armor-piercing shells. Co-operation with assault engineers using flame-throwers is very effective in these cases.

Assault guns are only to be used in towns and woods in conjunction with particularly strong and close infantry support, unless the visibility and field of fire are so limited as to make use of the guns impossible without endangering friendly troops. Assault guns are not suitable for use in darkness. Their use in snow is also restricted, as they must usually keep to available roads where enemy defense is sure to be met.

(2) Tactical Employment

(a) On the Move

Vehicles on the move should be kept well spaced. Since the average speed of assault guns is about 15 mph, they must be used in leap-frog fashion when operating with an infantry division. Crossing bridges must be the subject of careful handling. Speed must be reduced to less than 5 mph, and the assault guns must keep exactly to the middle of the bridge, with intervals of at least 35 yards. Bridges must be capable of a load of 22 tons. The commander of the assault guns must cooperate with the officer in charge of the bridge.

(1) In the Infantry Division

While on the move, the division commander keeps the assault-gun battalion as long as possible under his own control. According to the situation and the terrain he can, while on the move, place one assault gun battery in each combat team. The attachment of these weapons to the advance guard is exceptional. In general, assault gun batteries are concentrated in the interval between the advance guard and the main body, and are subject to the orders of the column commander.* On the march, the battery commander and his party should accompany the column commander.

*The April 1942 document states that "an assault gun battery well forward in the advance guard may ensure the rapid crushing of enemy resistance." It does not specify whether this is applicable to operations with infantry or with armored elements.

(2) In the Armored Division

On the move, the assault gun battalion attached to an armored division can be used to best advantage if included in the advance guard.

(b) In the Attack with an Infantry Division

The division commander normally attaches assault-gun batteries to the infantry regiments. On receipt of orders placing him under command of an infantry regiment, the battery commander must report in person to the commander of that infantry regiment. Exhaustive discussion between these two (as to enemy situation, preparation of the regiment for the attack, proposed conduct of the attack, main point of the attack, co-operation with divisional artillery, etc.) will provide the basis for the ultimate employment of the assault-gun battery.

It is an error to allot to the battery tasks and targets which can be undertaken by the heavy infantry weapons or the divisional artillery. The battery should rather be employed to engage such nests of resistance as are not known before the beginning of the attack, and which, at the beginning or in the course of the battle, cannot be quickly enough engaged by heavy infantry weapons and artillery. It is the special role of the assault-gun battery to assist the infantry in fighting its way through deep enemy defense zones. Therefore, it must not be committed until the divisional artillery and the heavy infantry weapons can no longer render adequate support.

The attached battery can be employed as follows:

(1) Before the attack begins, it is located so as to be capable of promptly supporting the regiment's main effort; (or)

(2) The battery is held in the rear, and is only committed if, after the attack begins, a clear picture is obtained of the enemy's dispositions.

Under both circumstances the attachment of the battery, and occasionally of individual platoons, to a battalion may be advantageous.

The commander under whose command the battery is placed gives the battery commander his orders. The latter makes clear to his platoon commanders the specific battle tasks, and shows them, as far as possible on the ground, the targets to be engaged. When in action the battery commander, together with his platoon commanders, must at all times be familiar with the hostile situation, and must reconnoiter the ground over which he is to move and attack. The battery will be so disposed by the platoon commanders in the sectors in which it is expected later to operate that, as it approaches the enemy, the battery, under cover, can follow the infantry from sector to sector. How distant an objective can be given, and yet permit the control of fire by the battery and platoon commanders, is dependent on the country, enemy strength, and enemy

action. In close country, and when the enemy weapons are well camouflaged, targets cannot be given to the platoons by the battery commander. In these circumstances, fire control falls to the platoon commanders. The platoons must then co-operate constantly with the most advanced infantry platoons; they remain close to the infantry and engage the nearest targets. The question of dividing a platoon arises only if individual guns are allotted to infantry companies or platoons to carry out specific tasks: e.g., for action deep into the enemy's battle position.

In an attack by tanks attached to an infantry division, the assault-artillery battalion engages chiefly enemy antitank weapons. In this case too, the assault-gun battalion is attached to infantry elements. Well before the beginning of the tank attack, the batteries are disposed in positions of observation from which they can readily engage enemy antitank weapons. They follow up the tanks by platoons, and under special conditions--e.g., in unreconnoitered country-- by guns, as soon as possible. In a deep attack, co-operation with tanks leading an infantry attack is possible when the hostile islands of resistance have been disposed of.

In the enemy tank counterattack, our own antitank guns first engage the hostile tanks. The assault-gun battalion engages the enemy heavy weapons which are supporting the enemy tank counterattack. Only when the antitank guns prove insufficient, do assault guns engage enemy tanks. In this case the assault guns advance within effective range of the enemy tanks, halt, and destroy them with antitank shells.

(c) In the Attack with an Armored Division

In such an attack, the following tasks can be carried out by the assault-gun battalion:

(1) Support of the tank attack by neutralizing enemy antitank weapons; (and/or)

(2) Support of the attack by motorized infantry elements.

According to the situation and the plan of attack, the battalion, complete or in part, is attached to the armored brigade, sometimes with parts attached also to the motorized infantry brigade. Within the armored brigade, further allotment to tank regiments is normally necessary. As a rule, complete batteries are attached.

To support the initial phase of the tank attack, assault-gun batteries can be placed in positions of observation if suitable ground is already in our possession. Otherwise the batteries follow in the attack close behind the first waves of tanks, and as soon as the enemy is engaged, support the tanks by attacking enemy antitank weapons.

As the tank attack progresses, it is most important to put enemy defensive weapons out of action as soon as possible. Close support of the leading tanks is the main essential to the carrying out of these tasks.

The support of the motorized infantry attack is carried out according to the principles for the support of the foot infantry attack.

(d) In the Attack as Divisional Artillery

In the attack of a division, the employment of the assault gun battalion as part of the divisional artillery is exceptional. In this role, the assault-gun batteries must be kept free for their more usual mission at all times, and must enter battle with a full issue of ammunition.

(e) In the Pursuit

In the pursuit, assault-gun batteries should be close to their own infantry in order to break at once any enemy resistance. Very close support of the leading infantry units increases their forward momentum. Temporary allotment of individual platoons--under exceptional circumstances, of individual guns--is possible.

(f) In the Defense

In the defense, the primary task of assault artillery is the support of counterthrusts and counterattacks. The assembly area must be sufficiently far from the friendly battle position to enable the assault-gun units to move speedily to that sector which is threatened with a breakthrough. Allotment and employment are carried out according to the plan of the infantry attack. The point of commitment should be arranged as early as possible with the commanders of the infantry units allocated to the counterthrust or counterattack. In the defense as in the attack, the assault-artillery battalion will only be employed in an antitank role if it must defend itself against a tank attack. (Only 12 percent of the ammunition issue is armor-piercing.)* If employed as part of the divisional artillery (which is rare), the battalion will be placed under the division artillery commander.

(g) In the Withdrawal

For the support of infantry in withdrawal, batteries, and even individual platoons or guns, are alloted to infantry units. By virtue of their armor, assault guns are able to engage enemy targets even when the infantry has already withdrawn. To assist disengagement from the enemy, tank attacks carried out with limited objectives can be supported by assault guns. Allotment of assault-gun batteries or platoons to rear parties or rear guards is effective.

*15 percent according to the April 1942 document.

d. Supplies

As GHQ troops, the battalion takes with it its complete initial issue of ammunition, fuel, and rations. When it is attached to a division, its further supply is handled by the division. The battalion commander is responsible for the correct supply of the battalion and the individual batteries, especially in the pursuit. Every battery, platoon, and gun commander must constantly have in mind the supply situation of his unit. It is his duty to report his needs in sufficient time and with foresight, and to take the necessary action to replenish depleted supplies of ammunition, fuel, and rations.

12. CONCEALMENT OF GERMAN TRENCHES

In one of the campaigns in the Middle East (Cyrenaica), reliable reports show that the German tactics put great emphasis on the development of a defensive system best designed to assure ground concealment.

It was found that German trenches were narrow, with no parados, and the spoil for the parapet was well spread out and never more than 9 inches high. The effect was to make the trenches inconspicuous, and it is stated that on one occasion an officer walked to within 30 yards of an enemy post without seeing it.

There were no sandbags and few wire obstacles, and there was a general lack of construction materials. This absence of materials, though it may have been enforced by circumstances, proved entirely effective and made defenses very difficult to locate. Revetting was usually dry-stone walling, but very few posts had overhead cover, protection from the air being obtained rather by the narrowness of the trenches than by concealment. In one area a number of tank turrets were used as pillboxes in fixed defenses and were very effective, providing good protection and being easy to conceal.

13. JAPANESE TASK FORCE IN CHINA

In regard to the various Japanese military campaigns in China during the past year, one factor of outstanding interest has been the composition of their task forces. These task forces appear to have been comprised of units selected from various first-line Japanese divisions. The selection of given units has been based on the convenience of their location with respect to the transportation problem in assembling a task force, as well as on the past record of a unit for efficient service in such forces. It is reported that these task forces have always been dissolved after a particular campaign, and the various units returned to their former stations.

The composition of one of these task forces is given at the end of this article. It should not necessarily be regarded as typical, owing to the circum-

stances noted above, and also because the Japanese, like the Germans, have little regard for the employment of units on the basis of tables of organization. The units are drawn from at least three divisions, though the total strength of the task force is probably less than 7,500 men. Intelligence officers should note that even though a number of small Japanese units are identified on a given front, they willl not necessarily indicate the strength or composition of the Japanese opposition.

For purposes of security, fictitious numbers are used to designate units.

UNIT A Commander: CO 2d Inf, 1st Div
1st Bn, 1st Inf, 1st Div
2d Bn, 2d Inf, 1st Div
3d Btry, 3d Mtn Arty Regt, 1st Div
Medical detachment

UNIT B Commander: CO 2d Bn, 14th Inf
2d Bn, 14th Inf, 15th Div
5th Btry, 16th Mtn Arty Regt, 15th Div
Infantry gun detachment

UNIT C Commander: CO 3d Bn, 22d Inf
3d Bn, 22d Inf, 25th Div
2d Btry, 23d Arty Regt, 25th Div
Infantry gun detachment
Transport detachment
Medical detachment

TASK FORCE TROOPS
Cavalry platoon
Artillery battery
4th Btry, 1st Bn, 3d Mtn Arty Regt, 1st Div
Engineer company
Transport detachment
Signal detachment (radio)
Medical detachment
10th F Hosp (from 48th Div)
Veterinary detachment (from Fifth Army)
Water purification detachment

14. SNAKE BITE*

a. General

Poisonous snakes are found throughout the temperate and tropical areas of the world, though the species to be encountered vary greatly on the different continents. Examples are the rattlesnake of North America, the fer-de-lance of Central and South America, the viper or adder of Europe, the mamba of Africa, the cobra of southern Asia, and the tiger snake of Australia. The danger of suffering a snake bite is greatly overemphasized, since these reptiles usually will not attack man unless disturbed. Such danger is probably greater in certain parts of the United States than in any other part of the world, with the possible exception of India and Burma. Unless one has some knowledge of the habits and habitat of snakes and is searching for them, they are infrequently encountered in ordinary travels.

In case of snake bite, it is important to kill the snake and have it examined, if possible. There are several different types of snake antivenom, and if the snake is identified it is much easier to select the proper type of antivenom for the treatment of the bite. The presence of an undigested or partially digested "ball" of food in the snake's stomach may indicate the amount of venom injected into the victim when the snake struck. When a venemous snake kills, a part of the venom is used up; thus, the presence of a visible food ball in the stomach may mean that the snake's poison sacs were relatively empty at the time of biting the victim, and therefore that probably only a small amount of venom was injected.

b. Precautions

(1) Wear boots when walking in snake-infested areas.

(2) When possible, remain on trails.

(3) Avoid the careless touching of shrubs, brush, trees, tree branches, etc., or walking near ledges where snakes may be hiding.

(4) In some areas, snakes may prefer dark, warm places for rest, and may crawl into shoes, clothing, or luggage. This is especially characteristic of the cobra in the Far East. Such articles should be examined carefully before use.

(5) If bitten by a snake the following procedures are recommended:

(a) Immediately apply pressure or tourniquet (rubber tubing, belt, string, piece of shirt, vine, or weed) above the bite--no tighter than a snug garter--to stop return of the venous blood toward the heart. The tourniquet should be released for a few seconds every 10 to 15 minutes to prevent gangrene.

*Prepared in the Office of the Surgeon General.

(b) Under field conditions and in the absence of medical care, do not make an incision, but instead place a piece of rubber dam three or four inches square over the site of the fang punctures, and by vigorously sucking and kneading with the teeth, remove as much venom as possible during a period of 5 minutes. The rubber dam will prevent sucking the venom into the mouth. Wash the wound and the rubber dam, and repeat the sucking and kneading at regular intervals, while removing the patient to the nearest medical officer or other physician.

(c) Kill the snake and take it to the physician for inspection.

(d) Whiskey or other alcoholic drinks should not be given.

(e) As far as possible, keep the patient from exerting himself, for exertion will increase blood flow and thus cause more venom to be absorbed.

MILITARY INTELLIGENCE

15. IDENTIFICATION OF GERMAN PRISONERS

Attention is called to the several ways by which German PWs may be identified by the examination of records found on their person.

a. Identity Disks

These are of three types, viz.--

(1) Those showing the man's present unit (comparatively rare);

(2) Those showing the man's Ersatz (replacement training) unit (most common;

(3) Those bearing the number, but not the APO number. This is a new kind of disk of which, the report states, nothing more is yet known.

The soldier is issued his identity disk by the unit to which he is first assigned. This accounts for the preponderant number of disks showing an Ersatz unit, for the majority of men called up since the first stage of the war would be untrained, and would therefore be assigned to a depot unit for training.

On the other hand, the trained reservists mobilized on the outbreak of war, or previously, would normally be assigned direct to a field unit, whose designation would therefore appear on the identity disk issued to them.

b. Mobilization Regulations Concerning Identity Disks

"Every member of the Army will be issued an identity disk by the unit to which he belongs, or to which he is assigned on the first day of mobilization, or to which he may be sent during the course of the war."

Members of the Frontier Guard (Grenzwacht), home security units * (Sicherheitsbesatzung), and the militarized personnel of the semi-military construction corps (Todt Organization) were issued an identity disk before the war. It bore the Roman number of the Corps Area (Wehrkreis) and a serial number.

c. Replacement of Lost Disks

It is worth noting that a soldier who has lost his original disk is issued a new one, which is stamped with the designation of the new issuing unit and sub-unit.

d. Pay-book (Soldbuch) and Identity Certificate (Truppenausweis)

The German pay-book contains so much information, especially about the soldier's present unit and previous units, that pay-books may be withdrawn from soldiers engaged in specific operations. Flying personnel are not allowed to carry their pay-book on war flights. During the operations at Bardia, Sollum, and Halfaya, the example of the German Air Force was followed generally, and pay-books were withdrawn from the army personnel engaged and kept with the company records together with the Wehrpass (a book containing the permanent military history of the individual). Instead of the pay-book a temporary certificate of identity was carried, giving the following particulars:

Vorlaufiger Personal-Ausweis

(Provisional Personal Identification Certificate)

(A) Inhaber ist der (Bearer is)

Dienstgrad, Name, Zuname.
(rank, first name, surname)

(B) Geb. am (Date of birth)

(C) Wohnhaft in (Home address)

(D) Am-----auf afrikanischem Boden eingetroffen (Arrived on African soil on - [date])

(Official stamp)

. . . . . .
(Unterschrift)
(signature)

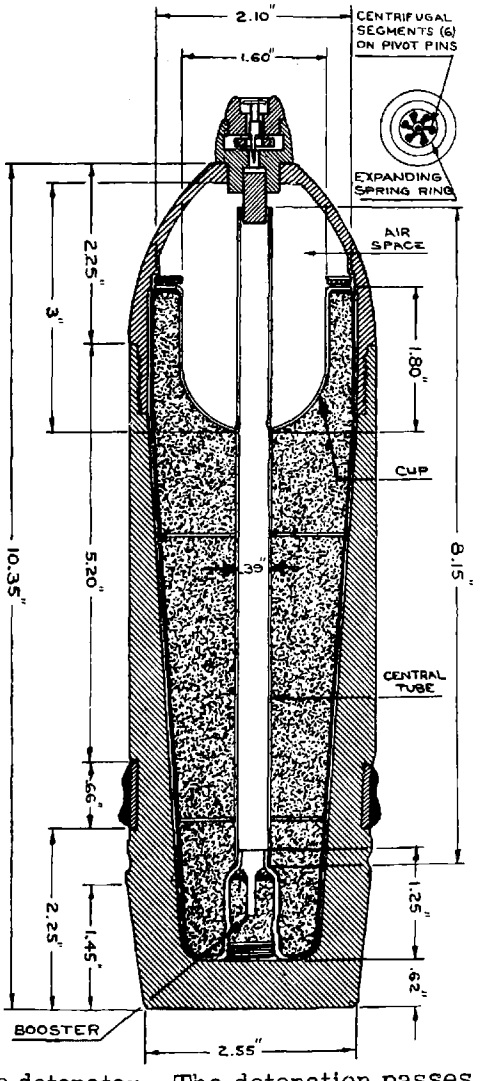
*Such as police, Gestapo, etc.

The certificate was signed by the company commander and was stamped with the APO number. Identification was therefore possible in most cases. The certificate was typed on any piece of paper. When folded it was much the same size as the pay-book.

ORDNANCE

16. GERMAN HOLLOW-CHARGE AMMUNITION FOR 75-MM TANK GUN

A sketch showing the details of the hollow-charge round for the German 7.5-cm KwK (75-mm tank gun) accompanies this report. The German nomenclature for this ammunition is 7.5-cm Pz. Gr. Patr. 38 KwK.



The round is of the fixed type. The cartridge case and the weight and type of propellant are similar to those for the other types of 75-mm antitank gun ammunition. The shell is fitted with a threaded hemispherical cap into which is screwed a small nose percussion fuze. From the nose fuze, a central tube runs down to a booster which is situated in the base of the shell. This booster consists of a detonator set in penthrite wax, the whole being contained in a perforated container. The bursting charge consists of three blocks of Hexagen (Trimethylene Trinitramine) the front one of which is concave, as shown in the sketch. The blocks are contained in waxed paper and are cemented into the shell.

The operation of the Aufschlag Zunder or percussion fuze (A.Z.38-type fuze) is simple. The striker is held off the detonator assembly by six centrifugal segments which are surrounded by an expanding spring ring. After the shell has left the gun, centrifugal force causes the clock spring and the safety blocks to open, thus freeing the striker. Upon impact, the striker is driven onto the detonator. The detonation passes down the central tube to initiate the booster. This in turn initiates the bursting charge.

The shell is painted white and has black markings. The weight of the shell is 4.5 kilograms, and that of the bursting charge 450 grams.

Comments: This is another instance of the use of hollow-charge ammunition to increase the armor-shattering effect of a gun of comparatively low muzzle velocity. No data is available at this time concerning the performance of this type of projectile against armor at various ranges.

17. GERMAN 37-MM STICK BOMB

This so-called stick bomb was recently developed for the German 37-mm antitank gun. It has a rod which fits into the bore of the gun, and a concentric perforated sleeve which fits over the barrel. The standard 37-mm shell case and primer are used. The propellant charge consists of 216 grams of nitroglycerine tubular propellant. The projectile, has a rounded nose cap and a nose fuze internally identical with that of the German HE rifle grenade. It is presumably a hollow-charge projectile, probably intended to give this gun better armor-piercing performance. The projectile perhaps takes the form of a bomb or grenade, because a hollow-charge shell of a caliber as low as 37-mm would not be effective. The bomb is likely to be effective at short ranges only.

The dimensions of the bomb are:

Over-all length	695 mm	(27.36 in)
Length of bomb	275 mm	(10.83 in)
Length of rod	420 mm	(16.54 in)
Length of sleeve	115 mm	(4.53 in)
Diameter of bomb	145 mm	(5.71 in)
Diameter of rod	36 mm	(1.42 in)
Diameter of sleeve	50 mm	(1.97 in)

18. SLEDS FOR WINTER WARFARE

German sources reveal the use of sleds (Ackja) by the Finns to meet the problems of winter transport.

A small flat-bottomed boat-shaped sled, the keel of which forms the running surface, is used for the transport of light loads of different kinds: ammunition, rations, radio equipment, wounded, and light weapons. The following types of sled, modelled on the Finnish pattern, have recently been introduced into the German Army:

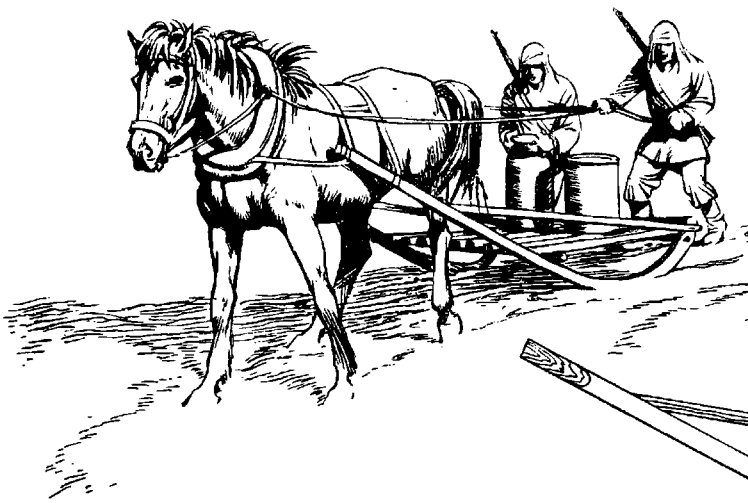
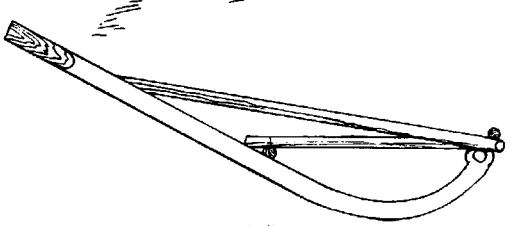


Fig. ② FINNISH TRANSPORT SLED



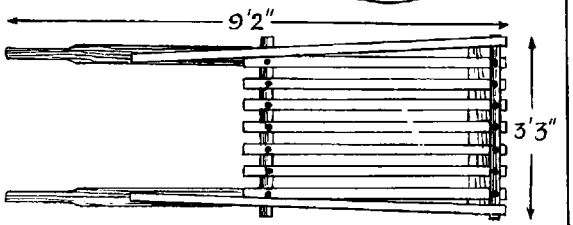
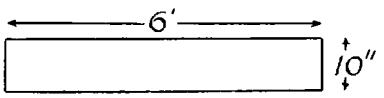
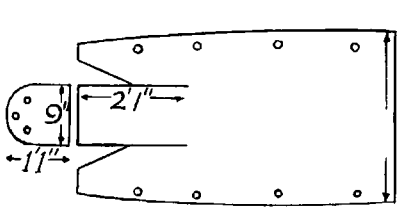
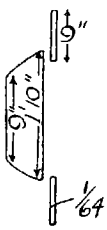


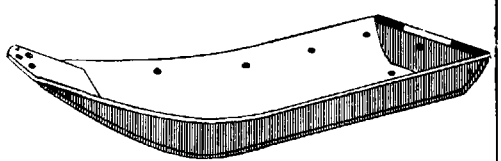
Fig. ① FINNISH ACKJA

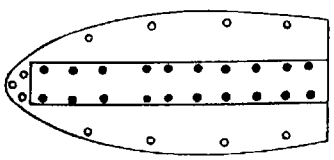




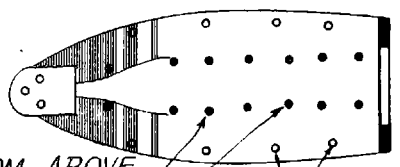


COMPONENTS





VIEW FROM BELOW



VIEW FROM ABOVE

Rivets

Holes for securing load

German Designation	English Equivalent
Schlitten 300 kg	Sled, 660 lbs
Schlitten 500 kg	Sled, 1,100 lbs
Krankenschlitten	Ambulance sled
Schlitten 1,000 kg	Sled, 2,200 lbs
Leichter Ackja	Light Ackja
Boots-Ackja	Boat-type (clinker-built) Ackja
Waffen-Ackja	Weapon-carrying Ackja

a. Description

Ackjas may be constructed either of three-ply wood or of ordinary planks, clinker-built (with planks or plates put on so that one edge of each overlaps the edge of the plate or plank next to it, like clapboards on a house).

(1) Plywood Type

An example is shown in the accompanying sketch, figure 1. The various sections of plywood are cut out, partly shaped by soaking in water, and nailed or riveted into position. The stern of the sled is braced by a 3/4-inch-thick wooden batten secured at each end by strips of 1/64-inch strap iron. Dimensions and design are varied to suit the purpose for which the sled is built, but in every case the sled should be as light as possible.

(2) Clinker-Built Type

These are stronger but also considerably heavier than the plywood type. They are constructed exactly like a small boat, and move on a single broad runner along the keel.

b. Propulsion

Ackjas can be pulled in two ways:

(1) By Dogs

The normal team is of two dogs, the first being led. Dogs must be specially trained for this work.

(2) By Men on Skis

In deep snow, a team of men commonly go ahead to clear a track of sufficient width to accommodate the sleds.

c. Light Snow Drag

A simple horse-drawn drag, suitable for transport of light loads, is shown in figure 2 of the sketch.

19. GERMAN MOTORCYCLE TRACTOR

The invasion of Crete revealed for the first time the use by the Germans of the motorcycle tractor for the purpose of hauling light, single-axle, open trailers or light guns. This tractor is known to be employed in the Middle East and, according to recent newspaper accounts, it is now to be seen on the Eastern Front. It is a suitable vehicle for accompanying airborne troops. Early in 1941, it was accepted as an army vehicle and received the number Sd.Kfz.2 (Sonder Kraftfahrzug--special motor vehicle).

a. Body

The accompanying sketches show that the body (1) is a box-like structure made of pressed metal in two halves, and joined along a horizontal plane below the track-guards (2). It contains the driving position (3), the engine (4) and transmission, and a transverse seat (5) at the rear over the cooling system (6). The driver is seated on a saddle (7) mounted above the gearbox (8) and clutch housing (9), and has two rubber knee-pads fitted beneath the dashboard. On each side, the track-guards carry gasoline tanks (10) at the front while, level with the engine, the sides are built up (11) and contain on the left the tool kit and on the right the battery and fuze panel.

At each side of the passenger seat there is a light rail (12), while foot rests, rifle rests (14), and clips (15) are provided at the rear.

b. Engine

The power unit (4) is an Opel "Olympia model 38," gasoline engine, mounted towards the rear of the body. It is a four-cycle, four-cylinder unit developing about 36 brake horse power at 3,400 rpm.

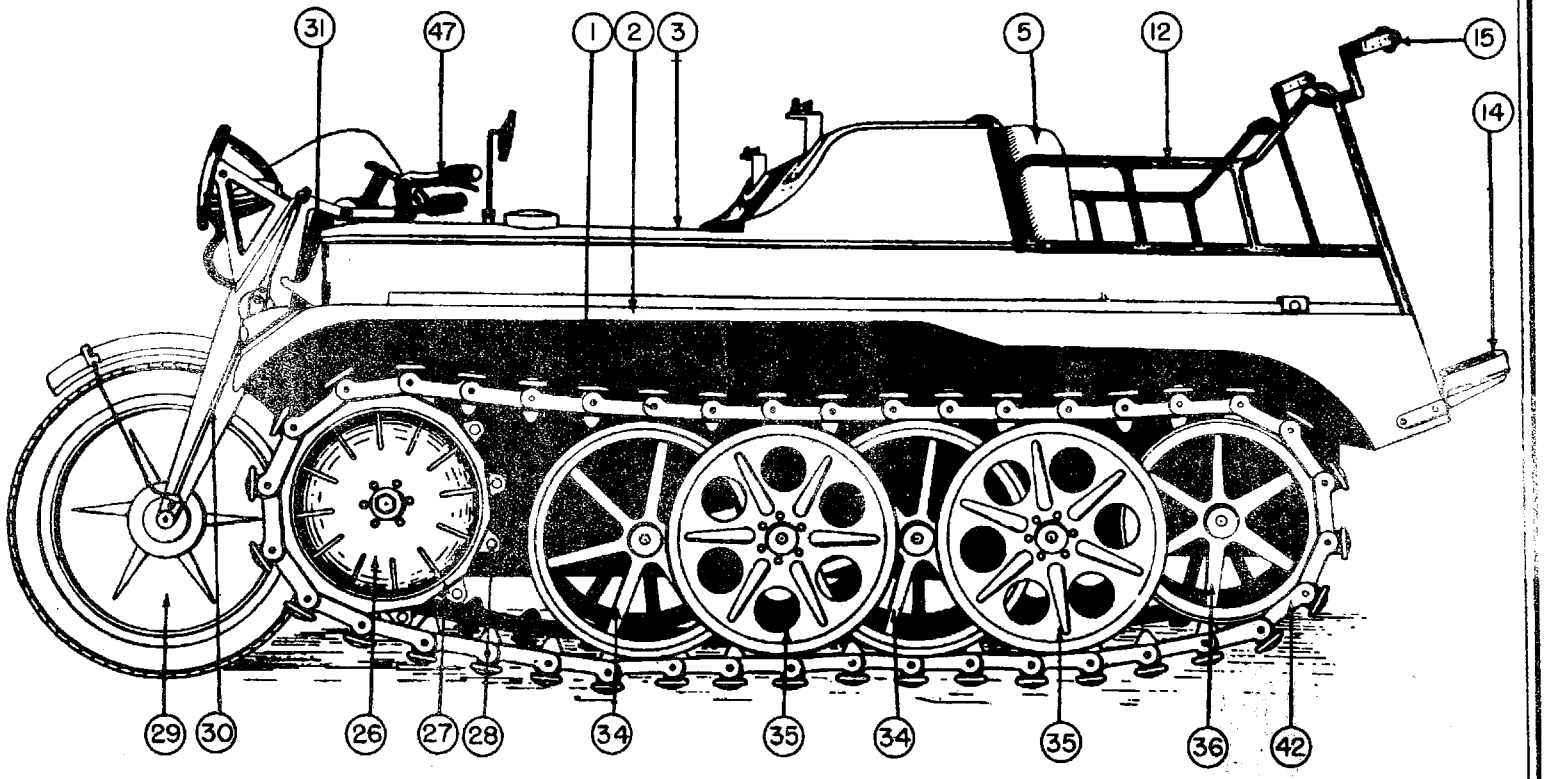
Bore	80 mm
Stroke	76 mm
Engine capacity	1,478 cc
Compression ratio	6
Firing order	1 - 3 - 4 - 2

The engine body is in two main parts: the cylinder head, and the cylinder block and crankcase (both in one piece).

c. Crankshaft Assembly

This is supported in four main bearings. The pistons are of light metal and are fitted with two compression and one oil-scraper rings. The wrist or piston pins are full floating and are prevented from sideward movement by locking rings on each side.

d. Valve Operation



MOTOR-CYCLE TRACTOR

The overhead valves (one intake and one exhaust for each cylinder) are operated by pushrods and rockers from the camshaft, which is mounted in four bearings in the crankcase. The gasoline pump, tachometer, oil pump, and distributor are all driven from the camshaft.

Valve clearance (warm)	Intake	0.2 mm (8/1000 in)
" "	Exhaust	0.3 mm (12/1000 in)

e. Cooling

An impeller-type water pump, together with the generator, is driven from a master pulley on the free end of the crankshaft and circulates water between the engine and the radiator (6), which is located at the rear of the vehicle. A small water tank is mounted above the pump.

The laminated radiator is built in a large airduct (16), in which there is a fan (17) driven direct from the crankshaft. The rear end of the airduct may be closed by a flap (18) operated by a hand lever on the left of the driver.

f. Lubrication

Oil is pressure-circulated by a gear pump from the sump through a strainer and passes through the bearings of the crankshaft, connecting rods, camshaft, tappets, and valve rockers at a pressure of 30 to 45 pounds per square inch. Piston pins and cylinder walls are splash-lubricated.

In order that the oil pressure may not rise too high, there is an excess-pressure valve in the wall of the oil pump, and this returns some of the oil to the sump.

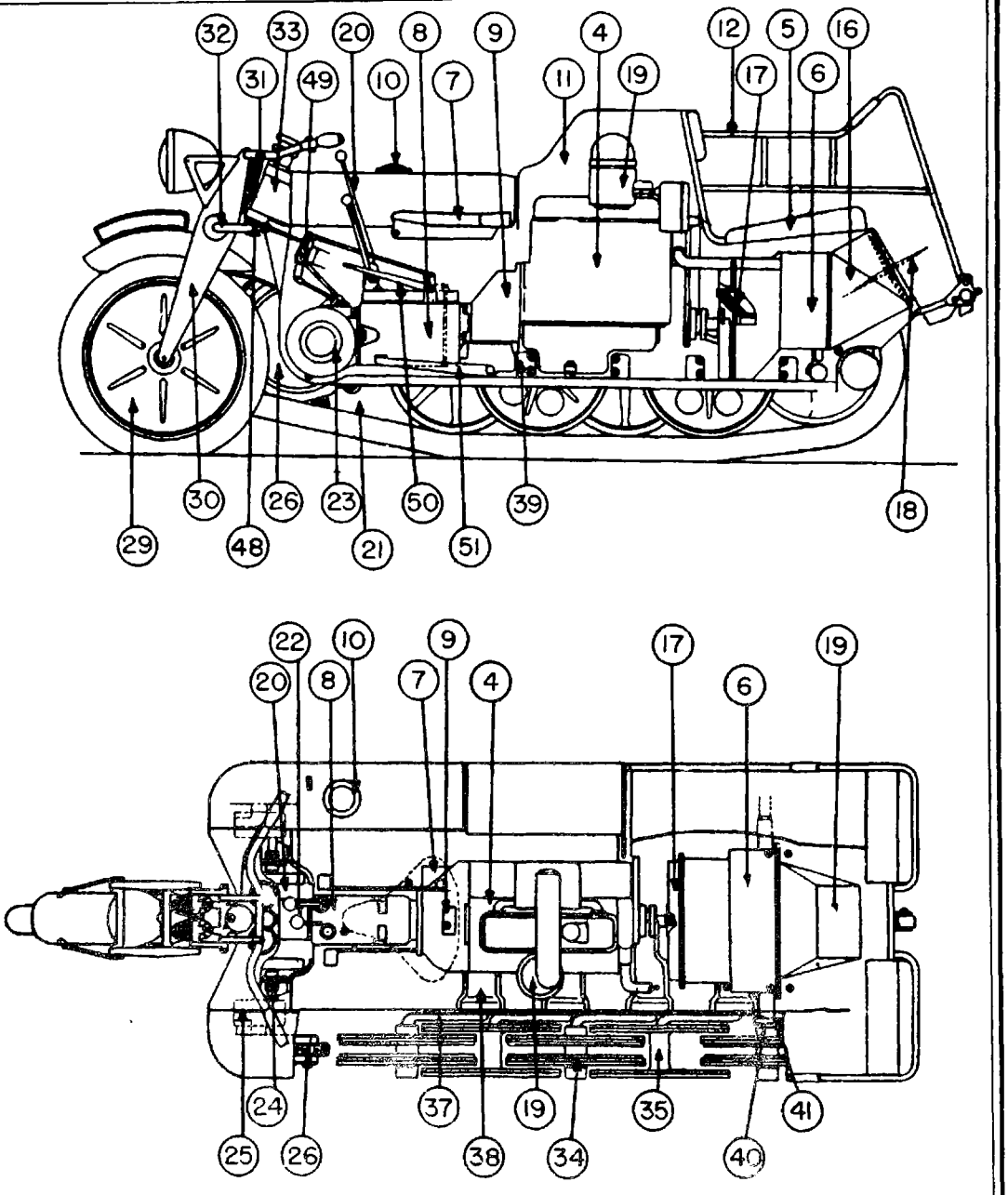
An oil cleaner of the metal-disk type is fitted. This is itself cleaned by turning the ratchet on the top.

g. Fuel-Supply

An Opel downdraft carburetor, with a large oil-bath-type air filter (19) on the air intake, is fitted. Gas is drawn from the tanks (of which there are two, each holding 5.5 U.S. gallons) and fed to the carburetor by a mechanical diaphragm pump of normal design, which is driven from the camshaft.

h. Electrical Equipment

Ignition is by Bosch coil and distributor, the latter being driven from the camshaft. A Bosch 75-watt generator, with voltage regulator, is mounted on the right side of the engine and together with the waterpump is driven by a V-belt from the master pulley. A Bosch starter motor is also fitted on the right side. The 6-volt battery is mounted on the right side above the track-guard.



GENERAL LAYOUT

MOTOR-CYCLE TRACTOR

i. Starting Equipment

Normally the engine is started by a self-starter controlled by a pull-knob on the dashboard. A crank is also provided and, for use, is inserted in an opening in the radiator grill at the back of the vehicle (just above the trailer coupling) and pushed through to engage with the crankshaft.

j. Transmission

Transmission is through an Opel multiple-spring, single dry-plate clutch, mounted on the flywheel, to a 3-speed-and-reverse gearbox (8), which also incorporates an auxiliary gear box, giving high and low ratios so that in effect 6 forward speeds may be obtained. A long gear-shift lever (20), held near the top in a gate (the H-shaped aperture in which the gear lever operates) on the dashboard in front of the driver, gives the main gear selection, while a shorter lever (21), to the rear of the first, gives selection of high and low ratios for road or cross-country travel. A hinged latch which covers the "reverse" part of the gate prevents accidental engaging of that gear, while an extension of the latch beyond the hinge makes its removal an easy matter.

The vehicle must be stationary while changing ratio in the auxiliary gearbox.

The speedometer is driven from the gearbox.

k. Differential

The differential (22) is of the controlled spur-gear type and incorporates two steering brakes (23), one for each track. These are internal expanding, and in order to increase their braking efficiency the drums are not directly fastened to the axle shafts, but are driven at considerably greater speed from the differential spur pinions through a set of gears.

l. Sprocket

From the differential, the drive passes through the steering brakes (23) and metal couplings (24) to the final reduction gears (25), and thence to the sprockets (26). Each sprocket is a narrow twin-rimmed wheel, of which the inner and outer rims are shod with rubber pads (27) (12 per rim) to form a continuous tire. The pads have the same inside curvature as the rim, but are flat outside. Adjustable rollers (28) (12 per sprocket) are fitted between the rims to act as teeth and to engage the track. An internal expanding brake, which is foot operated, is mounted inside each sprocket.

m. Suspension

(1) Front Wheel

The front wheel (29) is a pressed-steel disk type with a 3.5- by 19-inch tire (tire pressure 34 lbs. per sq. in.) and mounted in a pressed steel, motorcycle front-wheel fork (30) of conventional pattern. The springing (two vertical coil springs)(31), with controllable friction-disk shock absorbers (32), and the steering column (33) are very similar to those of a normal motorcycle.

(2) Track Assembly

The track assembly, which is of the usual type for half-track vehicles, consists on each side of a driving sprocket (26), four equal size, double-rimmed bogie wheels (34 and 35), and an idler wheel (36). Of the bogie wheels, the odd numbers (34) (from the front) are narrow wheels with radial spokes, while the even numbers are wider, pressed-steel disk wheels. The former run between the rims of the latter, the whole bogie and idler system being set rim to axle.

The bogie wheels are mounted on bell cranks (37) fastened to torsion bars, which pass across the body of the vehicle in crosstubes (38) of circular section and are anchored in the opposite side. The torsion bars of the corresponding bogie wheels of the two sides are carried one above the other (39) in the same cross tube.

The idler is simply another narrow-rimmed bogie wheel and is carried on an eccentric arm (40) which can be adjusted by a screw rod (41) passing through a bracket on the body. By this means the position of the idler can be varied, and hence the track tension may be adjusted. The bogie and idler wheel rims have thin, solid rubber tires. There are no return rollers, the track returning along the tops of the bogie wheels.

n. Track

Each track is made up of 40 forged steel links (42) (fig. 1) joined together by a bolt (43). These link joints are lubricated from oil chambers (44) which also, in part, form the tongues of the track links and pass between the rims of the bogie wheels. Above the oil chambers and track bolts, rubber shoes (45) are mounted. These are easily replaceable, being retained by 4 screws (46) only.

o. Steering

The motorcycle tractor is steered by the front wheel, by handlebars (47) in the normal manner of a motorcycle, and for sharp turns, by the steering brakes, operating on the tracks.

Two take-off rings (48) at the bottom of the steering column are connected by rods to arms on the brake crosstube (49). These in turn actuate levers, the ends of which are joined by means of adjustable rods to the steering brakes (23).

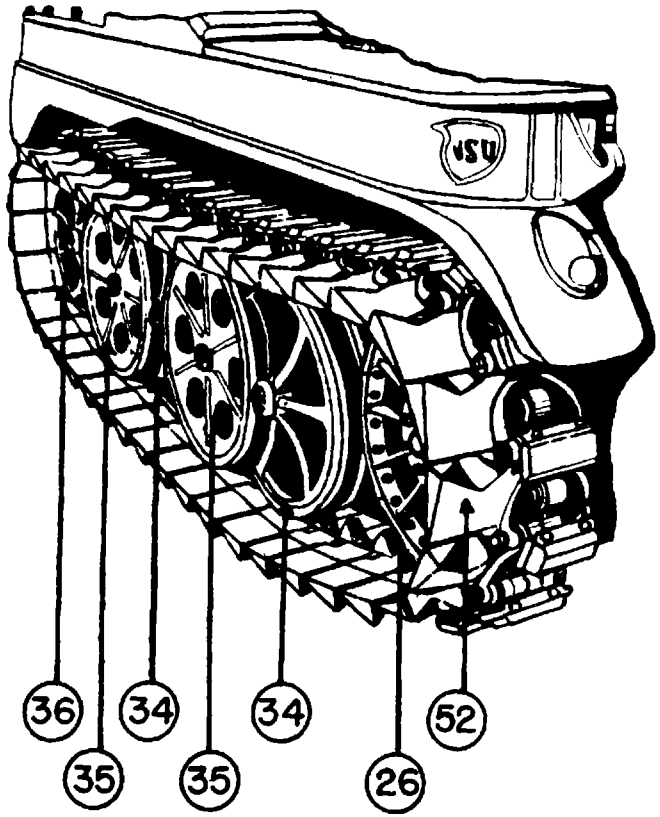


Fig. 2

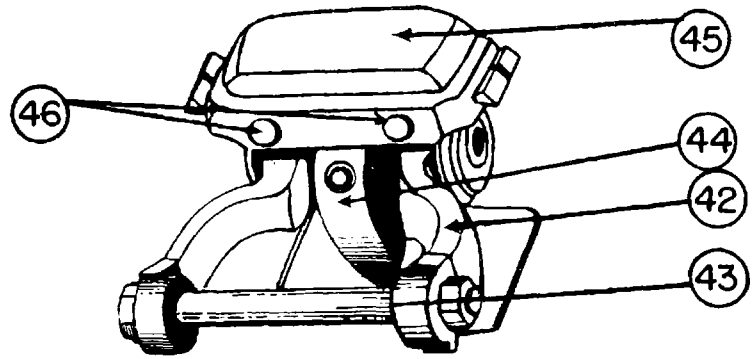


Fig. 1

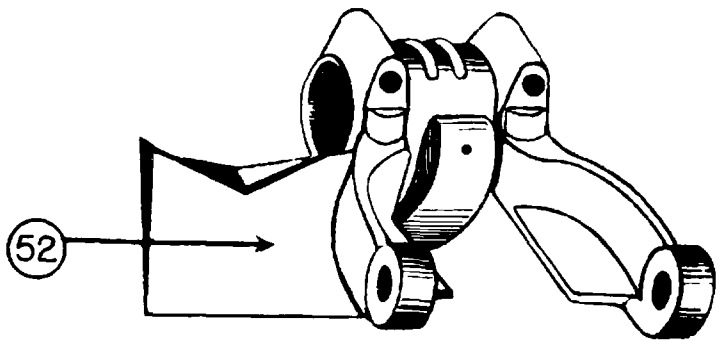


Fig. 3

TRACK OF MOTOR-CYCLE TRACTOR

The steering brakes come into play for turns of over 5^{o}, corresponding to a movement in either direction of about 1 3/4 inches at the ends of the handlebars.

p. Brakes

The footbrake, which is located on the right, and the handbrake (50) both operate an internal expanding brake mounted in each sprocket.

q. Driver's Controls and Instruments

These consist of the following:-

(1) steering handlebars with right hand throttle twist grip;
(2) main and auxiliary gear selection levers;
(3) a footpedal (51) on the left, operating the clutch;
(4) a handbrake (50) mounted on the left of the gearbox cover;
(5) a footbrake on the right;
(6) a radiator shutter control on the inside of the body, left of the driver, -

together with starter button, ignition and lighting switches, tachometer, speedometer, odometer, oil-pressure gauge, and water-temperature gauge.

r. Modifications for Tropical Use

A German document details several modifications which are made to the motorcycle tractor to fit it for use under tropical conditions.

(1) Engine

The oil filler cap has a linen hood tied over it, and the breather pipe has a steel-wool filter held between two pins near the bottom. For cleaning purposes, the filter may be removed after the lower pin has been extracted.

(2) Cooling

In order to provide sufficient cooling, the fan is driven at 1.4 times the crankshaft speed.

(3) Fuel Supply

The Opel carburetor is replaced by a Solex model, believed to be of the duplex downdraft type. A filter is incorporated between the gas tanks and the pump.

(4) Air Filter

The "Knecht Tornado" air filter fitted to the normal vehicle is replaced by a similar type of oilbath filter, incorporating a mechanical precipitator on the inlet side.

(5) Electrical Equipment

A new generator is fitted, while a solenoid-operated starter motor replaces the mechanically operated type fitted in the normal model. The starter push button is located on the right side of the body level with the driver's seat. The distributor is enveloped in a linen bag.

(6) Transmission

Both main and auxiliary gear levers have linen hoods tied to them to cover their points of entry into the gearboxes. The breather holes in the gearboxes, the steering brakes, and the stub axle housings are all covered with cloth hoods.

(7) Tracks

For special purposes, tracks in which the links have extension plates (52) welded to their outside (figs. 2 & 3) are provided. These are probably for use in very loose sand or swampy ground.

(8) Brakes

The covers of the track brakes have extension plates welded to the upper halves to prevent the entry of sand as much as possible.

(9) Controls

The throttle twist grip is covered with a linen sheath which is tied to the grip at each end and to the handlebars, with sufficient free cloth allowed between these fastenings to permit full movement of the twist grip.

(10) Additional Equipment

A 0.4-gallon container for distilled water, and a gallon tank for radiator water are fitted.

A length of wire (16 to 20 feet) and a 13- by 16-foot tarpaulin complete the special tropical equipment of the motorcycle tractor.

s. Further Particulars

(1) Dimensions

Length, over-all	9 ft 0 in

Width, over-all	3 ft	3 in
Height, " "	3 ft	11 in
Width between tracks	2 ft	8 in
Wheelbase, from center of front wheel to center of track	4 ft	5 in
Length of track in contact with ground	2 ft	8 in
Belly clearance		9 in

(2) Weight

Without load	2,690 lbs
Loaded	3,470 lbs
Axle load, front wheel	120 lbs
Load on tracks	3,248 lbs

(3) Performance

Maximum speed on roads,	
At 3,000 rpm	38 mph
At 4,000 rpm	51 mph*
Trailer capacity	1/2 ton (approx)
Maximum gradient, loose sand	
Without trailer	24^{o} (45% or 1 in 2.25)
With trailer	12^{o} (20% or 1 in 5)
Depth of water forded	1 ft 7 in
Fuel capacity	9 gal
Gasoline consumption,	
On roads	17 mpg
Cross-country (approx)	12 mpg

* This speed, it is stated, is only to be attempted in exceptional circumstances.

20. BRITISH SUPPLY PROBLEMS

The problem of the requirements of an army on the move, especially where long distances are involved, brings into play various types of transportation to furnish supplies and equipment. It has been said that over half the planning on any tactical problem must be that of the supply aspects, including computations for the use of every truck, vehicle, and available piece of equipment.

A display of divisional equipment and ammunition, recently held in England had, for its purpose, the object of presenting the scope of the logistic problems to the General Staff of the British Army. A correspondent gives an account of a visit to a British Ordnance Depot in an article which appeared in the December 13, 1942 issue of the London Sunday Times. As a matter of interest to supply branches other than Ordnance, this article is reproduced here.

* * *

Since the last war, the great increase in fire-power of a British infantry division has brough many complex problems of supply in its train. It has been estimated that a division, about 12,000 men, needs well over 100,000 packing cases to take its fighting equipment alone, without taking into account foodstuffs, clothing, or medical supplies.

These difficulties are strikingly illustrated in an exhibition, the only one of its kind in the country, which I saw yesterday at a great ordnance depot. It displayed every kind of fighting equipment used by various types of divisions, from the rifle bullet to the big shells, from machine guns to the 25-pounder, and the newest types of mortar and antitank gun.

The exhibition has been got together by the War Office to show officers at a glance the problems of organization, supply, and maintenance to be solved when an army is on the move.

Successful efforts are being made to economize space on ships. Motor vehicles and weapons are frequently taken apart so that they can be packed into a much smaller space. This was not done in French North Africa, where the material had to be got ashore within easy range of enemy bombers and it was essential for the vehicles to move off quickly, but it is done regularly at ports where the unloading can be carried out free from enemy interference and where time is not precious.

It should be stressed that a weapon which weighs, say, 10 tons on land may be reckoned as 50 ship-tons, for aboard ship tonnage is calculated on the space occupied. Thus a couple of motorcycles, packed away in parts, will save 5 ship-tons, and a couple of trucks 20 ship-tons.

It is estimated that a British division needs at least 80 trains to move it from one area to another. On the road its trucks are numbered by the thousand.

Wide Equipment Range

The range of equipment is astonishing when one considers how little of it existed at the outbreak of war. I saw weapons and equipment which are still closely guarded secrets.

An infantry division carries every conceivable type of radio, but most striking of all is the little set that can be carried on a soldier's back and enables him to converse freely with a neighboring unit amid the noise of battle. The secret is that the soldier does not talk into a mouthpiece at all. Round his throat is a very delicate piece of apparatus and as he speaks the tiny movement of the throat muscles convey the message to the listener.

I saw, too, mechanical wire layers which can trundle along at 22 miles an hour, which would make the signallers of the last war open their eyes.

When this war began, the British Army had no equipment for mountain or winter warfare. To-day it can vie with the Russians in the variety and practical value of its equipment.

The machines which it uses in desert warfare are well protected from the sand particles, while tanks which have to wade ashore from the sea have every working part protected from the salt water.

Self-Heating Soup

The comfort of the fighting soldier and his efficiency are now regarded as synonymous, and much has been done to provide him with hot food under the most trying conditions.

Self-heating soup is a brilliant little idea. The men waiting in the assault boats on a cold morning are given a tin of this soup. The glowing end of a cigarette applied to the tin ignites a solid fuel at the base, and in 5 minutes or less, appetizing hot soup is available.

Food for many hours can be packed into a mess tin, and is both varied and palatable. The iron ration is no longer bully beef and biscuits.

Every type of artillery is gradually increasing in caliber, and rapidly in numbers. Veterans of Mons who remember the two machine guns per battalion of the 1914 B.E.F. would be amazed at the wide range of types.

Also, the types of armored fighting vehicle are many.

Mine detectors are available for all types of terrain. I saw one which

the soldier pushes in front of him; when the apparatus touches a mine, a buzz in the headphones gives him warning.

Then there are the enormous number of working parts for each weapon. The 25-pounder, the best field-gun in the world, has 228 items of which 32 are essential, while the Bofors AA gun has 189.

* * *

21. REVERSIBLE UNIFORMS

A new three-part uniform has been issued to German troops on the Eastern Front, according to Swedish newspapers which quote Berlin. It consists of a hood, which may be pulled over the steel helmet, a coat, and breeches. Field-gray on one side and white on the other, the uniform may be reversed and used as camouflage.

The Japanese are also reported to have devised a reversible uniform in different colors for camouflage purposes.

SIGNAL CORPS

22. BRITISH SIGNAL SECURITY IN NORTH AFRICA

Radio, when properly used, furnishes a valuable means of signal communication. It is used for both tactical and administrative messages by all units of a modern army. It is an essential means for highly mobile elements such as aircraft and armored units, and is especially useful for control of motor movements and for dealing with fast moving situations.

One of the chief disadvantages of radio communication is that radio intelligence is one of the enemy's best methods of obtaining information of our plans, dispositions, and operations. In order to provide the necessary signal security a high state of training is required of all personnel. In North Africa the British have come to understand the importance of proper security measures in radio communication. In one compaign, security measures were poor and, as indicated below, valuable information fell into enemy hands. In a later campaign, corrective measures were taken; many of the earlier failings in the British signal security were remedied by the introduction of new procedure, combined with the reduction of traffic in the clear.

a. Lack of Signal Security

The following weaknesses in British signal security in one of the

earlier campaigns resulted in the enemy acquiring valuable information on the strength and disposition of British forces and on their future plans.

(1) The enemy found it impossible to predict a certain attack from an examination of requests for supplies. The sudden increase in requests for rations, fuel, and ammunition indicated the imminence of an attack. It was this extra supply traffic, combined with the German knowledge of the code call system, which enabled the enemy to anticipate the attack, and to make the necessary dispositions to meet it.

(2) The exact location of British unit positions was made easier by one station asking another to call back at a prearranged time.

(3) The identification of units was often made much easier by the constant repetition of names and code references, and the almost complete lack of security measures in conversation under conditions of bad communication.

(4) Carelessness in the use of plain language, especially under battle conditions, allowed information to escape relating to matters as important as command and operation plans.

(5) The practice of giving the coordinates of enemy positions in the clear was of value to the Germans by giving them information as to:

(a) The exact location of their own troops.

(b) The general location of British troops, since the report of the position of enemy forces obtained by visual observation necessarily gives the approximate location of the reporting unit.

(c) British intentions. The traffic between two British stations included reporting in the clear locations of enemy tanks, followed by a reply stating an intention to attack then or at a prearranged time.

(6) From the number of captured British codes and documents found in enemy possession, it was evident that the practice of forwarding a code name or list to all units in a division, and of showing the complete distribution list, has proved of great value to the enemy in determining the exact British order of battle.

b. Success of Signal Security

The effects of improved methods were most clearly seen at the time of a later British offensive. The Germans were unaware as to whether British preparations were offensive or defensive, nor did they know either the time of the attack or the strength of the forces employed.

This lack of information was attributed to the new signal procedure, increased radio security measures, the observance of radio silence by units arriving in their assembly areas, and the fact that no special supply preparations were identified.

SECTION II

"DANGERS" OF THE TROPICS

"DANGERS" OF THE TROPICS*

To Europeans and Americans whose traditions and experience are mainly associated with lands in the temperate zones, the Tropics have taken on a glamor or an atmosphere of terror far beyond that warranted by the actual differences between the two areas. Professional travelers, fiction writers, and others have exaggerated both the enchanting and the bad features of the Tropics. By placing particular stress on the latter they strive to enhance their own heroism and fortitude at the expense of literal truth. Much of the distortion of facts comes from picturing conditions in many tropical regions as they were long ago, with the implication that the same conditions exist today. The situation is similar to that in many parts of rural France, where even today one may find people who firmly believe that a trip from Washington to Philadelphia is fraught with great danger of attack from savage Redskins. This belief is no more absurd than that of a large portion of our own population to the effect that the traveler in equatorial Africa is in constant danger of capture by cannibalistic natives or of attack by blood-thirsty wild animals. Knowledge of conditions in the Oceanic Islands is probably even more distorted.

Most Americans, especially those born and raised in the city, are far enough removed from their pioneer ancestors to have lost the knack of taking care of themselves under any and all conditions, and it would be foolish to say that, without any training, they would be in no danger if lost in the New Guinea or some other Pacific island jungles. On the other hand, however, they would be in just as great danger if lost in the mountains of western Pennsylvania or other portions of our own country. The only difference is that there would be less tendency for a person to become panicky if so lost in his homeland than if it occurred abroad, because he would not be haunted by recollections of hair-raising tales of adventure. Actually there is no more reason to be afraid under one set of circumstances than the other, and neither here nor abroad are the conditions such that one need lose his head or become unduly concerned over his situation.

Popular literature is filled with references to poisonous snakes, man-eating crocodiles, savage beasts, noxious insects, blazing heat, torrential rains, and poisonous plants and trees. If the daring soul who ventures into the Tropics survives all these and is not decapitated by headhunters and eaten by cannibals, he is pictured as returning home wasted by fevers, his nerves completely shattered by his terrible experiences, in fact only a fragile husk of his former virile self. By way of reassurance to those who do not know the Tropics at firsthand, it might be well to review some of these popular "perils" more closely.

SNAKES

One of the first questions asked the tropical traveler is "how about

*Prepared in the Smithsonian Institution, this article is written by an authority on the area discussed and is based on scientific, firsthand experience.

snakes?" The popular writer-lecturer-Sunday-supplement explorer is prone to picture the jungle traveler as one who proceeds warily with one eye turned upward to watch for pythons or boa constrictors hanging from limbs awaiting the chance to cast their coils about the body of an unwary wayfarer, while the other eye searches the ground to spot the venomous snakes lurking in the grass ready to sink a pair of poison-drenched fangs into his lower extremities. The truth of the matter is that, unless he is a trained student of the science of reptiles, the jungle traveler will do well if he sees more than one or two snakes a month--and when he does, the view will probably be fleeting, as the snake most likely will be making every effort to disappear. There are no land snakes in the more remote Polynesian islands, and there were none in Hawaii until a minute, wormlike blindsnake was accidentally introduced there in recent years. Most of the islands of the East Indies have both venomous and non-venomous types. There are four kinds of snakes on the Fiji Islands, including one venomous variety. There are many kinds on the Solomon Islands, and Australia has an abundance of them, but nearby New Zealand has none. Only harmless kinds occur in the Galapagos Islands.

The poisonous snakes in New Guinea and the large neighboring islands are relatives of the Indian cobra, and their venom affects the nervous system (in contrast to the North American poisonous snakes, whose venom affects the blood stream). If one should inadvertently step on one of these snakes, a bite would most probably be the result. The chances of this happening to people traveling along trails or waterways are probably about the same as those of being struck by lightning. One large party, composed of some 700 men, traversed a considerable area in New Guinea some years ago and in a year's time did not have a single person bitten by a snake. New Guinea is as well infested with poisonous snakes as any part of Melanesia, but it probably is less dangerous from this source than New Mexico, Florida, or Texas, for example. This is not to say that one should be utterly careless of the possibility of snake bites, but ordinary precautions against them are sufficient. When natives are bitten, it usually happens when they are clearing new land for their gardens. One should be particularly watchful when clearing ground for a camp site, trail, or the like and also when roaming in the brush gathering fire wood. While most of the snakes in New Guinea, Australia, and neighboring large islands are non-venomous, the safest procedure is to regard all of them as poisonous and to treat any bite accordingly. There are pythons in New Guinea, but even if they would attack a human being--which they will not do--there is no snake of the constrictor variety in this region large enough to harm a man.

CROCODILES

"Crocodile-infested rivers and swamps" is another catch phrase of the Tropics. New Guinea certainly has its share of crocodiles, but authentic cases of their attacking human beings are practically impossible to find. Occasional rare instances are reported where an old and very large crocodile unable to catch its normal food has acquired the habit of preying on people.

The bite of a crocodile is weak, as it does not masticate its food but swallows it whole. No crocodile would attempt to attack any man or animal too large to swallow. To swallow a small man, a crocodile would have to be at least 15 or 16 feet long, a size rarely seen. There is no need to fear a crocodile's teeth, formidable though they may appear, but if approaching or attempting to kill one along the shore, care should be taken to avoid the sweep of its tail. They can move very swiftly, and the powerful tail is heavy enough to break a man's leg.

WILD BEASTS

Another favorite theme of the professional traveler is that of the dangerous wild animals. This probably is the most fallacious idea of all. In Africa where lions, leopards, and such carnivorous beasts abound, it usually is necessary for photographers and others to obtain pictures of them on the large preserves, where the animals roam about as do the bears in Yellowstone National Park. In areas where the beasts are not protected, they are shy and seldom are seen without the aid of experienced guides. When encountered, the one thought of the beast is to escape. All large animals, of course, can be dangerous if cornered or if they are suddenly startled at close quarters. This is especially true for females with young. The chances of this happening, however, are remote. The idea that big game hunting is dangerous is largely bunk. There are no carnivorous animals in the South Pacific, but in Sumatra, Bali, Borneo, and southeastern Asia there are tigers. There again, it takes a skillful hunter and some luck to see one. The rare instances where human beings have been attacked were the result of old animals, unable to obtain their normal food, being forced to attempt to get a native.

INSECTS

Tropical insects as a rule have had their noxious nature greatly overstressed, and the tenderfoot often has undergone much needless worry on that score. They do abound, however, and some varieties may act as transmitters of disease. Ordinary precautions should be taken against them, but they should not be regarded in the sense of a great peril. Mosquitoes generally are the most prevalent kind of noxious insect, and in many cases they are carriers of malaria; hence their bites should be guarded against. In the Southwest Pacific area, malaria is an important problem. Since malaria mosquitoes generally fly only in the evening and at night, the best way to escape infection is to get under a net or into a screened enclosure as soon as possible after sunset. This, of course, is not always possible for all on a military expedition. When on evening or night duty, exposed portions of the body should be reduced as much as practicable. Malaria itself is not as terrifying an affliction as it is usually described to be. It is decidedly uncomfortable but, with modern medicines and methods of treatment, it rarely becomes a critical ailment. In localities distant from human habitation, no disease should result from mosquito bites. Mud packs offer some relief from the itching which they cause.

Wasps and bees may be abundant in some places, but will rarely attack unless their nests are interfered with. In case of stings, mud packs are very helpful. In some areas there are tiny bees, called sweat-bees, that may collect on exposed parts of the body in enormous numbers during dry weather, especially if one is perspiring profusely. They are stingless and, until one has completely stopped sweating, the only thing to do is to scrape them off with the hand, hundreds at a time. The honey made by these bees is not edible, as too much perspiration goes into its composition. The larger centipedes and scorpions can inflict painful but not deadly stings. These creatures like dark, warm places, so it is always advisable to shake one's blankets before turning in at night, and to make sure that none are hidden in the clothing or shoes before dressing. Spider bites may be painful but are rarely serious, and as a matter of fact are not often incurred. Ants are a remote, although possible, source of danger to injured men lying on the ground and unable to move. This should be borne in mind in placing wounded where they may have to remain for some time.

In some localities certain butterflies collect to gather perspiration from the human body in dry weather. They are somewhat annoying but quite harmless. In Indo-Chinese countries the rice-borer moth of the lowlands collects around lights in great numbers during certain seasons of the year. It is a small, plain-colored moth with a pair of tiny black spots on the wings. It should never be brushed off roughly, as the minutely barbed hairs of its body may be ground into the skin, causing a sore much like a burn that often takes weeks to heal.

LEECHES

Leeches are common throughout most of the islands in the Southwest Pacific, and the Malay Peninsula. They are found in swampy areas, streams, and moist jungle country. In these areas they are found not only in the water but also clinging to vegetation. They are not poisonous, but their bites may become infected if not cared for properly, and the small wound* that they cause may provide a point of entry for the organisms which cause tropical ulcers or "jungle-sores." One should watch for leeches on the body and brush them off before they have had time to bite. When they have taken hold, they should not be pulled off forcibly, but rather made to release themselves and drop off by touching them with a moist cud of tobacco (this is especially effective if some red pepper is mixed in the tobacco), by touching them lightly with the burning end of a cigarette or a coal from the fire, or by dropping some alcohol on them. Leeches try to reach mucous membranes and frequently enter the rectum or penis without attracting attention until an itching sensation begins. Urination usually removes them immediately from the penis, but medical help may be needed to remove one from the rectum. After being satiated, however, leeches frequently leave the rectum with an evacuation. This may produce a certain amount of blood flow that may be mistaken for the beginning of dysentery, but

* In this connection, it may be cited here that open sores and scratches can become easily infected in the Tropics, and measures for disinfection should be promptly taken.

its short duration will remove all fears on that score.

POLLUTED WATER

Dysentery, which with malaria constitutes the twin ailments of the Tropics, is usually acquired through drinking polluted water. Pollution has nothing to do with the clearness or muddiness of the water. It is the result of contamination by human beings, and much of the water is polluted. Water from all "lived on" small streams or native wells should be avoided. The muddy water of large rivers frequently can be used with safety. The safest procedure, of course, is to boil all drinking water, at least 20 minutes to be on the safe side, unless the purity of the source can be ascertained with certainty.

POISONOUS PLANTS

Another category of fictitious dangers lies in the poisonous plants and trees. Such tales are of all degrees of frightfulness, from the man-eating Madagascar tree to the legendarily deadly Upas tree which, while incapable of affecting men or animals at a distance -- a trait attributed to it by Javanese tradition -- contains a sap which is poisonous when used on the projectile points of the natives. The truth of the matter is that nettles, particularly tree nettles, are about the worst that one will encounter, and one stinging from this source is sufficient to educate the victim to a ready recognition of the plant so that the mishap does not occur again. There are some trees, called Ringas by the Malays, the sap of which affects some people in much the same way as poison oak. Our own poison ivy and poison sumac, however, are much worse and much more likely to cause trouble. Danger from poisonous plants is much greater in Golden Gate Park, San Francisco, or in the woods of our own eastern seaboard, than it is in New Guinea or the Tropics anywhere. Thorny thickets, such as rattan, should be avoided as one would avoid a blackberry patch.

CLIMATE

Tropical climate is also frequently maligned. It is true that the climate as a whole is much warmer than that of the temperate zones, but it is not because one gets so much hotter in the Tropics than elsewhere that the idea of excessively high temperatures has gained credence; rather it is because the heat is more continual and persistent. In regions where the air is humid, the heat may seem more oppressive than it actually is. As a matter of fact, however, tropical travelers often complain that they have never experienced such heat and discomfort in the "jungles" as in some of our own cities in the summer time -- Washington, D. C.,for example. Conversely, there may be more suffering from cold in the Tropics than from heat. Of course at ordinary altitudes low temperatures do not occur, but chilly days and nights are far from uncommon. At higher levels the nights may even be cold. The contrast between hot days and cold nights, however, is not as marked in forested areas as in the desert.

Tropical rain is another subject generally mentioned. It certainly is true that precipitation in many parts of the Tropics is much greater than that in all but a few areas of the temperate zones. Tropical downpours usually are followed by clear skies, and in most localities the rains conform to a fairly predictable time table. Except in a few areas where the fall may be continous during the rainy season, there are not many days when the sun does not shine part of the time. Residents of the Tropics usually plan their activities so that they are able to stay under shelter during the rainy and hot portions of the day. After becoming accustomed to it, most tropical dwellers prefer the mild and equable climate of the torrid zones to the vagaries of more northern climes.

CANNIBALS AND HEADHUNTERS

New Guinea and the Solomon Islands are popularly believed to be the haunts of headhunters and cannibals. Fifty years ago this was true, and it is true today in much lesser degree in certain areas. A considerable portion of the interior of Dutch New Guinea is occupied by hostile tribes that are likely to be dangerous to small parties. This is particularly true of the natives of the interior lake plain. They are armed only with bows and arrows and are so excitable that they are prone to reveal intended ambushes by shouting or firing their arrows too soon. If attacked, a small force armed with modern weapons should be able to disperse them without serious difficulty. There still may be places in the interior of British New Guinea where the natives are treacherous, but for the most part these have been brought under control. Headhunting and cannibalism are usually practiced at the expense of traditional enemy tribes, although strangers occasionally may be attacked without provocation. For the most part, whites can get along with natives by treating them with the same respect that would be given peoples in civilized countries. This involves respect for privacy and personal property, and the observance of local customs and taboos. One should not enter a native house without being invited, nor should fruits be picked or sago trees cut without ascertaining their ownership, gaining permission, and paying for them. If one is tempted by the women of the wild tribes (and not many are likely to be), a case of venereal disease can be expected as a follow-up, this being one of the "benefits" of civilization conferred by the whites.

Apart from New Guinea, the Admiralty Islands are about the only other region in which the natives have a bad reputation. This of course refers to unprovoked attacks. Any natives may be dangerous if badly or unjustly treated, or if undue liberties are taken with their women without regard to local custom.

Those about to experience the Tropics for the first time will soon learn these facts for themselves, but a little advance knowledge may relieve them of some concern.

CORRECTIONS

CHEMICAL WARFARE

No. 14, p. 15: Reference was here made to a German "TB" hand-thrown, prussic-acid grenade. This was an error, as this is the Japanese "TB" grenade, a prussic-acid-filled glass cylinder. The Japanese "similar type" grenade also referred to is this same "TB" grenade.