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Tactical and Technical Trends

TACTICAL AND TECHNICAL TRENDS

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To facilitate the obtaining of complete reports where excerpts only are presented in the bulletin, each item will be numbered consecutively. In referring to them, it is requested that you do so by number together with the date and number of the issue itself.

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SECTION I

TECHNICAL AND TACTICAL TRENDS

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1. EMPLOYMENT OF GERMAN ANTI-AIRCRAFT
ARTILLERY AT SEVASTOPOL**UNCLASSIFIED**

The account given below describes an interesting example of the employment of anti-aircraft guns in the battle for Sevastopol. This article appeared in the German press in the middle of June, and shows clearly that 88-mm anti-aircraft guns have been used against ground targets by the German troops in Russia just as they have been by the Afrika Korps of Field Marshal Rommel.

“The battle for Sevastopol is among the hardest of the war. Here the German Command was confronted with a narrow front barricaded completely with concrete, steel, and guns. But however heavy the barrage from the massed Soviet artillery, our anti-aircraft guns succeeded in pushing through on several occasions and knocking out pillboxes at very short ranges so that our infantry could advance again. The initiative of the anti-aircraft gun crews in the battle for Sevastopol was outstanding, and one particular instance has been singled out as an example.

“A lieutenant in charge of an anti-aircraft combat detachment, who had been especially prominent in the fighting on the northern sector of the Sevastopol front, was ordered to support the infantry attack with one heavy gun and a light anti-aircraft section, firing from a gully. The tasks of these anti-aircraft combat detachments are almost always extraordinarily difficult. While the field artillery remains stationary for long periods in each position, the guns of the anti-aircraft combat groups move close behind the first wave of the infantry, and engage over open sights and at very short ranges those pillboxes and other enemy centers of resistance which the infantry cannot overcome. Since the anti-aircraft groups move normally without cover, they tend to draw the fire of all the enemy artillery. Such was the case here--and, in addition, the Soviet defenders had registered every yard of the ground.

“At first the task seemed impossible to the lieutenant. There was no field of fire for his gun from the gully, and the violent fire of the defenders made it impossible to advance. All alternative routes to the enemy pillboxes were also under heavy fire.

“Thereupon the lieutenant decided on a bold gamble. Despite the intensive Soviet fire, he rushed his gun to a suitable position and opened fire immediately. By constant change of position and by taking cover momentarily when things became too hot, he was able to maintain an almost continuous rate of fire against his targets. In this way he succeeded in knocking out six pillboxes and, in conjunction with the light anti-aircraft section, silenced a number of field works, machine-gun nests, and gun positions.

“Similar anti-aircraft combat groups were employed on a number of other sectors. In practically every instance they are the first heavy weapons to follow the infantry. Although the way is first cleared for them by the engineers, it nevertheless requires skill and coolness to take the gun through the narrow gap in the minefields, where the slightest deviation may bring disaster. Furthermore the terrain at Sevastopol is extremely difficult. The long hill-sides are covered with thick undergrowth and bushes, and bristle with pillboxes

and weapon-pits. Concealed Russian snipers will permit the antiaircraft elements to pass unmolested and then ambush the supporting units as they come up. The German infantry, following its own artillery screen on a front of a few hundred yards, is subjected to continuous Soviet attacks, supported by artillery, from the flank. In these circumstances the situation has often been saved solely by the initiative of the antiaircraft combat groups and by the high rate of fire of their guns."

COMMENT: The above account appears to indicate that the Germans, at any rate at Sevastopol, used antiaircraft guns to give close support to the infantry. The high velocity and heavy shell of the 88-mm antiaircraft gun make it a formidable weapon against pillboxes and similar types of concrete defenses. (See this publication No. 5, page 39 for the account of the siege of Sevastopol.)

ANTITANK (TACTICAL)

2. RUSSIAN EMPLOYMENT OF ANTI-AIRCRAFT GUNS AGAINST TANKS

Like the Germans, the Russians have found that it is profitable to allot antiaircraft guns a secondary mission of antitank defense. The following comments on antitank employment of these guns are taken from a recent issue of the semiofficial "Red Star."

"In the Russo-German War the Red Army antiaircraft artillery has learned to combat tanks as well as planes. Dual-purpose antiaircraft guns make good antitank guns because of their high muzzle velocity, high rate of fire, and 360° traverse.

"In the first 6 months of the war, Red Army antiaircraft artillery fired in self-defense at enemy tanks which broke through to the battery positions. Gradually, however, the antiaircraft artillery became an organic part of the antitank defensive system. In numerous instances, Russian antiaircraft guns have successfully repulsed attacks of large tank units.

"The antiaircraft units learned that most tactical operations seem to divide themselves into two phases. In the first phase, Russian army artillery concentrates heavy fire on enemy tanks before they can jump off. It then lays down a screen of fire to prevent the enemy tanks from approaching the Russian forward line of defense and breaking up infantry formations. In this stage the antiaircraft units are busily engaged in repelling the attacks of enemy aircraft, particularly dive bombers, which attempt to open the way for the tanks.

"In the second phase, after German tanks have broken into the initial line of defense, or deeper, the German aviation generally shifts its attention to Russian units reserved for counterattack. In this comparative lull, antiaircraft guns fire at the German tanks by direct laying; the shorter the range, the more effective the fire.

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"It must always be remembered, however, that the first mission of antiaircraft artillery is defense against planes. In areas where there is insufficient antitank artillery, antiaircraft guns must be employed to drive off tanks which approach the battery positions or threaten to break up the battle formations of Russian troops.

"In order to combat enemy mechanized forces successfully, the anti-aircraft artillery must prepare its antitank defense in advance. When the guns go into position they must be ready to open fire against attacking tanks immediately. To establish such a system it is necessary to:

- 1) Make a complete study of the surrounding terrain, with particular regard to possible tank approaches;
- 2) Determine the sector of fire for each gun, including ranges to key reference points;
- 3) Build the minimum amount of field fortifications necessary;
- 4) Establish special antitank observation points.

"All antiaircraft personnel not working at the guns during a tank attack take up positions in the vicinity and use hand grenades, gasoline bottles, or small-arms armor-piercing bullets against the enemy tanks."

ANTITANK (TECHNICAL)

3. NEW GUERLICH-PRINCIPLE GERMAN ANTITANK GUN

A captured document dated January 1942 refers to the introduction of a new antitank gun, the 42-mm Pak 41.

Examination of ammunition recently captured in the Middle East shows that this is a tapered-bore gun, the barrel tapering from 42 mm. at the breech to 28 mm. at the muzzle. Both HE and AP are fired, as in the case of the earlier 28/20-mm antitank gun, Model 41.

In this new weapon, it is interesting to note that the Germans are persevering with the Guerlich principle of a tapered bore.

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4. ORGANIZATION AND IDENTIFICATION OF GERMAN ARTILLERY UNITS

In the German Army, all artillery, apart from the relatively small divisional allotment, belongs to the GHQ pool (Heerestruppen). From this pool, units are allotted to army groups or armies according to the estimated needs. They may be suballotted, for shorter or longer periods, to divisions or corps, in both cases normally being placed under the immediate control of special artillery commanders and staffs, also provided from the GHQ pool.

With the exception of artillery commanders and staffs, and artillery observation units, no two artillery units, regardless of type, bear the same number. The following brief notes will indicate the possible variations in composition and allocation of artillery.

(a) Division Artillery --The division artillery regiment varies in composition according to the type and manner of employment of the division, as follows:

(1) Panzer divisions -- The artillery regiment consists of three battalions ("I" and "II" equipped with 105-mm gun-howitzers, and "III" with 150-mm howitzers). In some cases, III Battalion was previously an independent battalion in the GHQ pool, carrying a number in the series 401-450 or 601-650. Documents from the battalion files may therefore sometimes lead to an obsolete identification. In a task force, the artillery regiment may be reinforced by one or more units of GHQ artillery or other arms, such as army antiaircraft or smoke units.

(2) Motorized divisions --The artillery regiment is organized on the same lines as that in the Panzer division, and in a task force may be reinforced in the same manner.

(3) Light divisions --The organization of the artillery in the light division is believed to be still in the experimental stage, and cannot, therefore, be detailed as yet.

(4) Mountain divisions --The artillery regiment is organized in four battalions: I, II, and III equipped with 75-mm mountain howitzers, and IV with 105-mm mountain howitzers. In a task force, it may be reinforced from the GHQ pool.

(5) Infantry divisions -- The artillery regiment consists of four battalions: I, II, and III equipped with 105-mm gun-howitzers, and IV with 150-mm howitzers. Those infantry divisions, however, which formed part of Germany's peacetime army received their medium battalions, on mobilization, from the peacetime medium regiments, which consisted of the horse-drawn I Battalion and the motorized II Battalion. In most cases the motorized battalion and regimental headquarters were withdrawn to the GHQ artillery pool. The horse-drawn battalion was incorporated into the divisional light artillery regiment, but retained its original battalion and regimental numbers. In the 1st through 36th Infantry Divisions, the medium regiments were designated by a number equivalent to the sum of 36 plus the number

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designating the division; in the 44th, 45th, and 46th Infantry Divisions the medium regiments were designated by a number one higher than that of the light artillery regiment. The number designating the light artillery regiment was the same as the number of the division in the 1st through 36th Infantry Divisions; in the 44th, 45th, and 46th divisions, however, the number did not so correspond. Thus, after mobilization the artillery regiment of the peacetime 33rd Infantry Division was the 33rd Artillery Regiment, consisting of three light battalions and one medium battalion, designated respectively "I, II, and III Battalions, 33rd Artillery Regiment," and "I Battalion, 69th (i.e., 33 plus 36) Artillery Regiment."

In a task force, the division artillery regiment may be reinforced from the GHQ pool.

(6) Infantry divisions in defensive sectors--A division responsible for the defense of a sector (e.g., on the Channel Coast) may have its artillery modified to suit the local conditions. For example, part of the division regiment may be transferred elsewhere, for service in the field; equally, one or more units of coast defense or railway artillery from the GHQ pool may be incorporated (for the period of their tour of duty in that sector) in the division. In such cases, the units concerned retain their original numbers, but come under the ban against display of division numbers. Their shoulder straps and vehicles, therefore, will no longer serve to identify the unit.

(b) Artillery commanders --When the division artillery regiment is not reinforced from the GHQ pool, its commander is known as Artillerieführer (Arfü); he is also the division artillery commander. Whenever GHQ artillery units are attached to the division--in effect, whenever it is attacking--the Arfü is sometimes subordinated to an artillery commander (Artilleriekommandeur, abbreviated Arko), whose small special staff is supplemented in action by the larger staff of the organic artillery regiment. An Arko may also be assigned to command an allotment of artillery to corps. In this case a GHQ artillery regimental staff and an artillery observation unit are regularly included in the allotment. The following grades in the chain of artillery command have been identified:

(1) At GHQ--The artillery general at GHQ (OKH/Gen. d.Art.) is the principal adviser on the employment of artillery, and units from the GHQ pool are probably allotted to army groups and armies on his recommendations.

(2) At army-group and army Hq --The artillery general at army-group or army Hq (Stoart--artillery staff officer), or in a coastal sector (General der Küstenartillerie), advises the commander on all artillery matters, and recommends the suballotment of GHQ artillery units to lower units.

(3) Within army group and army--It is believed that each army group has one senior artillery commander (Höherer Artilleriekommandeur, abbreviated Höh.Arko) and staff, available to exercise command

over GHQ artillery units operating in an area larger than that of a single army corps.

(4) Under corps --An Arko (with staff) acts as the equivalent of an artillery commander whenever necessary, but a corps which is not in action may merely have a relatively junior artillery staff officer (Stoart) at corps Hq.

(5) Under division --An Arko (with staff) acts as the equivalent of a division artillery officer when assigned to a division in action.

(6) The Höh. Arko staffs carry numbers in the series 301 and upwards; the Arko staffs carry numbers in two series, 1-44, and 101 and upwards. There is no apparent connection between one of these numbers and that of the unit with which the commander concerned is for the moment operating.

(c) GHQ artillery--The heading Artillerie covers, in addition to the special commanders and staffs detailed under (b) (3)-(5) above, the following organizations, all of which wear the distinctive red piping of the artillery:

(1) Artillery regimental staffs--These include the staffs of the peacetime division medium regiments (Nos. 37-72, 97, 99 and 115--it is not known if the whole series was ever filled), and special staffs formed on or after mobilization (carrying numbers above 500). Most of the latter are independent staffs, with no battalions carrying the same number. Apart from coast-defense staffs, all GHQ artillery regimental staffs are fully motorized.

(2) Battalion staffs --There are a number of independent battalion staffs, the function of which is to administer and control independent GHQ medium, heavy, or superheavy batteries (motorized or railway) or coast defense batteries.

(3) Battalions and batteries--These include light, medium, heavy, and superheavy units, and may be horse-drawn, motorized, tractor-drawn, self-propelled, railway, or fixed artillery. The numbers allotted to them have no necessary connection with their particular type, though certain groups of coast defense artillery batteries which are equipped with weapons of the same type carry adjacent numbers (e.g., 996-998, coast defense batteries equipped with French 155-mm guns). The motorized II Battalion of the peacetime medium regiment invariably consists of three four-gun batteries, but many of the battalions formed on or after mobilization may have three-gun batteries, and heavy or superheavy batteries may include two guns only, or even one.

(4) Armored assault artillery --Armored assault artillery battalions are assigned vacant numbers in the series 151-250, and independent armored assault artillery batteries carry numbers above 650.

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The battalion consists of an unnumbered Hq (Stabsbatterie) and three four-gun batteries. It is equipped with the 75-mm assault gun (Sturmgeschütz) on a self-propelled mount (see Article No. 5, this issue).

(5) Artillery observation battalions--The artillery observation battalions (Beobachtungsabteilung) are part of the GHQ pool. However, an armored artillery observation battery (Pz. Boeb. Battr.) is normally organically assigned to the division artillery regiment of the Panzer division. These batteries carry numbers in the series 320-350, which have no apparent relation to the regiment to which the battery is assigned.

(d) Other units--During the course of a given operation, the artillery commander may control units other than artillery proper. They will be classified on organization charts under the following headings:

(1) Panzerjäger--Tank destroyer units are usually an independent command, but some units such as a battalion, company, or platoon of GHQ antitank troops may be found under an Arko.

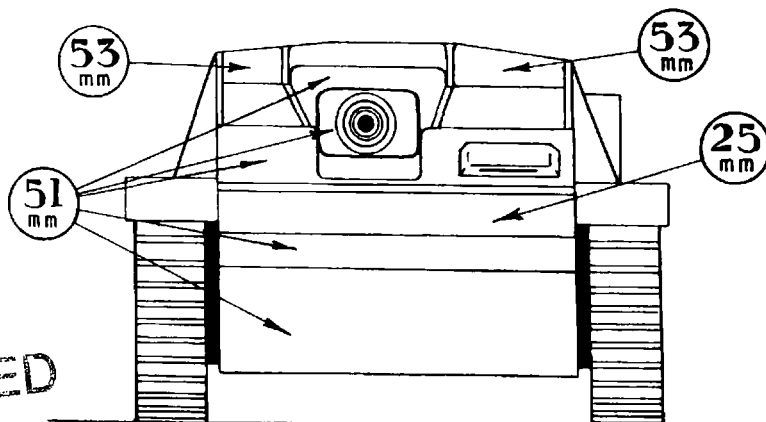
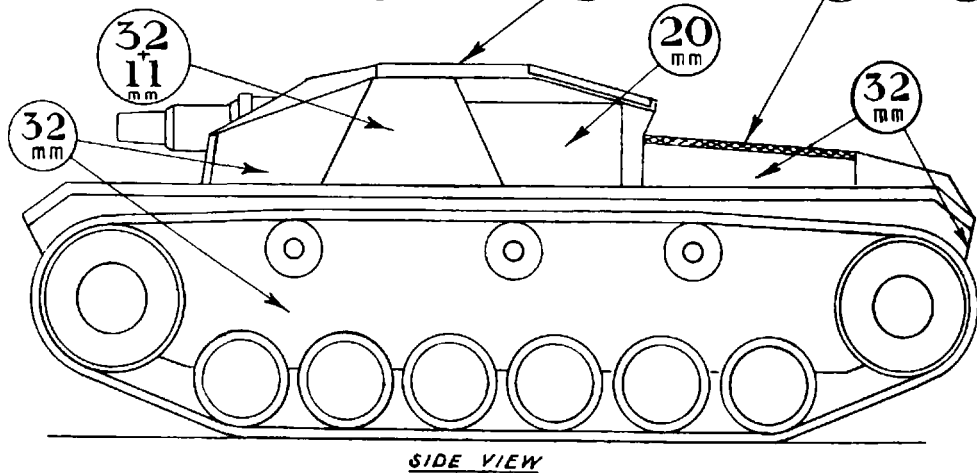
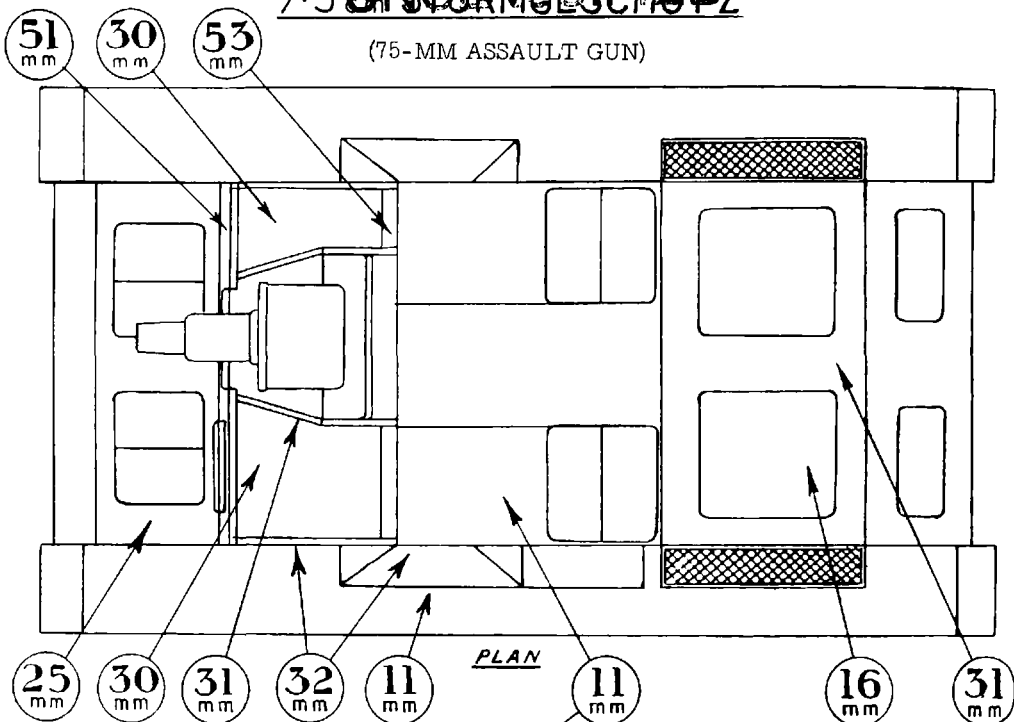
(2) Nebeltruppen--A regiment, or a regimental staff and one or more battalions of smoke troops, will regularly be found with a corps operating in the spearhead of an attack.

(3) Heeresflak--As a general term, Heeresflak designates: (a) Fla-Bataillone--antiaircraft battalions which belong to the infantry, and are therefore organically part of the ground forces and wear white piping; and (b) Heeresflakabteilungen--antiaircraft battalions which belong to the artillery and are therefore part of the ground forces and wear red piping. A Fla battalion or company, or a Heeresflak battery, may be under the command of the Arko.

(4) Luftwaffe--German air force antiaircraft units may provide additional antiaircraft reinforcement. It is Luftwaffe antiaircraft units which comprise the main German antiaircraft arm. Their total strength has been estimated at 1,000,000 men, whereas the Heeresflak units mentioned above consist of a relatively few independent battalions.

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(75-MM ASSAULT GUN)



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FRONT VIEW

5. GERMAN 75-mm ASSAULT GUN

This assault gun is a self-propelled gun mounted on a standard Mark III tank chassis. In 1940 a relatively small number took part in the Battle of France and it was first used extensively in the summer of 1941, when it played an important tactical role in the first battles on the Russian front.

The guns are organized into independent battalions, although it is now possible that they are organic within the motorized and Panzer divisions and are attached to front-line infantry divisions. Normally only direct fire is used.

An assault gun captured in the Middle East is described below.

The gun and mount weigh about 20 tons.

The gun itself is the short-barreled 75-mm tank gun originally mounted in the Mark IV tank. The range drum is graduated for HE up to 6,550 yards and for AP up to 1,640 yards. Elevation and traverse are hand-operated. Some other details are these:

Length of bore	23.5 cal.
Muzzle velocity (estimated)	1,600 f.s.
Elevation	20°
Depression	5°
Traverse	20°
Weight of projectiles	
HE	12 lb. 9 oz.
Smoke	13 lb. 9 oz.
AP (with ballistic cap)	13 lb. 9 oz.
AP (hollow charge)	not known
Estimated penetration of AP (with ballistic cap)	55 mm. (2.16 in.) at 60° at 400 yds.

It is believed that this low-velocity gun is being replaced by a high-velocity 75-mm gun with a reported length of bore of about 43 calibers. The Germans are also apparently making a similar change in the armament of the Mark IV Tank. (See this publication No. 4, page 15.)

As stated above, the hull is that of the standard German Mark III tank with normal suspension system. The turret has been removed. The length is 17 ft. 9 in., height 6 ft. 5 in., and width 9 ft. 7 in. In general the armor is 51 mm. (2 in.) at the front and 32 mm. (1.25 in.) on the sides and at the rear. An added 53-mm plate is fitted to the rear of the front vertical plate, apparently between the driving and fighting compartments, and is braced to the front plate by two 31-mm. plates, one on each side of the opening for the gun. For detailed arrangement of armor plate see accompanying sketch.

The sides of the hull are reported to be vulnerable to the British 40-mm antitank gun at 1,500 yards, but this gun can penetrate the front only at very short ranges, and even then only the driving compartment.

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The engine is a Maybach V-12 -type rated at 300 horsepower. The gears provide for six speeds, and steering is hydraulically controlled. The capacity of the gasoline tank is 71 gallons, which is consumed at the rate of about 0.9 miles per gallon at a cruising speed of 22 miles per hour. The radius of action is about 70 miles, the maximum rate of speed about 29 miles per hour.

As in German tanks, this vehicle is equipped to carry extra gasoline in a rack on the rear of the vehicle, which should hold about 10 standard 5-gallon gasoline cans.

The captured vehicle contained metal boxes for 44 rounds of ammunition, and 40 rounds were stacked on the floor at the loader's station. Ammunition is also carried in an armored half-track which tows an armored ammunition trailer. There was also a rack for 12 stick grenades, and the usual smoke-candle release mechanism for 5 candles was fitted to the rear. For communication there were two radio receivers and one transmitter. For observation a scissors telescope was provided.

As spare parts the 11-mm. sloping plates over the track guard (see sketch) carried two spare bogie wheels on the right side and one on the left side. Two spare torsion rods were also carried, one in each side of the hull above the bogies.

The crew consists of four men -- a commander, gunner, loader, and driver.

CHEMICAL WARFARE (TECHNICAL)

6. JAPANESE TOXIC SMOKE CANDLES

Certain aspects of Japanese chemical warfare have been summarized in a recent report.

A Japanese manual dealing with operations in the Southwest Pacific specifically refers to the possibility of the use of gas by Britain, the United States, or the Netherlands. The intention of the Japanese may be to use this "possibility" as a justification for initiating the use of gas themselves.

Some Japanese gas masks with service containers have been recovered, and many notebooks have been captured in which the gas-mask number of each member of the unit has been recorded. Small containers holding a cleansing powder similar to British antigas ointments, and a pouch containing chloride of lime, have also been recovered. The cleansing powder is issued to each man, the chloride of lime to squads or larger units to be carried by the "antigas" NCO or private.

From this it will be seen that the Japanese are definitely prepared for

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defense against gas. Their gas masks and other equipment are, of course, equally necessary if they are to use gas offensively.

The Japanese possess, and have provided the Burma traitor army with toxic smoke candles containing an arsenious compound which causes severe irritation to the nose and throat. It is not lethal and the effects pass off in 2 or 3 hours.

The Chinese have reported the use of "poison gas" in Burma. It is known that the toxic smoke candles mentioned above have been frequently used by the Japanese in China.

The Japanese toxic smoke candles described below were captured in Burma and presumably are the same as those containing an arsenious compound and mentioned above.

The candles are of two types, hand-thrown and charge-propelled.

(a) Hand-Thrown Type.

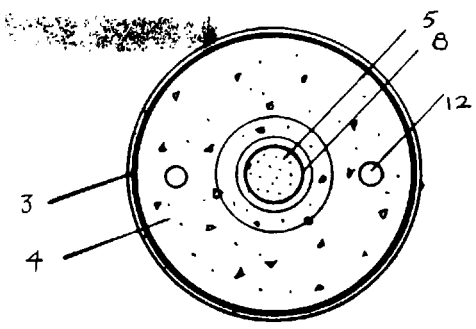
A preliminary examination shows that this candle contains a mixture of nitrocellulose, camphor, and diphenyl arsenic acid. The mixture is ignited by means of a matchhead and friction striker, and after a delay of 3 to 4 seconds the diphenyl arsenic acid is evolved in the form of a toxic smoke.

Diphenyl arsenic acid is a nose irritant about one-fourth as irritating as diphenylchlorarsine. As in the case of other toxic smokes, if the smoke is breathed before the mask is adjusted, the effects persist for some time after protection has been gained.

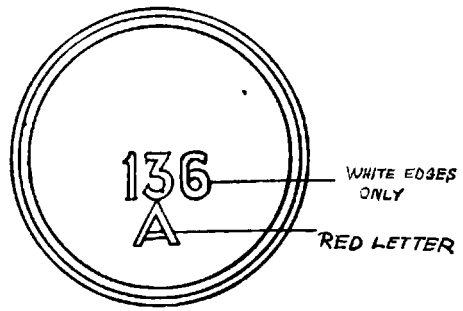
This type of candle is cylindrical in shape, about 7 inches long, and 2 inches in diameter. (See accompanying sketch and legend.) The weight is about 9 ounces. It is painted bluish gray with a red band, one-third of an inch wide, about 1 1/2 inches from the top.

Legend, hand-propelled type:

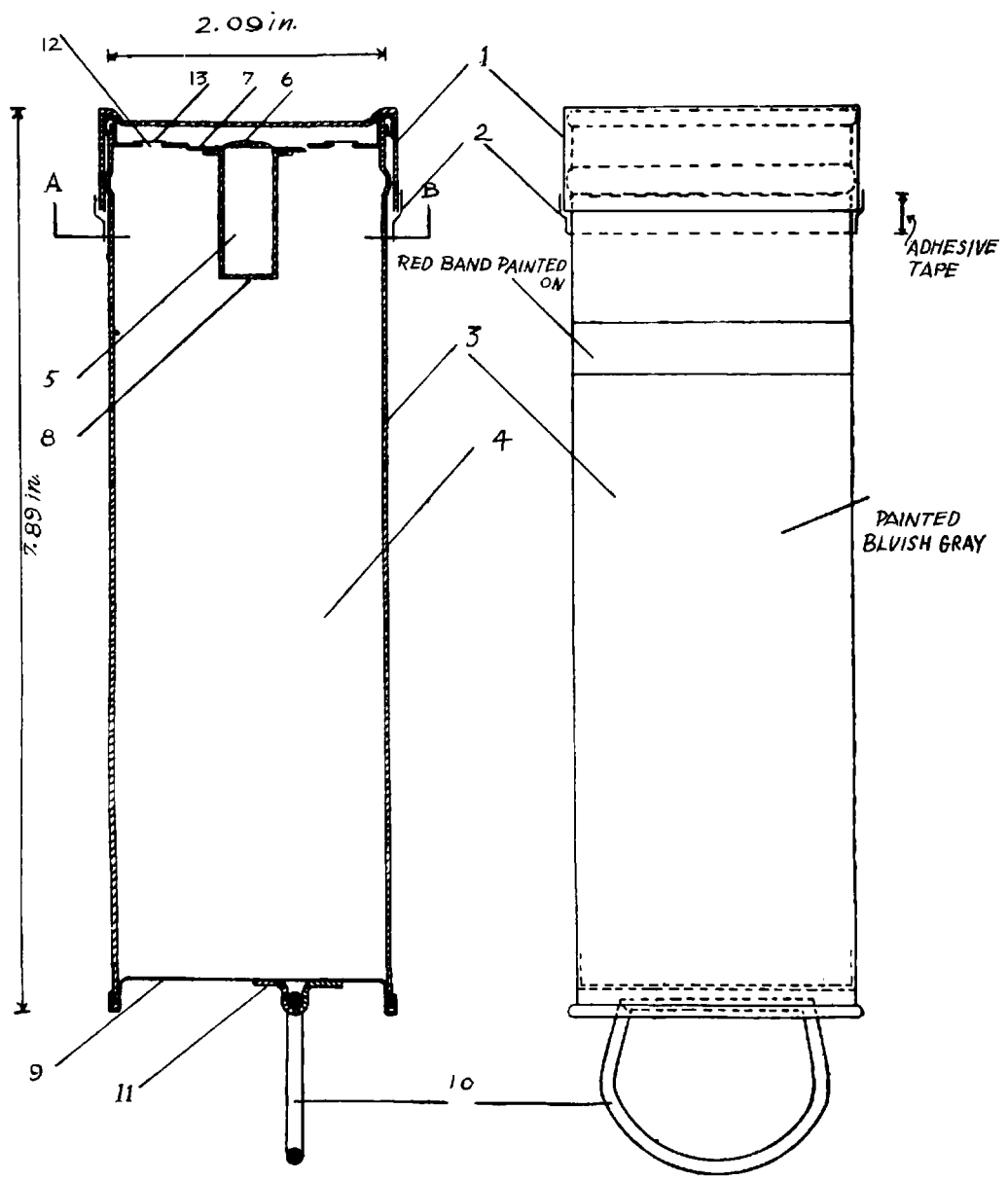
- | | |
|---|-----------------------------------|
| 1. Lid with lettering "136A." | 8. Leadfoil cover. |
| 2. Adhesive sealing tape. | 9. Bottom of container. |
| 3. Cylindrical container, wall thickness
0.0124 in. Painted a bluish gray color. | 10. Handle, diameter
0.116 in. |
| 4. Charge. | 11. Handle clip. |
| 5. Fuze. | 12. Smoke vent. |
| 6. Ignition cap. | 13. Tinfoil covering
for vent. |
| 7. Tinplate diaphragm. | |



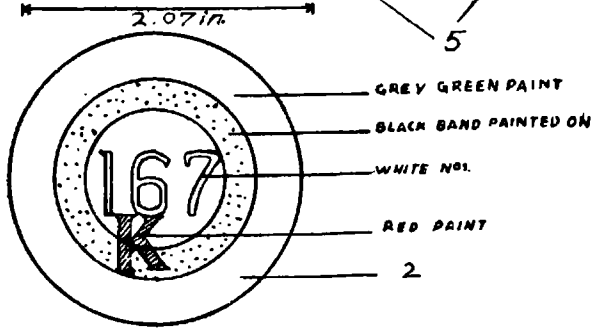
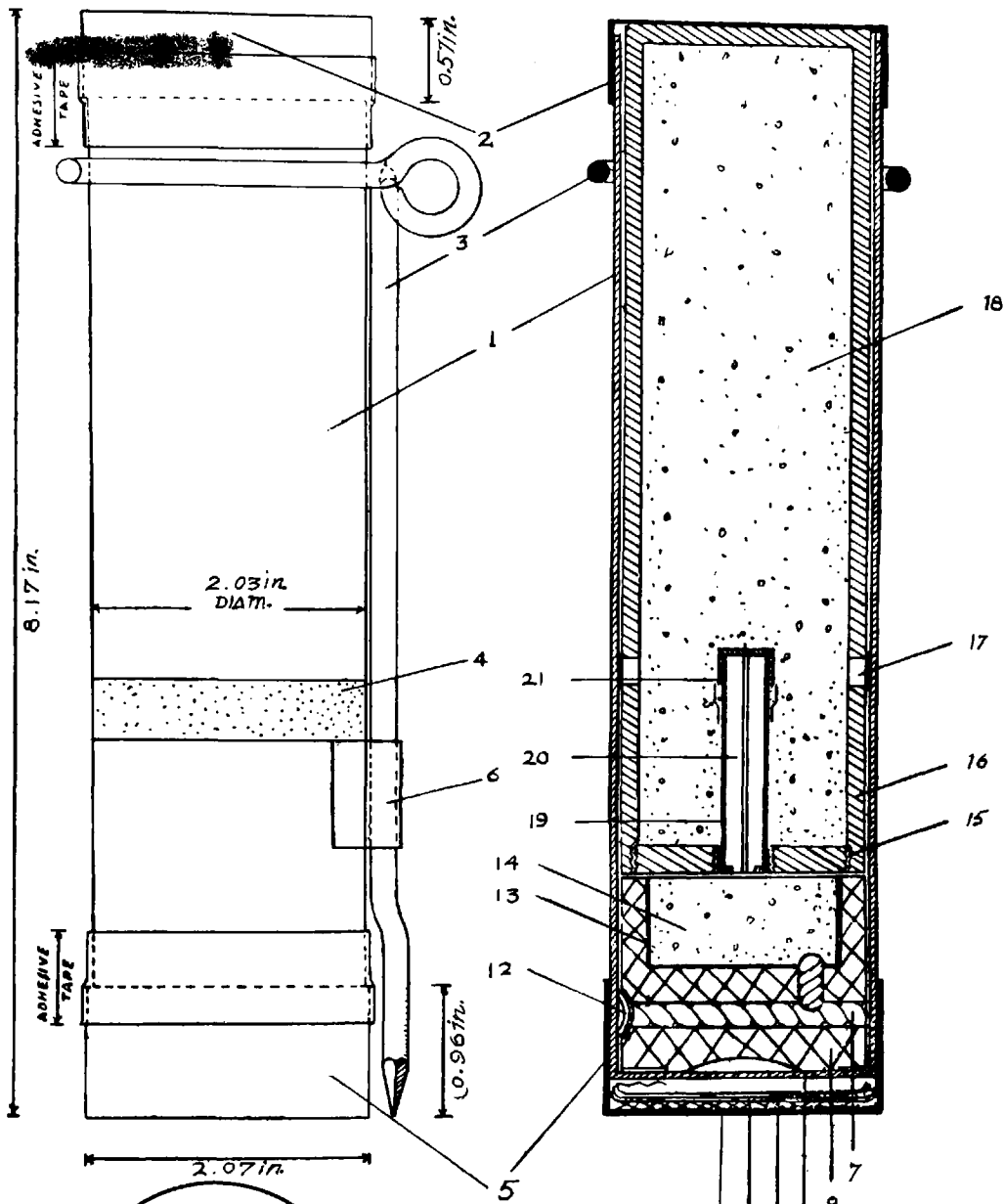
PLAN AT "A-B" (WITHOUT LID)



TOP COVER



JAPANESE SMOKE CANDLE--HAND-THROWN



TOP COVER

JAPANESE SMOKE CANDLE--CHARGE-PROPELLED

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(b) Charge-Propelled Type.

This candle is said to contain a composition similar to that in the hand-thrown candle.

It consists of an outer cylinder 8 inches long and 2 inches in diameter, and is painted a greenish gray color with a half-inch red band about 3 inches from the bottom. (See accompanying sketch and legend.) It contains a propelling charge, and an inner container which is the candle proper. The whole assembly is supported in an inclined position by means of an attached spike which is stuck into the ground.

The propelling charge is ignited through a time fuze by means of a friction striker and matchhead. As the inner container is ejected, the flash of discharge ignites the smoke composition in this container through a fuze of 4 to 5 seconds delay.

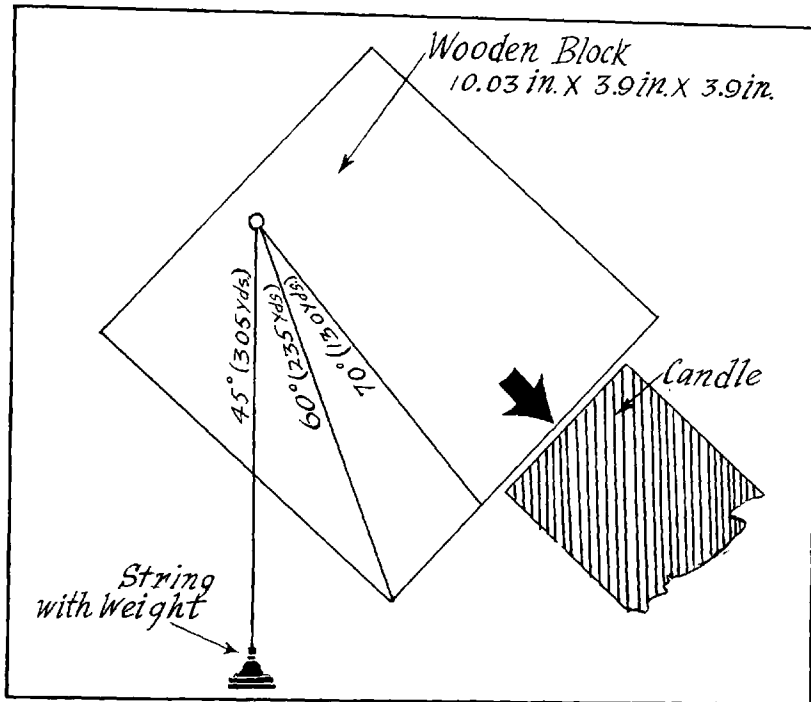
Legend, charge-propelled type:

- | | |
|--|--|
| 1. Outer container, wall thickness 1 mm. (0.039 in.). Painted a greenish gray color. | 10. Two cardboard packing disks. |
| 2. Top lid with lettering "167 K" sealed with adhesive tape. | 11. Wooden disk with abrasive edging. |
| 3. Spike used to set up the candle. | 12. Ignition cap. |
| 4. Painted red band. | 13. Cylindrical steel pan for powder propellant. |
| 5. Bottom lid sealed with adhesive tape. | 14. Propellant. |
| 6. Clip securing spike to candle. | 15. Screwed base of inner container. |
| 7. Fuze. | 16. Inner container, wall thickness about 2.5 mm. (0.098 in.). |
| 8. Wooden block drilled for fuze with positioning slot at bottom. | 17. Smoke vent. |
| 9. Bottom of outer container with slot at center for positioning wooden block. | 18. Charge. |
| | 19. Fuze tube. |
| | 20. Fuze. |
| | 21. Lead cover. |

See next page for sketch of device used for setting the charge-propelled smoke candle at the proper angle for the range desired.

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ANGLE MEASURING BLOCK FOR USE WITH JAPANESE
CHARGE-PROPELLED SMOKE CANDLE



ENGINEERS (TACTICAL)

7. GERMAN METHODS OF CAMOUFLAGE

Modern methods of air operations--including developments in aerial photography--have enormously increased the importance of camouflage.

In the last war the air was used more for reconnaissance than for bombing, and consequently troop movements were more important to conceal than factories and airdromes. It has needed the intense bombing attacks of this war to develop the art of concealing large structures such as railway stations and hangars.

The Germans have evidently studied the problem very closely, and with their usual thoroughness have resorted to elaborate schemes of concealment and deception wherever they consider such measures justified by the importance of the target. Thus it is now becoming the rule rather than the exception to see landing fields and airdromes presenting from the air the most convincing

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impressions of woods, roads, ditches, hedges and cultivation patches. Brown, light green, and yellow substances are sprayed over the ground to give the effect of plough or vegetation. Dummy farms and other buildings are disposed around airdromes to conceal workshops or isolated aircraft outside their hangars, while papier-mache cows and beds of real flowers are used to add a convincing note. Dummy cottages are erected or painted on the tops of hangars, the vertical sides of which are sloped off by a lattice of steel wires garnished with green-dyed jute, sometimes shaped possibly to resemble trees. Great attention is always paid to changing the color of the garnishing by spraying so as to correspond with the changing colors of the seasons.

It is well known that Berlin has been extensively camouflaged, not only the city itself but also the outskirts. One example is the most important distinguishing landmark in Berlin, namely the wide avenue running east and west through the city and called the "Axis". The pavement of this avenue has been sprayed with a dark green paint to blend with the trees in the Tiergarten (a large park), along the avenue and throughout the western section of the city. The Victory Monument (Siegessäule), in the center of a circle on the Axis, has been painted with a dull color so as not to reflect light. An overhead cover of wire matting, interwoven with green materials to resemble vegetation, covers the avenue for a considerable distance. The wire netting is about 18 feet high and is interspersed with artificial shrubs and trees. About every 30 yards the coloring and texture of the greenery has been changed. To eliminate shadows, netting has also been hung from the sides at an angle of about 20 degrees.

To create an opposite effect namely to simulate a street where in fact there is none, wire netting has also been used. These dummy streets are frequently connected with the real ones which then disappear into artificial woods. In one instance it is reported that a "woods" was created by fastening artificial sprigs about 1 foot high and about 1 to 2 inches apart to a wire net. Through these "woods" a system of "roads" was painted in brown on the mesh of the net.

In Berlin many important buildings have been camouflaged by covering them with nets, and by placing artificial barns, farm buildings, and trees on the roofs.

It has also been reported that dummy installations on a very large scale have been erected at a distance of about 40 kilometers from the center of Berlin in an area about 400 kilometers square. These dummies include not only structures simulating railway stations, etc., but also installations to give the effect of city lights, and for causing fires to give the impression of effective bombing.

The principal railway station at Hamburg had a complete false roof built over it in the shape of a small hill. This false roof was completely covered with material resembling green grass, and artificial paths were made over the "hill". A hangar at Rheine in Northwest Germany had no other form of camouflage than two dark patches painted on top of the northern edge. These

patches combined with the shadow to break up the regular shape of hangar and shadow together. Painted disruptive camouflage of this type is very simple, and surprisingly effective when viewed under favorable lighting conditions.

Camouflage of a landing-field surface is begun at the earliest possible moment, even when extensive construction work is still going on. A good example of this is at Laval, south of Cherbourg, where the excellent camouflage of that area of the landing ground which is now finished could only have been carried out under considerable difficulty, in view of all the other levelling and drainage work involved.

Water is recognized as an easily distinguishable landmark, and lakes and canals in important industrial areas are covered by rafts and netting, painted to blend with the surroundings.

The importance of avoiding regular outline is appreciated, and applied not only to the breaking up of the form of large buildings, but also to the parking of motor transport.

Though considerable effort is apparently devoted to training the individual soldier to camouflage himself by the use of whatever material he may find, comparatively little information has come in concerning the methods adopted by German troops in European campaigns. There are two reasons for this: first, they have almost always been on the offensive, so that the necessity of constructing and concealing defensive positions has not arisen very frequently; and second, they have, at least until recently, enjoyed air superiority, so that the need of concealing themselves from air observation has hardly been felt.

Considerable ingenuity was shown in Poland and France in concealing minefields and artillery, but disruptive painting of motor transport and armored vehicles was apparently little practiced. The use of dummy positions appears to have been very common. Field guns were concealed in dummy haystacks, antitank guns and limbers were disguised as carts and even driven by soldiers disguised as civilians. On the other hand parachutes with straw dummies attached and canisters with bogus instructions were dropped to create alarm. There appears, in fact, to have been a frequent offensive use of camouflage to enable all kinds of ruses to be carried out.

German practice in Libya was affected by lack of unchallenged air superiority and by the fact that they have had to engage in positional warfare. Much ingenuity in concealing weapons, war materials, and minefields has been shown, aided very frequently by the favorite German method of using dummies.

In the desert more attention has had to be devoted to concealment from the air, which has been achieved in two ways. Either vehicles and war material are camouflaged with nets or local material, or else resort is had to wide dispersion. At first dispersion was bad owing to lack of training, but lessons have been quickly learned and dispersion is now generally excellent. The use of dummies is very frequent and popular.

In Section II of this publication, the report of the encirclement of Kiev mentions the use of this stratagem and its importance in the tactics adopted. Here, it is to be observed that dummies simulating boats and bridging equipment were constructed by the Germans in the crossing of the Dnieper in order to deceive the Russian observers as to the area chosen for the initial crossing.

Near Capuzzo in July 1941 guns were located among abandoned Italian artillery which had been left there from previous battles. These guns were not noticed until they opened fire. It is reported that at Derna planes destroyed in previous fighting had been recovered and placed on the airdrome as dummy targets. Dummy motor transport parks and coast defense guns had been constructed. A minefield was recently camouflaged by tracks made with a spare wheel between the mines, and a British armored car was lured into it. In an Italian sector a post was found manned with straw-filled dummies in German uniforms stripped from corpses.

Most important is the use of dummy tanks. According to a prisoner these are cardboard structures built over a motorcycle, but a photograph has been captured showing one mounted on a light Volkswagen. Probably both are used. They are, of course used only at a distance, and their purpose is to draw fire, to confuse the enemy as to the probable point of attack, to conceal the fact that a real tank unit has moved, or to give an exaggerated idea of tank strength.

Disruptive painting of guns, vehicles, motor transport, and tents is apparently not very much used. There has been a report that both motor transport and tanks are painted light khaki and sometimes smeared with grease and sand. There have, however, been reports of armored cars painted dark green with yellow turrets. This, however, may have been some form of unit marking. Tents are reported to be the standard dark green color. Guns are painted yellow; the only concealment is provided by their sun-covers. Nets have recently been reported in use by the Germans, stretched over vehicles, and either pegged down or else extended outwards on poles. These nets are garnished with small bushes, and the like. A net or screen has also been used to disguise the presence of armored cars lying in ambush. Food and fuel dumps are concealed in pits about 18 inches deep, which are dug well away from any landmark, are well dispersed, and covered with nets and brushwood.

A recent report mentions a large gasoline dump camouflaged by a net or screen, behind which an enemy patrol, consisting, it is thought, of three trucks mounting guns, lay concealed. When the gasoline was fired on, the screen disappeared and fire was returned.

A report written by the commanding officer of a German infantry battalion throws interesting light on the difficulties caused by excessive orderliness of mind and lack of practice in individual concealment. He complains of the necessity of combating the herd instinct--"Not only man and beast fall victim to it, tents and vehicles do so also". He enlarges at considerable length on both the bunching and symmetrical dispersal of tents and motor transport, practices to

which the Germans are addicted. He also gives careful instructions on the construction of narrow and deep trenches, which must have no parapet and must be covered over, citing British positions as examples to be imitated.

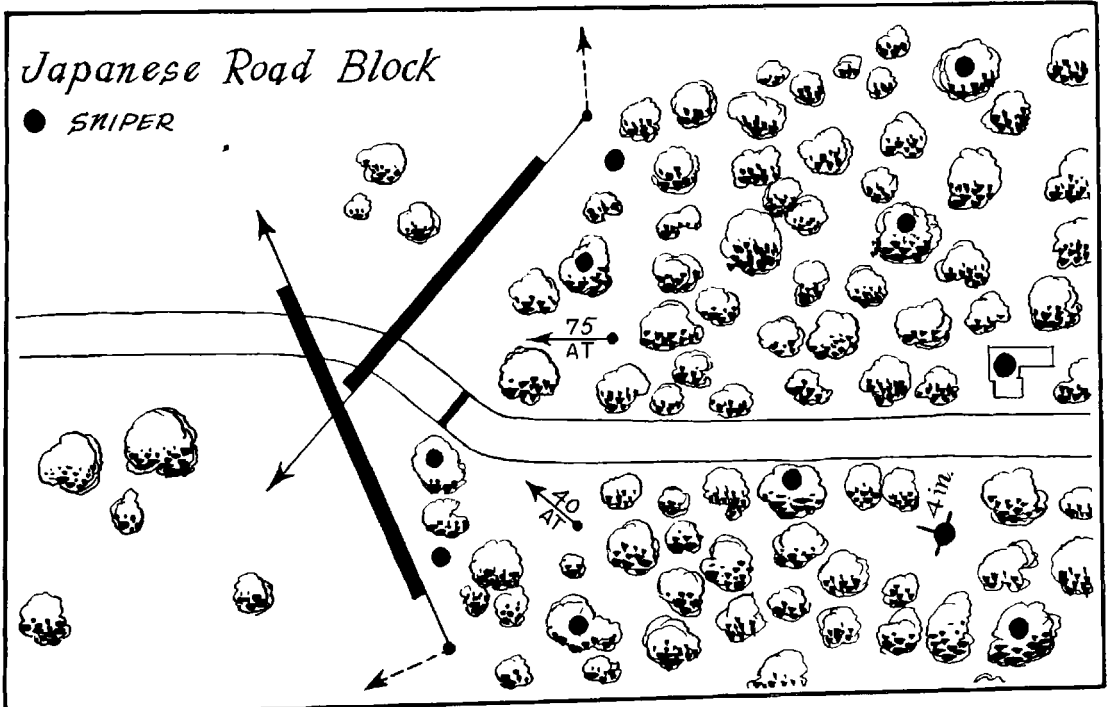
INFANTRY (TACTICAL)

8. JAPANESE TACTICS IN BURMA

The following information is based on a report by a British officer of the fighting in Burma. As will be readily seen it is not a complete analysis, but simply a collection of miscellaneous notes.

Tactically the Japanese relied for the most part on the ambush. The ambushes were generally very skillfully located, but were always on the same pattern, particularly with reference to the positions of weapons.

The chief form of enemy defense encountered was a combination road-block and ambush. The position was invariably located at a point where woods converged on the road. Covering weapons were effectively located. Light machine guns in dispersed positions were placed forward of the woods, and snipers spotted in the woods to prevent envelopment of the position. The road-



block is also covered by one or more heavy weapons. In three instances a French 75 (probably taken in Indo-China) was encountered at a road-block. In each instance the block was in a bend of the road, and the gun was placed in a concealed position off the road about 50 yards beyond the block on a line in prolongation of the original direction of the road. To knock out this gun the area may be searched with artillery and mortar fire, but its elimination is primarily an infantry task to be accomplished by mopping up the gun crew with small arms. In addition, a 37-mm antitank gun may be placed very close to the road-block, usually on the opposite side of the road to the 75-mm gun; a 4-inch mortar may be emplaced further to the rear.

The Japanese 37-mm antitank gun is only 2 feet high, being supported on small wheels. It is thus easily concealed and is usually put in position in a ditch or in the shadow of a building. It may also be found near culverts which the crews use when being shelled.

The Japanese 4-inch mortar is not as highly effective as some reports would indicate. For effect it depends entirely upon blast and its killing power is very limited. One of its chief dangers is its incendiary powers against halted vehicles. When attacked by British mortar fire, the fire of this weapon became inaccurate. If the counter-mortar fire was at all accurate the enemy moved the gun. As soon as its position has been determined, it should be overrun by infantry. When the 4-inch mortar is used in support of road blocks it is generally emplaced near the road, but farther to the rear than the 75-mm and antitank guns.

The Japanese have invariably emplaced their light machine guns a short distance in front of the forward edge of a woods. This is done in order to escape artillery or mortar fire which may be directed at the edge of the woods. The machine guns are not dug in, but they are cleverly concealed by use of background; every precaution is taken to eliminate splash. The guns are normally fired on fixed lines along the edge of the woods. In attacking the machine guns, artillery and mortar fire should start some 50 yards in front of the edge of the woods, and the leading infantry must follow the barrage as closely as possible. Any formation in line, or bunching, by the attacking infantry is suicidal. From the jump-off point until the objective is overrun the infantry must remain widely dispersed; within platoons at least one section should be held in reserve, and sections should maintain a patrol formation.

In wood and jungle fighting the Japanese snipers presented a most difficult problem. They remained at their posts with great bravery, and in the opinion of the reporting officer they had been assigned a definite time to remain there. Snipers took positions in trees, on the ground, and in houses. The elimination of snipers in trees or on the ground is the task of the individual soldier. Care must be taken not to advance in a straight line; one should get behind a tree, observe in all directions, both on the ground and up in the tree, and then move very rapidly to a tree about 10 yards to the right or left front. This

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process is repeated, and it is probable that the sniper will either be spotted or that the stalker will get behind him, and have the sniper at his mercy. Snipers posted in houses present a different problem, and experience shows that too many casualties occur if stalking is attempted. The best means of attack appears to be either to burn them out or use grenades under the protection of smoke.

The Japanese were very adept in the use of camouflage and altered their appearance according to the nature of the terrain that they were traversing. Examples of their use of camouflage were these: a green net for the helmet, long green gloves, bottle-green liquid carried to color face and rifle, different colored shirts carried by the individual soldier, and elephants colored with varying shades of green paint.

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MECHANIZED VEHICLES (TACTICAL)

9. GERMAN EMPLOYMENT OF TANKS,
AND THEIR COOPERATION WITH OTHER ARMS

The article summarized below comes from a handbook that is used in the German army, especially by officer candidates. It is called "Tactical Handbook for the Troop Commander" and was written by General von Cochenhausen.

Most of the German tanks are in the "Panzer" divisions, but Panzer divisions are organized in many ways. Some have one and some have two tank regiments. The infantry may be a rifle brigade made up of several motorized battalions, forming a regiment, in addition to a separate motorcycle battalion. There are as many antitank and antiaircraft units as necessary to meet the tactical situation. The whole organization depends on how many men or what equipment is available, on the task to be done, on the terrain and the nature of the hostile defenses.

Generally the Panzer division contains a division staff; a brigade of two tank regiments, each with two or more battalions of four companies each; a rifle brigade of one motorized infantry regiment, which also has a battalion of armored assault artillery and a motorcycle battalion; a reconnaissance battalion; an engineer battalion with combat bridging equipment; a signal battalion; an antitank battalion; an antiaircraft battalion; an artillery regiment; and all the necessary administrative, supply, maintenance, and medical troops.

In order to understand this text it should be remembered that the ways in which the Germans use a Panzer division vary according to the mission, the commander's conception of the terrain, and the nature of the hostile defenses.

TRANSLATION

"The entire force of our troops is concentrated in the attack"-- Frederick the Great

1. PREPARATION FOR THE ATTACK.

a. General. The time before an attack should be spent in studying the terrain, preparing positions, and making arrangements to work with the other arms. The study of the terrain should cover the area from the assembly position forward to the front line, and then as far as possible into the enemy's position. The tank force commander, or an officer chosen by him, should take part in this study. Aerial photographs should be used along with the map. It is important to find out the location of mines and the position of the enemy's defense weapons.

b. Surprise. Surprise is most important for a successful attack. Therefore, all preparations must be carefully camouflaged. Tank units should move at night, and in the daytime they should move only when they can be hidden from enemy airplanes. The time of the tank attack must be set so that it will come as a

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surprise. The enemy can be kept from knowing that an attack is coming by engaging him in a few local actions, as well as by camouflaging our radio communications or by keeping the radio silent.

c. Organization of the Tank Force. The tank force commander must decide in every case whether he is going to attack with his tanks in line or in column. An attack in column facilitates control, and makes it possible to maneuver tanks in any direction; to attack in line makes the enemy stretch out his defense, and supports the infantry attack over a broader front.

d. Objectives. Tanks set out to attack the enemy's infantry and infantry heavy weapons, artillery, command posts, reserves, and rear communications. But before they can get through to these targets, they must destroy their most dangerous enemy, the antitank defenses. For this reason the heaviest and most powerful tanks must lead the attack, and they must be supported by the other arms, both before and during the attack.

Only after the antitank defenses have been destroyed can the tanks go ahead. After that, the most powerful tanks should be directed to attack the points that are deepest within the enemy positions, such as artillery, reserves, and command posts. The lighter tanks attack the infantry. Each echelon of tanks should be definitely informed concerning its mission and its objective.

Tank forces are also able to seize important points, such as river crossings, and to hold them until the infantry comes up.

e. Assembly Positions. The Panzer division usually prepares for an attack in a position, not too near the battlefield, which gives cover against observation and is beyond the range of the enemy artillery. Here the troops should be told what they are to do, supplies should be distributed, and fuel and ammunition issued. If the tank force by itself cannot protect the position, the commander should see to it that the necessary supporting weapons are brought up.

The tanks can go to the attack more quickly if there are several roads leading from the position to the front, and if crossings over railroads, highways, and rivers have been constructed by engineers.

When time is the most important factor, tank units should remain in their assembly positions for a limited period, or they should move directly to the attack without stopping in these positions.

2. SUPPORT OF THE TANK ATTACK BY THE OTHER TROOPS.

a. Infantry. The infantry must direct its heavy machine guns against the enemy's antitank defenses. The other heavy weapons must fire at targets outside the area of the tank action so that they will not disable their own tanks. Signals must be arranged in advance (such as tracers, flags, and radio) so that coordination is assured.

b. Artillery. The artillery fires upon targets in front and to the flanks of the area of the tank action. It fires both high explosives and smoke, and must generally regulate its fire by time. Adjustment can be attained through the radio or the artillery liaison detail, which, riding in armored vehicles, can accompany the tanks.

c. Engineers. Engineers assist the tanks by strengthening bridges, building temporary crossings, and removing obstacles and mines.

d. Signal Troops. Signal troops keep up communications with the commanders, with the artillery, with the services, and with separate units of infantry, engineers, or the air force.

e. Antitank Units. Antitank guns must follow the tanks as closely as possible so as to be able to enter the fight immediately if enemy tanks are met.

f. Aviation. Aviation has two duties: it should serve as reconnaissance before and during the time the tanks are in action, and it should attack the enemy's reserves, especially tanks and antitank defenses, before they can come into action.

g. Rear Services. If a tank force does not have its own medical service, it should be kept in touch with first-aid stations of the assisting troops. During the battle the service troops are held in readiness well to the rear.

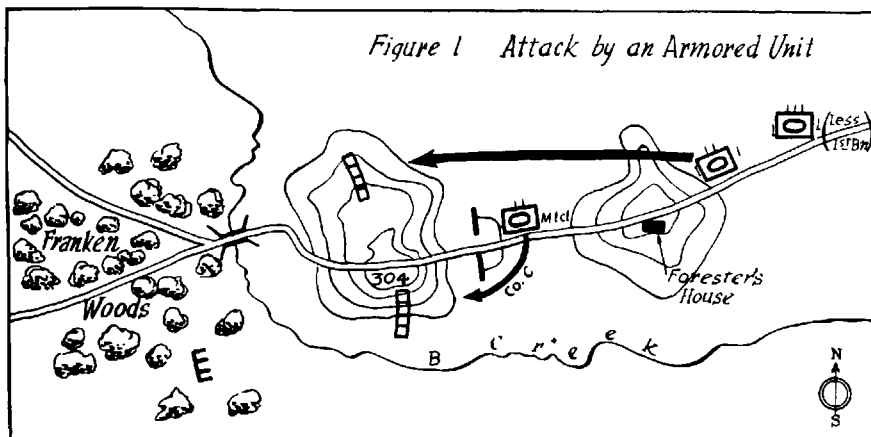
h. As soon as the tanks reach their objectives, they at once prepare themselves for a new mission. They send reconnaissance to the front and find out how far the infantry has advanced. They decide their next movement on the basis of these findings.

i. After the battle the tank force is withdrawn behind the lines and reorganized. The longer it has been in action, the longer the rest period should be.

3. EXAMPLES OF COMBAT ORDERS AND OPERATIONS.

a. General. Orders to the tank force must be kept brief and simple in all situations during a war of movement. It is enough if they tell: (1) the location and strength of the enemy; (2) the location and mission of our own troops; (3) the mission for the tank force, to include direction of attack, the objective, and sometimes the hour the tanks are to attack and their action after the attack; and (4) what support is to be given by other arms.

b. Example No. 1 (see figure No. 1) illustrates an order to a Panzer detachment in the advance.



(1) The Order. The Motorcycle Battalion has encountered the enemy and has deployed on each side of the road in front of Hill 304.

The commander of the 1st Battalion, 1st Panzer Regiment, meets the commander of the advance guard (probably the motorcycle battalion commander) at the forester's house. After receiving brief information about the terrain, he issues the following order:

“The enemy holds Hill 304. Hostile artillery, estimated to be one battery, is firing from the direction south of Franken Woods.

• “The Motorcycle Battalion deploys for attack on both sides of the road. Company C is advancing here left of the road against the southern edge of Hill 304.

“The 1st Battalion, moving north of the road, will attack Hill 304. After overcoming the resistance thereon, it will continue across B Creek to attack the enemy artillery south of Franken Woods. It will continue combat reconnaissance to the far end of Franken Woods. I want to know:

- a. When the crossing over B Creek begins.
- b. When the hostile artillery has been reached and overcome.”

(2) The Engagement. The commander of the 1st Battalion then drives to the commander of Company A and orders him to advance around the northern edge of the woods just in front of him and to attack Hill 304. He then gives the necessary commands to the other companies by radio.

While Company A is deploying, Company B, with its left flank on the road, advances against Hill 304. Company D supports the attack from the vicinity of the forester's house. Company C, forming the second line, follows Companies A

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and B, and the Battalion commander advances with it. As soon as Company A reaches Hill 304, Company D begins to displace forward to this position.

Meantime, the artillery has been definitely located south of Franken Woods. The Battalion commander now issues a new order to attack the artillery, and Companies A, B, and D proceed around Hill 304. Company C then engages the remaining resistance on Hill 304 until the motorcyclists come up from the south side. A part of Company A carries out the reconnaissance on the far side of Franken Woods.

c. Attack Against a Prepared Position. If the tanks are to attack a prepared defensive position, the commander of the force must then coordinate all the arms in his command to assist the tanks. Therefore, every arm must be told exactly what to do in an action which is intended first of all to support the tanks against the enemy's antitank weapons.

(1) Preparation. The commander tells the tank force commander about such matters as the enemy, the terrain, and the plan of attack. The tank force commander reports the results of his own reconnaissance, how he thinks the attack should be carried out, and what sort of support he wants. The commander then makes his decision and draws up the order. The tank force commander then informs his subordinates about the terrain and what he intends to do. The tank forces advance to the assembly position on the roads that the commander has assigned to them. These roads are kept free of other troops.

(2) The Tank Force Combat Order. The order should contain:

(a) Information about the enemy (his position, strength, and the location of known or suspected antitank weapons) and the position of our troops. All later messages from the front that contain information for the tanks are passed on at once to the tank force commander.

(b) Our own intentions, stated thus:

“Tank force ---- in ----, echelons ---- at (time) crosses the front line, attacks with the first echelon across ----, toward ----, advancing thence to ----. The second echelon attacks ----. After the attack the tanks will ----. (This order should give the mission and support furnished by the infantry, if a part of the tank force is not placed directly under an infantry unit or attached to it.)

(c) Artillery ----. Smoke ----.

(d) Engineers ----.

(e) Aviation ----.

(f) Signal Communications ----.

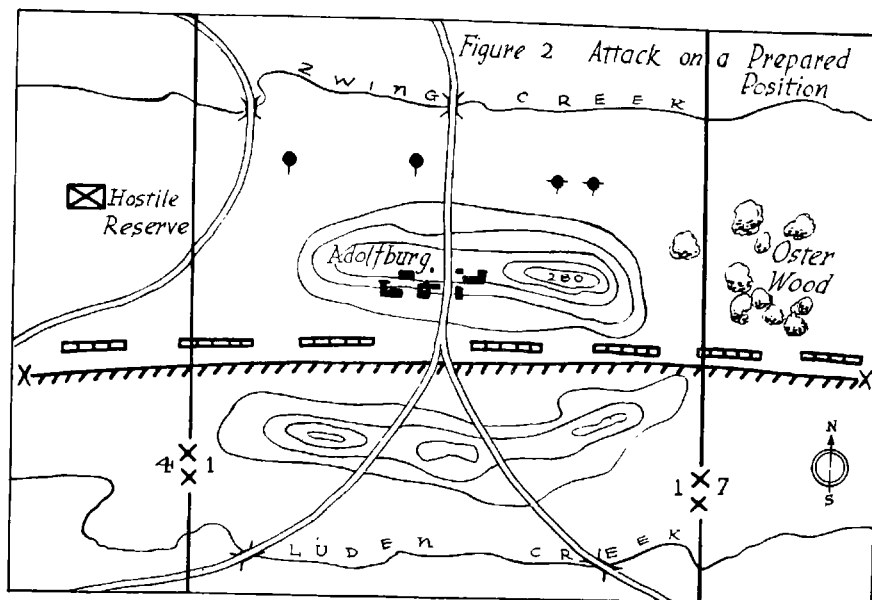
(g) Rear Services ----.

(h) Command post of the higher commander is at ---- (where reports are to be sent).

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d. Example No. 2 (see Figure No. 2) illustrates a typical problem for the cooperation of tanks with other arms.



(1) Situation. An infantry division, encountering increasing hostile resistance, arrived at the line X -- X at 1600 hours. The division, supported by the Panzer Brigade, will renew the attack the next morning.

(2) Operations. In the morning, after a brief artillery bombardment, the widely deployed tanks break into the enemy line. The infantry push through the break. Meantime, the artillery advances its fire to the village, Adolfburg, and the Zwing Creek crossings. Smoke troops place fire on the western edge of Oster Wood. Wherever the enemy's antitank weapons are found, they are immediately engaged by heavy infantry weapons and by the tanks. Heavy artillery fire is kept up on Adolfburg. The first echelon of tanks is now advancing rapidly north around both sides of the village; the second echelon decreases its speed and attacks the enemy forces still resisting on the high ground on both sides of Adolfburg. The artillery constantly moves its fire forward so as not to hinder the advancing tanks, being informed by its own forward observers who advance with the leading tanks.

On the right, the infantry attack in the direction of Oster Wood has been checked. Guided to the place by tracers and flag signals, the second echelon of tanks moves toward Oster Wood. Meantime the commander of the first echelon reports:

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“Have overcome hostile artillery groups north of Adolzburg. Am continuing toward the artillery discovered farther west. Reconnaissance toward Zwing Creek reports that the stream is passable.”

The supporting infantry has been mopping up Adolzburg and the high ground on both sides of the town. This infantry now proceeds to assist the tanks at Oster Wood. Then the heavy weapons and artillery are brought forward to Adolzburg. The enemy, retreating along the road, offers stubborn resistance, but is overcome by elements of the tank battalion cooperating with the advance infantry. Zwing Creek crossings are kept under the fire of tanks, artillery, and combat aviation.

END OF TRANSLATION

COMMENT: 1. These instructions show how much emphasis the Germans put upon surprise, which is even more important in an attack by tanks than in an infantry attack. Speed is necessary, and so is concealment, but careful preparations are not to be neglected. The approaches are carefully selected, traffic regulations worked out, and reconnaissance and engineer units make every effort to secure quick, unbroken movement of the tanks from the assembly position into combat. The supply system is planned to avoid delay. Because the Germans are well trained, these arrangements are executed in a businesslike manner, which makes them look simple and easy, though they are often difficult and complicated.

2. German tank attacks are based upon an accurate estimation of the opposing strength and defenses, and the organization of their attacking force is determined by the situation. The tanks leave the assembly position in the formations they will hold during the attack. In difficult terrain, the detailed deployments are made just behind the last cover before coming into the open. Careful scouting of the position, studies of maps and photographs, the planned removal of obstacles, and the preparation of material to be used in negotiating unforeseen obstacles enable the tanks to come upon the enemy with surprise and with a mass fire effect.

3. The heavy tanks attack first to clear the way for the lighter tanks, which then operate against any resistance likely to hold up the infantry. The Germans realize that tanks must act in close cooperation with infantry, but at the same time they believe that the tanks should be free to strike hard by themselves. Therefore they plan things so that each tank unit has a definite goal to reach.

4. German artillery gives the tanks good support; to work out this support, artillery officers ride in the tanks and signal the ranges to the guns.

5. The Germans regard the tank as the decisive weapon and arrange for its support by all other arms.

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6. Note in Example No. 1 of the combat orders that the tank battalion commander does not waste time by getting together his subordinates and issuing a complete order. Instead, he gives his order orally to the officers near at hand, and to the others by radio. What looks at first like a piecemeal action is actually a united effort by the entire battalion.

7. In Example No. 2 note that smoke was used along the edge of the woods; where hostile antitank and other weapons, even if observed, would be difficult to combat with tanks.

8. German antitank crews are trained to be ready for action at any moment and to fire very rapidly.

9. Not only are the tank units supported by the other arms, but the German tank units support each other. Individual tanks within the platoon, and platoons within the company, will fire while halted in concealment in order to protect other tanks or platoons advancing to positions from which they in turn will be able to protect their former supporting group.

10. FUEL SUPPLY FOR TANKS

Photographs have shown that German tanks carry a certain amount of spare gasoline in containers at the back of the turret, strapped or otherwise fixed to the vehicle. However, in the Middle East a recent document has been captured which states that it is now forbidden for any German armored vehicles to carry gasoline containers outside on racks or in any other way. This order applies to all armored vehicles including armored cars and troops carriers.

MECHANIZED VEHICLES (TECHNICAL)

11. GYROSCOPIC COMPASSES IN GERMAN TANKS

A German Mark II tank with an electric gyroscopic compass has made its appearance in Libya. It is possible that all commander's tanks may be equipped with this particular device.

The whole equipment is first-class in quality and workmanship. It is not likely that breakdowns will occur to any great extent, and the equipment should give long service without overhaul.

The main components of this instrument are the generator and the gyro, connected to each other by a flexible multicore cable. Switches for operation and lighting are fixed to the casing.

The motor generator is housed in a separate casing which may be placed

in a convenient location in the vehicle. A 12-volt motor drives a three-phase alternator supply to the gyro. The whole arrangement is compact, and appears fully suppressed and screened to avoid radio interference.

Fitted to the dashboard in front and to the left of the driver, the gyroscopic instrument consists of a small box with a panel showing two cards rotating in a horizontal plane. A switch and two control knobs, one for each dial, are added features of this equipment (see accompanying sketch).

To march on a certain point, a celluloid disk, marked around the circumference in clock-rays, is centered on the position of the tank on the map with 12 pointing due north. A thread leading from the center of the disk is joined to the point on the map which is the objective, and thus shows, in terms of clock-rays, the bearing of the objective from the tank. This is termed the "march number"

The indicator must be set before using. This is done by finding the course of the tank, setting the gyro, and starting the gyro and allowing it to gain speed. The course is set on the course-setting dial and the tank steered until the dial markings on both dials coincide.

A special compass is provided to find the tank's course. It has a glass marked with clock-ray divisions. The compass user must not stand nearer than 15 yards from the tank when finding its heading. Setting of the gyro is done by turning the gyro dial with the setting knob until it is the same as the tank's course previously found with hand compass. After setting, the gyro must be started and allowed 3 or 4 minutes to gain speed; it then must be set free by pressing the release button.

The course-setting dial is to assist the driver in keeping to his course without constantly remembering what the actual bearing is. Therefore, the dial is set to the desired course (or march number) and the tank then steered to make the top dial figures keep opposite the lower (gyro) dial.

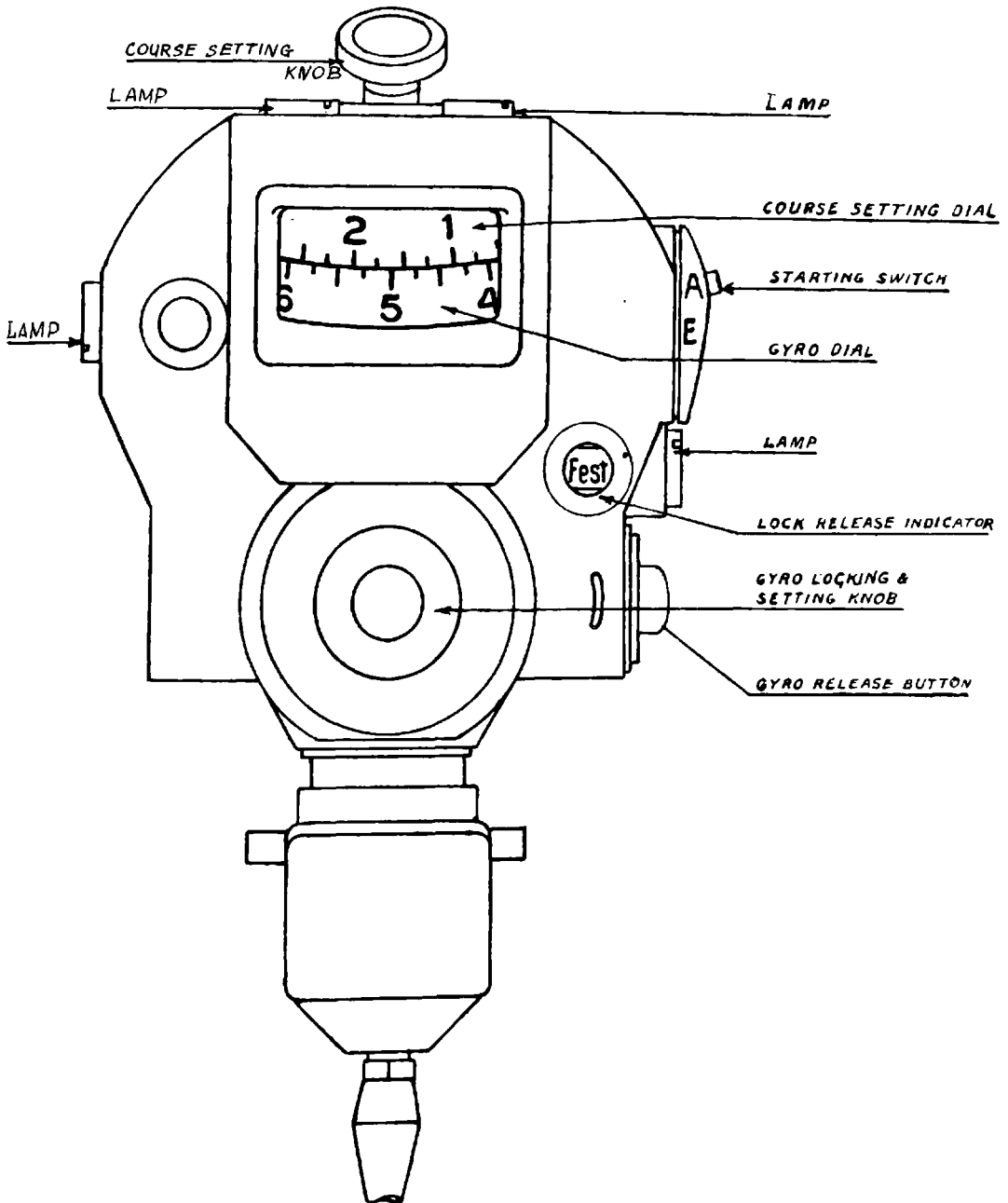
Resetting of the indicator may be necessary, either periodically because of deviation, or because exceptional tilt temporarily interferes with the internal mechanism. When this occurs a red warning-light is shown.

12. TANKS IN BURMA

The following remarks on the use and performance of tanks in the Burma campaign represent the opinion of a British officer who participated in this fighting. They are not complete comments on the subject, since they were given in the form of answers to specific questions.

The U.S. Light M3 was found to be extremely reliable; the engine gave no trouble, overheating did not occur, and excessive oil was used only when the

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GERMAN ELECTRIC DIRECTIONAL GYROSCOPE

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100-hour overhaul period was exceeded. The sponson machine guns had been removed. It was not considered that their retention would be useful for jungle fighting since they are fixed in position, consume ammunition uneconomically, and, the space occupied is required for radio sets, etc.

It was considered that the emission of smoke from the rear of tanks would be of use in jungle fighting.

No tanks were set on fire by ammunition being hit.

Larger tanks could have been used in the campaign.

If searchlights had been available they could have been very useful in night actions.

Canister for the 37-mm guns to be used in close-quarter work against personnel would have been very useful.

Mortars on carriers to fire smoke shells would have been of value.

The Japanese used prussic-acid bombs against tanks on only one occasion. Molotov cocktails were used against British tanks, and had some temporary effect on morale but none on materiel since they burned on the outside of the tank.

Japanese tanks were small, low, and light, and poorly armored. They were knocked out by British and American tank guns at 1200 yards. There was little chance to observe the effectiveness of antitank weapons against the Japanese tanks. The Japanese avoided tank-versus-tank actions, saving their tanks for use against unarmored troops.

The Japanese were rarely able to stop British tanks except in villages.

ORDNANCE (TACTICAL)

13. GERMAN AMMUNITION SALVAGE

A new plan by the German army for reclaiming used metal is reported in a recent captured document.

Salvaging of empty cartridge cases, belonging both to small arms and machine guns, is being encouraged by the inducement of cash payments for such deliveries.

The method appears comparatively simple. The division ammunition supply depots issue the receipts. Corps ammunition dumps act as the receivers. The latter pack the collected empties in bulk and send them along to the corps

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ammunition depot designated. A certificate also is sent to the effect that no live ammunition has been included.

The shipping cases are provided with sealing strips carrying:

1. The serial number
2. Contents
3. Unit stamp
4. Signature of ammunition supply depot commander.

Attention is called to the fact that particular care must be taken to return empties from all weapons, as well as the corresponding packing materials.

ORDNANCE (TECHNICAL)

14. USE OF CAPTURED ITALIAN WEAPONS

In the several North African campaigns the British have captured a large amount of enemy materiel, particularly Italian. Although some of the Italian weapons have not proved satisfactory enough to be used by the British, the following weapons have been utilized, some with interchangeable British ammunition and parts, and others with the Italian ammunition.

Breda Light Machine Gun. The Breda light machine gun is similar to the British Bren gun. It is mechanically superior to the Bren gun under dusty conditions. It requires only one man to service it as compared to several for the Bren gun. It has a slightly higher rate of fire than the British weapon. Its disadvantages are that it has no carrying handle, cannot be fired on fixed lines, and has no tripod mounting.

Breda 20-mm. Heavy Machine Gun. This is an excellent dual-purpose AA and AT gun, firing several types of high explosive, armor-piercing, incendiary, and tracer ammunition. It is particularly good for anti-aircraft use, although as a weapon it is rather cumbersome. A great many of these guns have been utilized by the British, and a large number of them have been mounted on British armored cars.

81-mm. Mortar. This mortar fires an 8 1/2-lb. projectile 5,000 yards. The secondary charge is considered superior to that of the British 3" mortar, and the weapon as a whole is also considered superior and a valuable addition to an infantry unit, although the bipod is more complicated and the projectiles are inferior in fragmentation to the British.

The 75/27 Gun (75-mm., 27 calibers in length). This gun fires a 14-lb.

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shell 9,000 yards, and has a rate of fire of 4 rounds per minute. It is considered a mechanically satisfactory weapon and has been used extensively, although it has the disadvantages of light hitting power and poor fragmentation. (For greater detail see next article.)

100/17 Howitzer (100-mm., 17 calibers in length). This is an accurate and satisfactory howitzer, which fires a 30-lb. shell 9,000 yards at approximately 3 rounds per minute. However, it has a long unwieldy trail that has to be dug in for high elevation.

149/13 Howitzer (149-mm., 13 calibers in length). This howitzer fires a heavy, 80-lb. shell accurately up to a range of 10,000 yds. The rate of fire is 2 to 3 rounds per minute.

105/27 Gun (105-mm., 27 calibers in length). This weapon is considered to be the most valuable battalion artillery piece, although very few of them have been captured. It fires a 35-lb. shell a maximum range of 13,600 yards, at the rate of 6 rounds per minute.

The use of all these field artillery weapons has been limited by a lack of spare parts; the recoil systems, both spring and hydropneumatic, have suffered particularly. The carriages of the 100-mm. and 149-mm. howitzers are old models, and the best performance from these weapons can be expected only when they are mounted on modern carriages. None of these weapons is considered suitable for mobile operations in the desert, but within the limitations noted they should prove satisfactory under static conditions.

75/46 (75-mm., 46 calibers in length) Ansaldo Mobile AA Gun. While this is primarily an anti-aircraft gun, successful experiments in engaging ground targets have been carried out. The weapon is mechanically sound, and practically no maintenance has been required. The muzzle velocity is probably 2,500 feet per second, although it may be higher. The gun has a high rate of fire, and with a trained crew it is estimated that 20 rounds per minute can be fired. The silhouette is satisfactory and it is believed that it would be difficult to hit from a tank at 600 to 1,000 yards. The Italians camouflage the gun with light gray and dirty white colors, and from a range of 500 yards it is practically invisible, even on level ground. A speed of 25 miles per hour over good terrain and 10 miles per hour over rough terrain should be obtainable.

37/54 (37-mm., 54 calibers in length) Light Double-Barrel AA Gun. This is a tray-loaded twin anti-aircraft gun serviced by a detachment of seven men. The rate of fire is 250 rounds per minute--125 rounds per barrel per minute. It is considered to be a very effective light anti-aircraft gun, although stoppages are frequent unless all the equipment is kept scrupulously clean and free of sand.

102/35 (102-mm., 35 calibers in length) AA and Coast-Defense Gun. This anti-aircraft weapon has a muzzle velocity of approximately 2,476 feet per second, a maximum horizontal range of 14,500 yards, and a maximum vertical

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range of 31,000 feet. The breech mechanism is semiautomatic.

76/40 (76-mm., 40 calibers in length) Dual-Purpose AA-AT Gun. This is a fixed weapon and is expected to be satisfactory for antiaircraft work, but sufficient tests have not been made to give any details.

20-mm. Solothurn AT Rifle. It is a good serviceable weapon and capable of sustained fire over a long period. For a description of this weapon see this publication, issue No. 5, page 18.

15. ITALIAN 75-MM FIELD GUN - MODELS 06, 11, AND 12

The standard light field piece of the Italian army is the 75/27 weapon (caliber 75-mm., length of bore 27 calibers) of which there are three models, 06, 11, and 12. British users consider it satisfactory equipment, and find that it gives good results in spite of constant use.

Its disadvantages are: (a) light hitting-power; (b) at ranges above 6,600 yards, it is necessary to use a false angle of sight, slope the platform and dig a hole for the trail; (c) poor fragmentation effect.

Additional data on these guns follow:

	<u>Model 06</u>	<u>Models 11 and 12</u>
Muzzle velocity	1,730 f.s.	1,675 f.s.
Maximum range	11,200 yds.	9,075 yds.
Rate of fire (theoretical)	8 r.p.m.	8 r.p.m.
Rate of fire (practical)	4 r.p.m.	4 r.p.m.
Length of bore	27 cal.	27 cal.
Weight in action	1 ton	1.06 tons
Weight in draught	1.67 tons	1.87 tons
Maximum depression	-10°	-15°
Maximum elevation	+16°	+65°
Traverse	7°	52° 9'

QUARTERMASTER (TACTICAL)

16. GASOLINE AND AMMUNITION SUPPLY--LIBYA

One British brigade that engaged in about a dozen major tank actions in Libya towards the end of last year appeared to follow a standard plan in keeping its tanks supplied with gasoline and ammunition.

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A convoy containing 100 percent fuel and 50 percent ammunition replenishment always moved up in close contact with the battalion. This convoy was commanded by an officer with a radio set tuned in on the regimental frequency.

When it was necessary to replenish ammunition during the course of an action, as happened frequently, the convoy commander was ordered in code to send up a specific number of ammunition trucks to a point as far forward as possible. This was generally at a position a few hundred yards behind brigade headquarters. Company commanders were then ordered to send back one tank per platoon at a time to load up.

Before half of the gasoline supply of a tank had been used, the tank was refilled, if possible before action appeared imminent. The quickest method of refueling was as follows:

All gasoline trucks were sent forward even if only 20 percent refill was required. These trucks then drove around to each individual tank--the company trucks having previously been notified of the location of their company. On arrival at each tank the crew of the gasoline truck would dump large gasoline cans. From these the tank crew fills the fuel tank and also its own small, reinforced cans which are carried as a reserve supply.

When refuelling a hot tank it was found necessary to have one of the crew stand by with the fire extinguisher. There were several cases of fire while refuelling under these conditions, but with the extinguisher ready for immediate action no serious damage resulted.

ARMY GROUND FORCE COMMENT: In general, the method of refueling outlined is the normal method employed by our QM Gasoline Supply Company which is an organic part of, or attached to, motorized and mechanized units in combat.

The formation of a convoy under an officer for fuel and ammunition replenishment and charged with maintaining close contact with a unit engaged in combat, would be very desirable and should be employed, where the number of available vehicles permit such employment.

QUARTERMASTER (TECHNICAL)

17. JAPANESE RATIONS

The use by modern armies of concentrated foods is nothing new, and the development tends to become more widely exploited as the war takes on the character of large-scale activities on many fronts.

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Japanese parachutists are using iron rations made in wafer form and composed of ground rice and wheat with some sesame seed. Besides this, they have an extract of mussel flesh, dried plums, preserved ginger, crushed bean meal, and nori (dried seaweed containing alkali, soda and iodine). For one meal these rations weigh about one-half pound. They have been successfully tried out in the climates of Malaya, East Indies, Philippines, China, Manchuria, and Siberia.

All foreign iron rations were previously tested, but the Japanese selected the above type as most suitable for the Japanese soldier.

It seems that the Japanese parachutists in Sumatra and Celebes had to carry considerable quantities of food, which had to be light in weight. One Japanese authority spent 17 years in research on these rations before presenting his findings to the Japanese Diet.

The Japanese have three types of field rations, a variable emergency ration, and a "peacetime" ration. Rice, sometimes barley, is the basic food in each type of ration.

a. "Peacetime" Ration. This consists of 21.16 ounces of rice, 6.6 ounces of barley, and a cash allowance per man of approximately 9 1/2 cents per day. The cash allowance is spent on meat, fish, vegetables, and sometimes for extra cooking and heating fuel. The caloric value of the ration in kind is 2,780. A total food equivalent for each man of 3,500 calories a day is allowed in barracks, and 3,700 to 4,000 calories a day is allowed on maneuvers. The American garrison ration allows 5,140 calories per day, and the field ration is approximately the same. The caloric allowance is slightly higher in cold climates.

b. Emergency Rations. These are of two types--the "A" scale and the "B" scale. In Burma, Japanese orders showed that each soldier carried rations for three days on the "A" scale and for one day on the "B" scale. Neither was to be eaten except on orders of the commanding officer when the unit was separated from its supply column.

(1) "A" Scale. This scale consists of about 1 pound 3 ounces of rice (sufficient for two meals) and one small can of mixed beef and vegetables per man. The rice, which is simple to prepare, is frequently cooked by the soldier in a small bucket carried for that purpose.

(2) "B" Scale. It consists of three paper bags of hard biscuits (sufficient for three meals).

c. Field Ration. These generally are of two types, "normal" and "special", although an "alternative" ration may be substituted for either of them. The "special" ration usually is issued when the rations are carried on

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the soldier. The following table shows the make-up of the three rations:

<u>Types of Food</u>	<u>Normal</u>	<u>Special</u>	<u>Alternative</u>
Cereal or Biscuit	Rice: 23.3 oz. Barley: 7.4 oz.	Rice: 20.46 oz. Biscuit, or compressed ration: 8.113 oz.	One of the following: Rice: 30.69 oz. Bread: 36 oz. Biscuit: 24.34 oz. Compressed ration: 24.34 oz. Other cereals: 31.75 oz.
Meat or fish	Raw meat: 7.4 oz.	Tinned meat: 5.3 oz. (or) Dried meat: 2.1 oz.	Smoked salted meat: 3.175 oz. (or) Eggs: 6.35 oz.
Vegetables	Raw: 21.16 oz.	Dried: 4.23 oz.	-----
Pickles	Pickled radish: 2.1 oz.	Dried plum: 1.09 oz.	Salt or sweet pickles: 4.23 oz.
Flavoring	Powdered soybeans: .08 qt. Bean paste: 2.6 oz.	Powdered soybeans: 1.06 oz. (or) Powdered soybean extract: 1.4 oz. Powdered bean paste: 1.06 oz.	Bean paste: 5.3 oz. (or) Vinegar: .08 qt. (or) Sauce: .08 qt.
Flavoring	Salt: .176 oz. Sugar: .7 oz.	Salt: .176 oz. Sugar: .7 oz.	----- -----
Tea	Tea: .1 oz.	Tea: .7 oz.	-----
Nutriment	-----	Nutritive food: 1.09 oz.	-----
Extras	-----	Japanese sake*: .4 qt. (or) Sweets: 4.23 oz. Tobacco: 20 cigarettes	-----

*The chief alcoholic beverage of the Japanese; a kind of beer made from rice.

d. Vitamins. The Japanese are using vitamin tablets to supplement their rations, and also as an emergency ration in the jungle. Some of the vitamin tablets are known to consist mainly of vitamins A and D.

SIGNAL CORPS (TECHNICAL)

18. WIRE COMMUNICATION USED BY GERMANS IN OCCUPIED COUNTRIES

Full maintenance of telephone and telegraph systems in occupied countries is essential for German control. This raises many technical problems; for example, in Europe telephone communication is often made through roundabout connections; the hook-up between nearby rural subscribers is often put through by means of connecting-junctions terminating at distribution centers, often a distant town.

In case of breakdown, whether due to sabotage or other causes, the Germans decided that machine switching systems were too complicated to permit quick resumption of operations. In some cases, they provided against this by installing manual boards, suitable for connection to the main frames of a telephone distributing center. This permitted them to reestablish an immediate restricted service.

In occupied European territory, the Germans have employed 4-wire rubber-covered cables with encased loading coils inserted in the cables by means of coupling joints. Thus, two physical circuits and a phantom circuit were obtained from each cable. The cables were strung on convenient objects, such as branches of trees, or laid on the ground, sometimes in groups of perhaps 20. The outer diameter of the cable was about 3/8 in., and that of the loading coil container, about 2 in. At elevated points, short lengths of cable comprising loading coil assemblies were looped and suspended to relieve strain.

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SECTION II

THE GERMAN CROSSING OF THE DNIEPER
IN THE KREMENCHUG AREA
(KIEV OPERATION)

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THE GERMAN CROSSING OF THE DNIEPER IN THE KREMENCHUG AREA
(KIEV OPERATION)INTRODUCTION.

1. GERMAN FAILURE BEFORE MOSCOW AND KIEV, AND PLANS FOR KIEV ENCIRCLEMENT. August 1941 saw the German Center Group of Armies under von Bock halted in front of Moscow, and the South Group of Armies under von Rundstedt halted in front of Kiev (see map at page 42). There was now no chance for a quick seizure of the capital and a drive by armored spearheads to other strategically important parts of the country as had been the case in France. Plans were shifted to achieve a gigantic double encirclement, which would aim at the capture of the great Ukrainian city of Kiev and the destruction of Budenny's armies. The salient between the Desna and the Dnieper, with Kiev at its apex, was to be cut off in a wedge-and-trap operation. The holding attack would be made by the forces which were already in position in front of Kiev. The northern wedge of the encirclement maneuver would have to be driven across the Desna northwest of Konotov, and the southern wedge across the Dnieper below Kremenchug. As preliminaries to the main operation, Uman to the south of the proposed salient and Gomel to the north would have to be taken in order that German troops might advance to the Desna and the Dnieper.

2. IN THE SOUTH -- THE UMAN OPERATION. While the Sixth Army under von Reichenau was halted in front of Kiev, the German armies in the south had been moving forward in conjunction with Hungarian and Rumanian troops. Von Stuelpnegel's Seventeenth Army and von Kleist's First Panzer Army crossed the Bug west of Uman. They helped von Schobert (who had crossed the Bug further south) in the encirclement of Uman and then occupied the right bank of the Dnieper River.

3. IN THE NORTH -- THE GOMEL OPERATION. Von Bock kept up the feint of striking toward Moscow, but shifted to the south the Second Panzer Army of Guderian and the Second Army of von Weichs. These armies encircled Gomel, which fell on August 19, and moved toward their new assembly areas. Guderian reached the Desna near Novogorod on August 30 and immediately established a bridgehead on the south bank. The advance of the von Weichs and Guderian armies toward the Desna also relieved Russian pressure on German forces (von Reichenau's army) west of Kiev.

4. THE SITUATION. Thus, toward the end of August 1941, the situation was as follows: in front of Kiev the strong army of von Reichenau was in position to launch a holding attack; the von Weichs and Guderian armies some 125 miles to the northeast, and the von Stuelpnegel and von Kleist armies some 190 miles to the southeast, were the potential wedges for encirclement of the Kiev area.

But the maneuver could not be begun, much less completed, until a German bridgehead was established east of the Dnieper. The crossing of this broad and deep river, the third largest in Europe, would have to be attempted in the vicinity of Kremenchug. The operation was entrusted to the Seventeenth Army under von Stuelpnegel, but, according to German custom, the specially created

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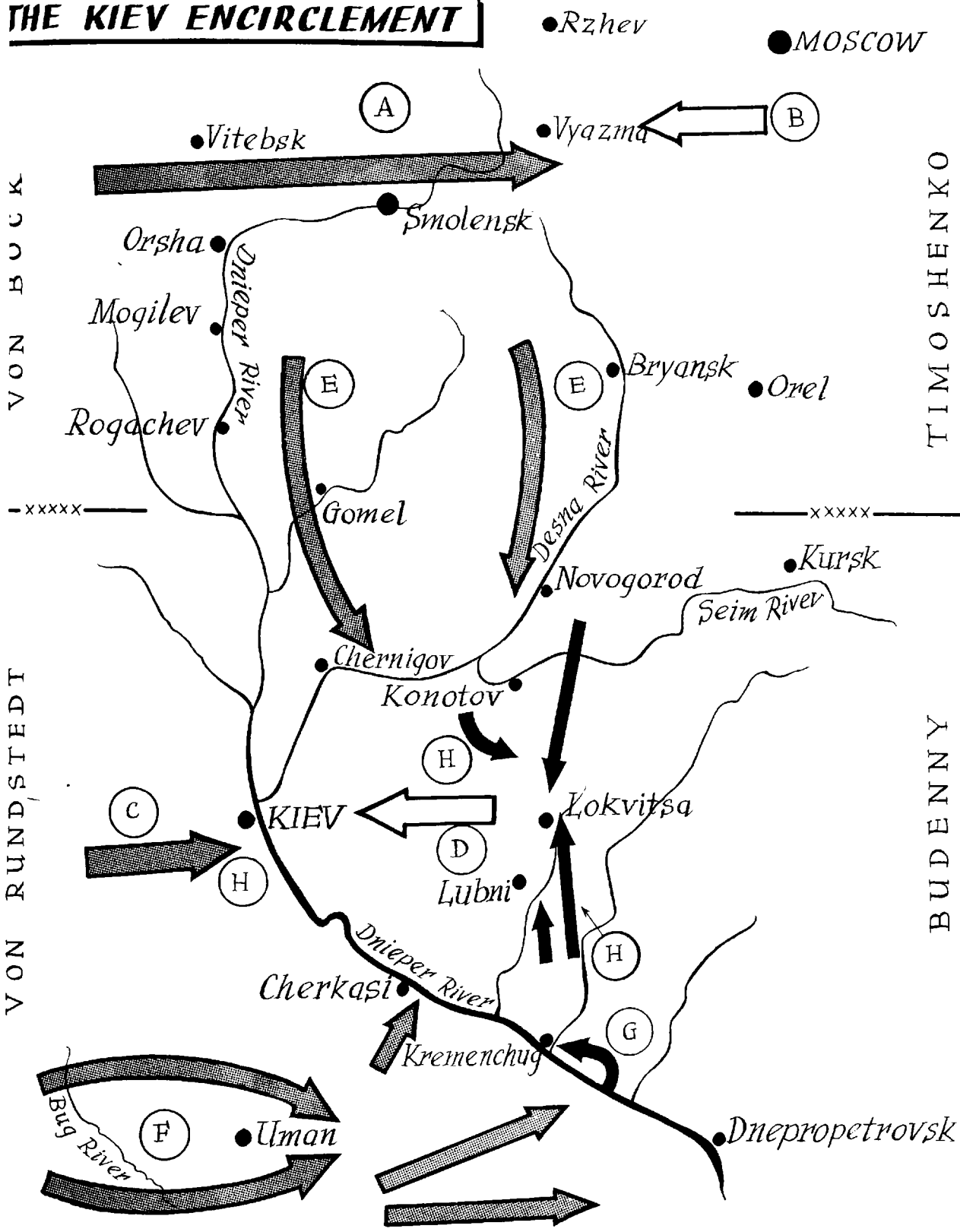
THE KIEV ENCIRCLEMENT

MAP LEGEND

- (A) Von Bock's drive toward Moscow halted by Timoshenko's Group of Armies. (B)
- (C) Von Rundstedt's drive toward Kiev halted by Budenny's Group of Armies. (D)
- (E) The von Weichs and Guderian Armies (von Bock Group) advance to the Desna.
- (F) The von Stuelpnegel, von Kleist, and von Schobert armies (von Rundstedt Group) advance to the Dnieper.
- (G) The initial crossing of the Dnieper.
- (H) The "wedge and trap" encirclement of the Kiev salient.

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THE KIEV ENCIRCLEMENT



task force was composed of units deemed to be best qualified, irrespective of the command to which they belonged.

THE OPERATION

5. SELECTION OF A CROSSING POINT. The general considerations which influenced the German choice of a point for this difficult operation can be seen by reference to the map (see map at end of article).

The area between Kiev and Kremenchug was in every way ill-adapted to crossing operations. From Kiev to Cherkasi, the eastern bank is swampy, and roads would permit the Russians to move troops and supplies easily to a threatened area. Furthermore, a wedge driven across in this area would fail to secure the maximum strategic effect, in that fewer Russian forces would be cut off in the resulting pocket. Between Cherkasi and Kremenchug a crossing is almost impossible; the Dnieper wanders in numerous channels, much of the terrain is marshy, and a tributary (the Tyasmin) parallels the Dnieper on the south.

The area chosen for the crossing, about 25 miles southeast of Kremenchug, possesses several obvious advantages. The Dnieper flows in a single channel, 1,200 yards wide; there are no tributary streams; and the banks are free from swamps. Moreover, in this area the railroads and roads favored the Germans rather than the Russians. On the German side of the river, the Dnieper valley road would be useful at all stages of the operations; on the Russian side, there are no roads to bring reinforcements close to the point of crossing.

A particular feature of the terrain helped the Germans concentrate for attack at this point. The area southwest included a watershed ridge running perpendicular to the river. This ridge was wooded and had sandy soil. The Germans could bring men and supplies by road and rail to a point 30 or 35 miles from the crossing point and advance under cover of the woods, over what was in effect a natural highway almost to the river. The absence of roads would not prevent armored and supply vehicles from negotiating this route.

On the Russian side, the terrain was adapted to exploitation of a successful crossing. Once a bridgehead was established, the Vorskla River would protect it on the right flank, while on the left no natural barrier impeded a German advance toward Kremenchug. North of Kremenchug, the terrain is ideal for a maneuver of envelopment by armored forces. A watershed ridge gave a good route for advance northward by armored units, regardless of damage done to highways or railroads. Each flank of this route was protected by a swampy river.

6. PREPARATION. Very little information is available on the German preparations for this crossing. In view of its difficulty, and of the importance attached to this operation in the strategy of the campaign, there can be little

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doubt that a task force was prepared for this assignment according to the usual German principles. These may be summarized as follows:

- a. A commander for the task force is selected and given sole responsibility for the operation.
- b. He is given troops and materiel according to his estimate of requirements. (This would include, in an operation of this sort, all types of infantry and artillery units, a heavy air component, and important pioneer and transport units.)
- c. The commander organizes and trains the units for the specific task assigned. If possible, this is done on terrain similar to that of the proposed operation. The object of this training is to develop a combat team thoroughly rehearsed in all stages of the assignment.

Preparation for the Dnieper crossing involved concentration of considerable supplies of weapons and other necessary materiel. This concentration had to be made as close as possible to the place of projected crossing.

The most serious logistical problem was that of bringing up boats and bridging materiel. German accounts state that hundreds of assault boats were used on the Dnieper River. These boats apparently were of two types--one capable of carrying from 4 to 6 men, and one capable of carrying 10 to 16 men. Both were driven by outboard motors. It is not known how many of these boats were used in the operation, but if "hundreds" were used the problem of transporting and concealing them was an operation of considerable magnitude. Equally difficult was the problem of concealing sufficient pontoons and platforms for the construction of a 1,200-foot bridge. Apparently there were enough trees on the sandy ridge to afford cover, yet not so many as to block the movement of wheeled or tracked vehicles.

In this wooded area, camouflage by tree limbs was easy, effective, and much used, as is shown by German photographs. German camouflage emphasizes the value of dummy positions which cause the enemy to waste his ammunition and reveal his position, and which divert suspicion from important concealed installations or supplies. It is quite likely that such positions, with indications of boats and bridging equipment, were constructed at other points on the Dnieper in order to deceive the Russian observers as to the area chosen for the initial crossing.

Concentrations at secondary points along the Dnieper were apparently not so well guarded from Russian air observation. These other concentrations were made partly to divert suspicion from the preparations for the initial crossing, and partly to have heavy weapons and supplies ready for later crossings which would follow after the success of the initial operation.

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7. THE JUMP-OFF. By the end of August, the subordinate commanders charged with execution of the preliminary operations were able to report to the task force commander that they were ready.

At dawn on the morning of August 31, German planes took possession of the sky in the Kremenchug area. German artillery threw a heavy barrage across the river against the Russian lines. At the same moment, hundreds of assault boats were taken from their hiding places and carried down the gently sloping sandy banks to the shallow water at the edge of the Dnieper. The boats, which were designed for this particular type of operation, were probably similar to those which crossed the Rhine in somewhat less than a minute in the Maginot operation (June 1940). No reports have been seen on the time required for the storm boats to cross the Dnieper, but their attainable speed is variously given as 30 to 40 miles per hour.

The boats were not beached at the eastern bank but returned at once for further loads. The speed of the turn-around is to be noted; it is said that the men jumped from the boats as they turned without coming to a complete stop. The small boats carried about 4 men, and the larger boats (judging from pictures) seem to have carried 10 to 12 men. The carrying of less than the maximum loads may have been designed to permit a speedier crossing.

The Germans report that the Russians, taken by surprise, nevertheless immediately organized a determined resistance. Since the steersmen of the German boats stood up, many were killed by the Russian machine-gun fire, which was withheld until the boats were near the shore, but in each instance another soldier took the helm. Preparations had been made for plugging bullet holes immediately, and many boats that received hits were thus enabled to continue across the river. German photographs show spouts of water in the Dnieper caused by Russian artillery shells, and also show sand clouds produced by Russian shells bursting only a few yards from German concentrations on the eastern side. Russian resistance cost the Germans many assault troops, but not enough to endanger the success of the operation.

8. FORMATION OF A BRIDGEHEAD. As soon as the German assault troops reached the far bank, they immediately began to overcome enemy resistance. The boats crossed the river again and again. The special river-crossing units were followed by more assault troops and by pioneers, and then by the infantry. By noon, enough troops had been ferried over to make the Germans feel that their position was secure. During the afternoon they transported more infantry and further organized their bridgehead. All these operations were continuously reconnoitered and protected by units of the German air arm.

The passage of troops and materiel was now increased by the use of additional, more vulnerable transport. Inflated rubber boats were used for ferrying more men--some 10 to a boat--and ammunition. Large rubber rafts were loaded with heavy infantry weapons, especially antitank guns. These rafts were towed to the eastern side of the river by motor boats. The Germans

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also prepared ferries consisting of pontoons lashed together to support a platform on which heavy guns were towed across the river to be used in neutralizing and capturing the field fortifications of the Russians.

In the meantime the troops which had been transported earlier in the day advanced and took the sand dunes and low hills beyond the opposite shore. The enemy line of artillery observation was thus in German hands. Many troops were now on the Russian side of the river and much materiel had been transported. Since the area was not occupied in force by the Russians, and possessed neither roads or railroads, there was no possibility of an immediate heavy Russian counterattack. Thus, in a single day, a strong German bridgehead had been established. Since they had been carefully rehearsed by specially trained troops, the crossing operations were carried out successfully without great losses.

9. CONSTRUCTION OF THE BRIDGE. Transport by storm boats, inflated rubber boats, and pontoons had been effective, but loading and unloading was necessarily slow. The bridge was needed and, with air superiority in the area and artillery already in place on the Russian side of the river, the Germans did not hesitate to proceed with its construction. This was accomplished in a single night (August 31-September 1), and the next day supplies and troops were pouring across the bridge.

It seems certain that the bridging equipment used in the crossing below Kremenchug was of the type which the Germans refer to as "bridge-gear B": equipment tried out in Poland, perfected, and used for the crossing of the Rhine in the Maginot operation in France.

The basic unit in the construction of a German military bridge is the half-ponton. This is built of metal except for strips of wood on the gunwales. It is 25 feet long, 6.3 feet broad, and 3.3 feet deep. The weight is not known. Half-pontoons are used in constructing 4-ton and 8-ton ferries, and sections of 8-ton bridges. Two half-pontoons locked stern to stern form a full-ponton. The full-pontoons are used in constructing 8-ton and 16-ton ferries and sections of 16-ton bridges. As soon as the pontoons are in the water by the shore, The Germans construct platforms on them.

The maneuvering of the bridge section or the ferrying of a ponton-supported raft is accomplished by rowing, by the use of storm boats, by the use of "M" boats (a powerful light motor boat of 100 h.p.), or by the use of outboard motors on the pontoons themselves.

German bridging equipment includes prefabricated metal material for building piers at the shore. However, such piers were not needed at Kremenchug. Photographs show that the bank was well drained and sloping, and ramps could easily be used to connect the shore with the ponton-supported bridge.

10. ENLARGEMENT OF THE BRIDGEHEAD. By the end of August 31, the Russians realized that a major threat had developed. Russian planes made repeated but unsuccessful efforts to destroy the bridge, and also attacked the

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points of German advance. Hastily assembled Russian reserves made heavy counterattacks with tanks. The Germans, however, maintained their bridgehead, and extended it upstream to threaten the Russian position at Kremenchug.

11. ADDITIONAL BRIDGES AND BRIDGEHEADS. The Germans gradually enlarged their tactical bridgehead on the east bank of the Dnieper into a strategical bridgehead. Land operations to the northwest reduced enemy resistance 15 miles upstream, at another area free from swampy banks and multiple channels. To gain another route across the river, a second bridge was built at this point, apparently during the night of September 2-3. German reinforcements poured across the new bridge, only 10 miles below Kremenchug. Under their flank attack and a frontal attack from the west, Kremenchug fell on September 8, and the Germans had secured the controlling center of a road and railroad net.

Whether or not the Russians had destroyed existing bridges is not clear. In any case, the Germans felt the need of better transportation across the Dnieper at Kremenchug, and decided to move to that point the bridge which had been constructed 10 miles downstream. The sections were detached and towed upstream during a single night, in a rainstorm, and the bridge was rebuilt at a place where it could serve the Kremenchug road net.

Meanwhile, the Germans had established other bridgeheads across the Dnieper further down the river. These bridgeheads doubtless had the double purpose of paving the way for further operations in the Dnieper Valley and of preventing the reinforcement of Russian troops further north.

12. THE PINCER MOVEMENT BEGINS. With the eastern bank of the Dnieper at Kremenchug in their possession, and a strong bridgehead established, the Germans had accomplished the most difficult part of the large-scale pincer movement which was to isolate Kiev and destroy a considerable portion of Budenny's armies. The way was now clear for the southern wedge to move. With the First Panzer Army on the right and the Seventeenth Army on the left, the Germans advanced northward along the strategic ridge of high ground from Kremenchug toward Lubni and Lokvitsa, their flanks protected by marshy tributaries of the Dnieper. Meanwhile, from the Desna, the Second Panzer Army moved southward protecting the advance of the Second Army. At Lokvitsa and at Lubni the armored spearheads which had crossed the Dnieper met those which had crossed the Desna, to complete a gigantic double encirclement. The Russians of the Kiev salient were in a trap. The Sixth Army joined the Second and the Seventeenth in the annihilation and capture of Russian forces, while the two Panzer armies protected the operation and moved toward their next objectives. This successful wedge-and-trap maneuver had been made possible by the river crossing at Kremenchug.

13. SUMMARY AND CONCLUSION. Air superiority is absolutely essential to the success of an operation such as the initial German crossing of the Dnieper below Kremenchug. Airplanes were used in the initial phases for reconnaissance, and to deny reconnaissance to the Russians. Combat aviation guarded the sky

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above the bridge. Bombardment aviation was doubtless used to harass and neutralize the Russian lines as German troops moved across the newly constructed bridge.

The German success in the Kremenchug operation, especially in the initial stages, owed much to surprise, which they achieved by the secrecy of preparations, by deception, and by very rapid execution.

Deception was achieved by obvious preparations for a river crossing at other points in order to draw the defending forces out of position. The incomplete evidence suggests that either actual attempts or feints at crossings may have been made at points other than the one described above. An attempt at Dnepropetrovsk, of uncertain date, is known to have been repulsed.

Speed of execution aided the Germans enormously. By the end of the first day (August 31), the Russians knew that the operation was of major importance, but the speed with which the Germans built the bridge and moved their forces across the river enabled them to establish a large bridgehead, and prepare to extend it, before adequate Russian forces could be brought up.

In river crossings the Germans send over antitank guns very early in the operation in order to neutralize local tank attacks. Infantry supporting weapons (75-mm and 150-mm howitzers of the infantry regiment) are also ferried over early to support the operation of enlarging the bridgehead.

In the Kremenchug operation, the construction of the first bridge did not commence until after the assaulting formations on the far bank had captured the line of artillery observation; even then the construction was carried out under cover of darkness. Normally, in crossing smaller streams, the bridge-building operations start much sooner, in some cases before the site is clear of small-arms fire. When speed of execution is being employed to achieve surprise, as is often the case with armored forces, much time can be saved by an earlier start even though a few casualties must be accepted. The over-all gain justified those losses.

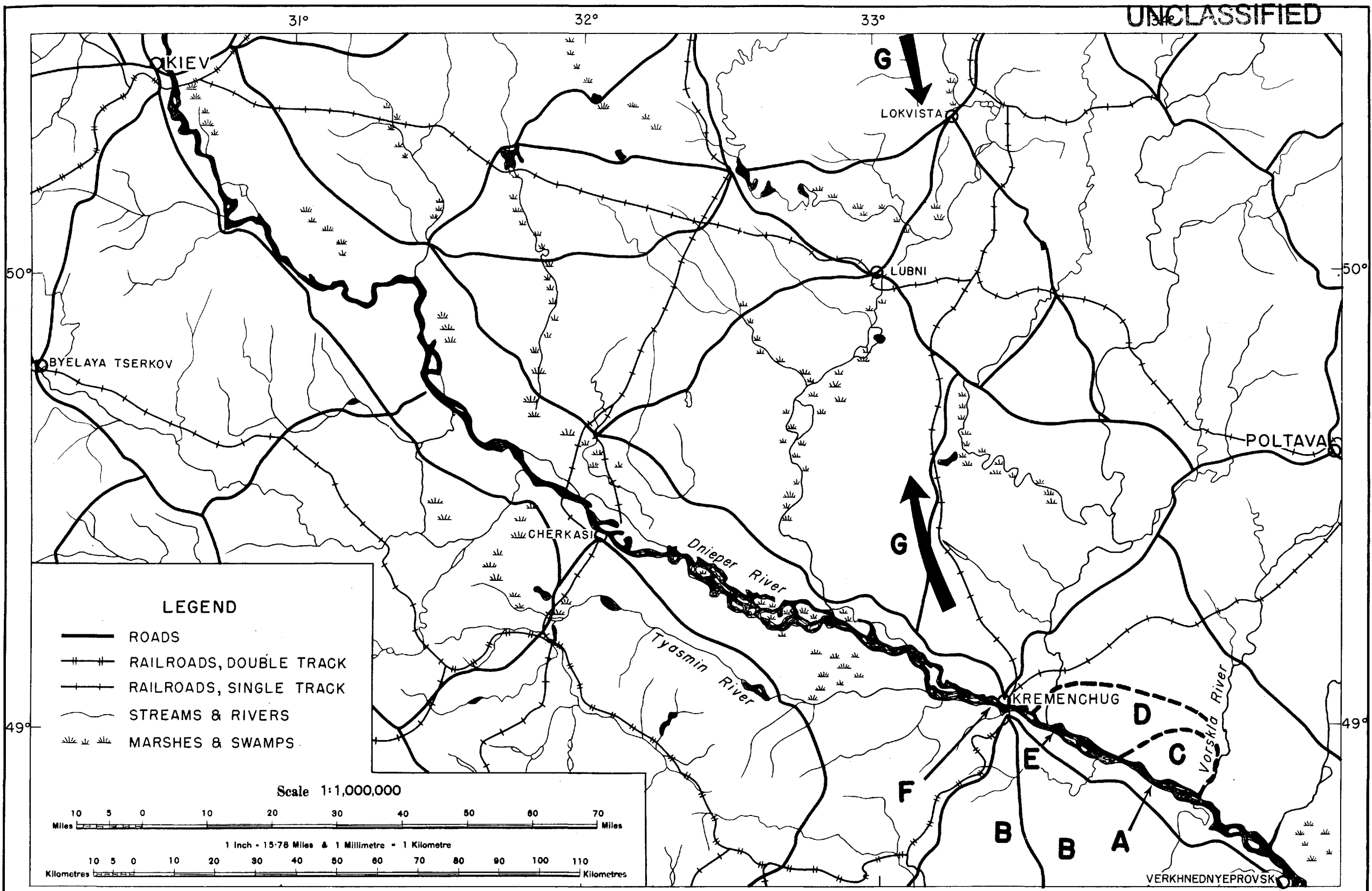
The German forces employed in the difficult initial crossing of the Dnieper below Kremenchug attribute their success to the secrecy of their preparation, thus exploiting the principle of surprise to the maximum; to good staff work in the careful tactical and technical preparation; and, finally, to boldness and skill in the execution of the plans.

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MAP LEGEND

- A. Site selected for crossing. Here river is narrow and has neither multiple channels nor swampy banks.
- B. Watershed on which Germans concentrated men and material.
- C. Bridgehead area. Protected on east by Vorskla River and has no roads or railroads for use of Russians in bringing up troops and equipment.
- D. Enlargement of bridgehead. Flanks Russian position at Kremenchug.
- E. Site of second bridge across Dnieper.
- F. Germans take Kremenchug and move bridge from "E" to "F", in order that it may serve Kremenchug road net.
- G. Advance of German armored troops northward to Lokvitsa and Lubni where they effect junction with similar spearheads moving south from the Desna River, thus completing the meeting of the wedges in the "wedge and trap" maneuver.

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LEGEND

- ROADS
- +—+ RAILROADS, DOUBLE TRACK
- + RAILROADS, SINGLE TRACK
- ~ STREAMS & RIVERS
- ~ MARSHES & SWAMPS

Scale 1:1,000,000

