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SECTION I

1. ME-210 FIGHTER--DIVE-BOMBER

The new Messerschmitt 210 (shown in the accompanying sketches) was first believed to be an improved model of the Me-110, but subsequent developments have shown it to be an entirely new long-range fighter and dive-bomber.

The pilot and a radio operator, who also acts as a rear gunner, comprise the crew.

Except for size, the Me-210 bears little resemblance to the Me-110 fighter-bomber. It is a twin-engined, low-wing, all-metal monoplane with a single fin and rudder. The noticeable deep fuselage tapers to a very slim section near the tail. The wings have a straight taper with rounded detachable tips. As the drawings indicate, the cabin enclosure is very humped and ends approximately at the trailing edges of the wings. The bomb compartment, which has a normal capacity of 4,400 pounds, is in and under the cabin forward of the leading edge of the wing. The single-strut undercarriage and the tail wheel are retractable.

Slots are fitted to the leading edges of the wings, and the slotted ailerons are equipped with trimming tabs. Strips are also fitted to the trailing edges of the ailerons for trim adjustment on the ground. The wing flaps are of the split type.

The venetian-blind-type dive brakes are located outboard of the engines, immediately forward of the coolant radiators, and are fitted to both upper and lower surfaces of the wings.

The comparatively large-span horizontal stabilizer is not adjustable, and the elevators are fitted with trimming tabs.

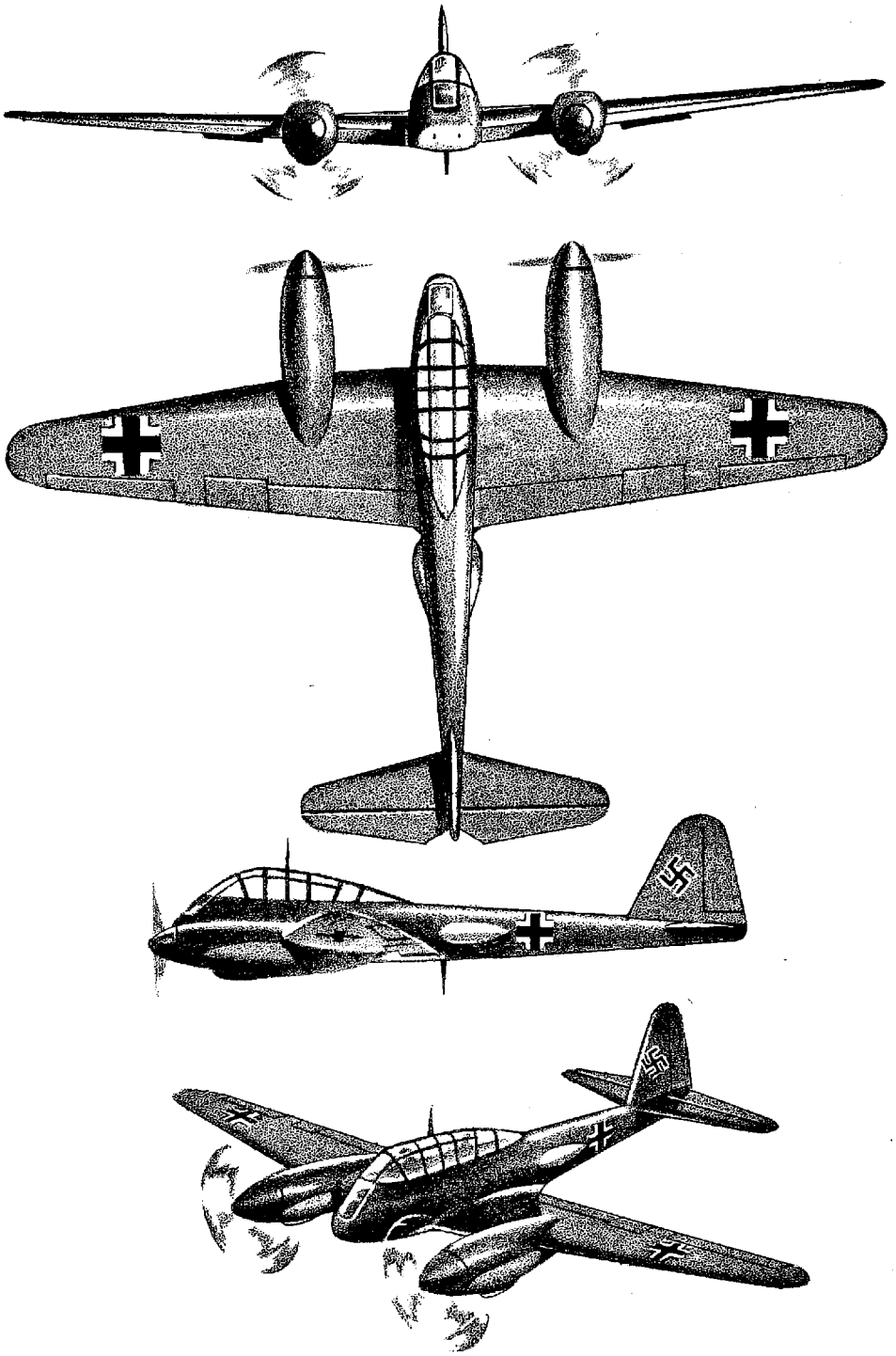
The Me-210 has comprehensive armor protection and is believed to be one of the best-armored planes of its kind.

The airplane is armed with five or six guns.

The fixed forward armament is mounted in the nose and is believed to consist of two 20-mm cannon flanked on each side by one 7.9-mm machine gun.

The rear or lateral armament comprises two 13-mm machine guns 131, one mounted on either side of a barbette which joins the two sides of the fuselage amidships. The guns fire through blisters on the sides of the fuselage aft of the trailing edges of the wings. The entire barbette, including guns and fairings, rotates in elevation, both guns moving in unison. For horizontal movement, one gun traverses the field of fire while the other gun is locked nearly parallel with the fuselage. However, both guns can fire together when in a nearly parallel position.

The rear gunner aims through a heavy bulletproof glass screen and controls the barbette through a handle which moves in elevation and in traverse. The motion of the handle is torque-amplified by an electrically driven mechanism



Messerschmitt 210

which drives the barbette through direct gearing. The blisters attached outside of the fuselage turn with the barbette. They have slots in which the guns move in traverse.

Two standard reflector-type sights are used, one on either side of the fuselage. Corrections are made to the line of sight by a mechanical vector device, the plane's speed being set manually.

This whole arrangement of the blister gun-mountings is of considerable interest as the first known enemy attempt to produce a power-controlled armament suitable for small and fast aircraft.

2. GERMAN GLIDERS AND GLIDERBORNE TROOPS

a. Organization of Gliderborne Troops

Gliderborne troops constitute one of the two German Air Force components operating under the Fliegerkorps XI. They are known as Sturmtruppen (assault troops) and are organized into a Sturmregiment. Although technically airlanding units, they must not be confused with the airlanding Army troops, which are infantry units.

Troops transported by gliders function in close conjunction with parachute troops and the Army airlanding detachments. In the general pattern of operations, they precede the parachute troops and, by their noiseless approach, utilize to the fullest the element of surprise. Their mission is to neutralize antiaircraft and other defenses, and to disrupt all communication systems. They thus prepare the way for the parachutists who seize landing ground for the transports bearing the airlanding Army troops.

The assault regiment has a full strength of almost 2,000 men and is organized into 4 battalions having a total of 14 companies. Each of the first 3 battalions is broken down into a headquarters and signal unit, a heavy weapons company, and 3 rifle companies of 120 men each. A rifle company consists of 4 platoons, plus a headquarters and signal unit. Each platoon is divided into 3 sections of 10 men each. The fourth battalion includes a headquarters unit, a signal section, and 2 companies, infantry-gun and antitank.

The DFS-230 gliders, in which the assault troops are normally carried, are organized into a special air transport unit known as the Luftlandung Geschwader, the smallest operational unit of which is a Kette of 3 gliders. Each glider carries a complement of 10 men, which is a section of a platoon. Three flights or Ketten make up a Gruppe. The Geschwader is, therefore, composed of 4 Gruppen with a total of 192 gliders and can transport the entire Sturmregiment of approximately 2,000 men.

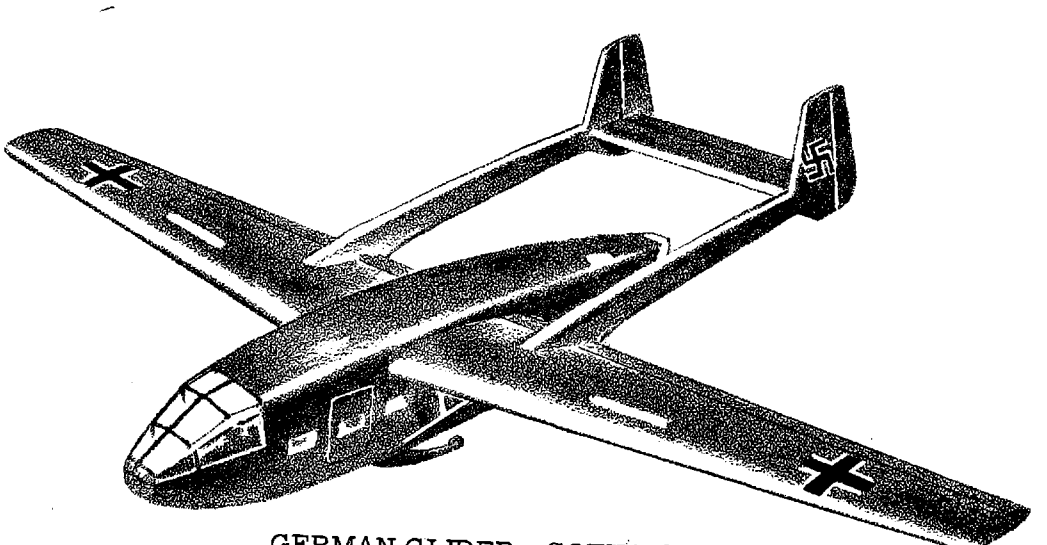
b. Training

Glider pilots generally have had previous experience in civilian glider flying, although this does not qualify them for handling a freight-carrying glider. A 6 weeks' course in gliding is given in special training schools, particular stress being placed on spot landings. Training on large gliders is conducted within the glider unit itself. The troops carried by a glider are graduate parachutists; however, they do not normally wear parachutes in gliderborne operations. It is debatable that they parachuted from gliders over Crete as has been reported.

Training gliders are believed to fall within three classes according to wing span. The "A" class glider has a wing of high aspect ratio with 55- to 60-foot span and usually a very short nose. It is possible that some gliders in this class may be high-performance sailplanes. Gliders in the "B" or intermediary class, having a span of 35 to 50 feet, are probably the most widely used. The "C" class gliders, with a span of 33 to 35 feet, are believed to be used for primary training.

c. Types of Gliders

Up to the present time the DFS-230 mentioned above is the only troop-carrying glider that has been identified as carrying assault troops during operations. The Gotha-242 (see following sketch), which has often been referred to as one of the principal troop transport gliders, is used almost entirely for carrying freight. This high-wing, dual-controlled glider is reported, however, to be capable of carrying 21 fully equipped men in addition to 2 pilots.



GERMAN GLIDER--GOTHA-242

The Merseburg, which has been mentioned as a tank-carrying glider, has been estimated to accommodate 40 to 50 men, while the Goliath is veritably the giant glider that its name implies. This twin-fuselage glider is believed to have a wing span of 270 feet and a wing area of 7,500 square feet, and to carry 17 to 20 tons or 140 fully equipped men, 70 in each fuselage. These gliders are in a more or less experimental stage and are therefore not considered for the purpose of this discussion as a part of the Geschwader organization.

The DFS-230 used in the Cretan campaign is a high-wing monoplane with a wing span of 71 feet 5 inches and a length of approximately 36 feet. It has fabric-covered wings and a fuselage of steel tubular construction. The wheels can be jettisoned after the take-off, and a landing is effected on a central skid. The empty weight of this glider, fixed equipment included, is approximately 2,200 pounds, and the (tare) fully loaded weight 4,600 pounds. Weight varies according to the assignment involved; a useful load is probably about 2,400 pounds.

This glider will carry nine fully equipped men and one pilot. Seats are arranged in a single line on a boom running along the center of the fuselage, six facing forward and four backward. The rear seats are detachable in case more space is needed for freight. A 24-volt storage battery installed in the nose of the glider furnishes power for navigation, cabin, and landing lights. A fixed light machine gun (LMG-34) is believed to be attached externally to the starboard side of the fuselage and fired by the man in the seat behind the pilot. Instruments on the panel of the DFS-230 include altimeter, compass, and airspeed, rate-of-climb, and turn-and-bank indicators.

The DFS-230 is ordinarily towed by a Ju-52 aircraft, which normally flies empty. Towing planes usually fly in a Kette; but when two or three gliders are towed, each is attached directly to the tug in V-formation. The glider is towed by means of a rope or a steel cable attached to a hook in the tail of the aircraft and fitted with a quick-release mechanism. The length of the towing line depends on the airfield space available; the longer the rope the easier the handling. A multiple tug arrangement probably would be necessary to tow a glider the size of the Goliath or the Merseburg. Three or four Me-110's or three Ju-52's might give a reasonable performance, although this would be a difficult operation.

d. Glider Operations

Gliders do not require large landing areas, runways being desirable but not essential. The landing run of a DFS-230 is said to have been shortened by wrapping barbed wire around the skids. Flaps are used to steepen the angle of the glide. In case of Me-110's being used as tugs, rocket-assisted take-off may be necessary when using airdromes with runways less than 2,000 feet.

The range of operations of a glider is obviously dependent on the range of the towing aircraft. The total range for the Ju-52 with 530 gallons of fuel in still-air conditions when towing one DFS-230 is about 780 miles, or 600 miles for three gliders. This will allow an approximate radius of action of 250 miles.

With extra fuel a Ju-52 is reported to be able to tow a DFS-230 more than 1,000 miles.

The distances which gliders can cover after the release vary according to altitude of release, direction and force of wind relative to line of flight, navigation errors, and evasive action. The gliding distance for the DFS-230 has been calculated in the ratio of 1 to 16 in still air, i.e. for every foot of descent, the glider theoretically covers 16 feet measured horizontally. In Crete, gliders are believed to have been released at not more than 2 to 5 miles from shore and at altitudes not more than 5,000 feet, permitting a gliding range of 8 to 10 miles. Normally gliders are never released directly over the objective but at a sufficient distance so that towing aircraft need not fly over the point of attack.

While the Germans were apparently successful in glider operations in Belgium,* the glider performance in Crete resulted in many casualties due to premature release, short turns, navigation errors, and rocky terrain. The troop glider, like all aircraft, is extremely vulnerable to small-arms fire when gliding low near ground defenses. Although it is not clear how light tanks if brought by air would be employed, it is believed that gliderborne units are not equipped to follow up tank advance, at least in the early stages. They lack motor transport and are, therefore, not mobile. Darkness is also a deterrent to gliderborne operations. So far as is known, glider attacks have been limited to dawn and dusk operations.

When a glider attack is made a part of large-scale airborne operations, it is important that glider airdromes should not be located too near the objective, since concentrations of aircraft are conspicuous and likely to receive attention from hostile aircraft before the units get on their way. It is, on the other hand, impracticable to conduct glider attacks from airdromes more than 200 miles away. Over longer distances, decisions at the rear take progressively longer to affect the action and thus make operation more difficult for the pilots. Furthermore, it is desirable that troops going into action not be kept seated in aircraft for longer than 2 or 3 hours, the time required for the 200-mile flight. Finally, since dawn is the usual time of attack, and such attacks cannot be made unless the planes take off at night, it would follow that they should depart early in the day and not spend too much time on the journey.

* In the comparatively small (but important) operation at Fort Eben Emael.

3. GERMAN MOBILE AUXILIARY DIRECTOR

The mobility and tactical efficiency of heavy antiaircraft units are, at least to some extent, limited by their elaborate fire-control equipment. The Germans have designed an auxiliary director (reported to be the Kommando-Hilsgerät 35) as an alternative to the standard director (Kommandogerät 36) for occasions when the latter is out of action or otherwise not available. The auxiliary director is also reported to be used for fire control against ground targets (see Tactical and Technical Trends, No. 6, p. 8).

The auxiliary director weighs about 400 pounds and does not need any electrical equipment. Heights or ranges are obtained from a separate 13-foot stereoscopic height- and rangefinder, and passed orally to the director. In the standard director, the rangefinder is incorporated. This simplification has, of course, only been introduced at the expense of accuracy in the data provided.

The director works on simple angular rates ignoring the meaning factor. By following the target continuously in line and elevation, and by setting in range (or height) continuously, deflections in terms of rate of change are multiplied by present time of flight. It is claimed that these approximations counterbalance each other, since with an approaching target, rates of change of bearing and angle of sight will be too small, while time of flight will be too great, thus giving a close approximation. At the crossing point, when the error is greatest, it is considered that errors so caused will be within the 50 percent zone of fire.

The fuze setting is obtained from the rate of change and the present range. The data are corrected for abnormal ballistic conditions, dead time, and drift and transmitted by telephone to the guns. The dead time allowed is 3 seconds. No allowance is made for wind and displacement.

The setting-in of range is interesting, in that a target not flying at a constant height can be engaged. Height, not range, is set in when the target is flying at a constant height.

A crew of four are employed on the rangefinder, and distribution of duties on the director is as follows:

No. 5 Layer for azimuth
No. 6 Layer for elevation
No. 7 Range setter
No. 8 Lateral rate-setter
No. 9 Vertical rate-setter
No. 10 Range rate-setter
No. 11 Reader of azimuth to guns
No. 12 Reader of elevation to guns
No. 13 Reader of fuze setting to guns

4. GERMAN GUN-FIRE AGAINST AIRCRAFT

The Germans apparently do not resort to desultory fire against enemy aircraft but "turn on the tap" by using every weapon capable of pointing skywards, including heavy and light AA guns, machine guns, automatic rifles, rifles, and pistols. These are fired to the limit whenever an attempt is made to attack one of their columns. Bombing a German column has often proved to be a dangerous and costly matter, as was evidenced both in the battles of France and in the fighting in Libya. This information, reported by a British air officer, emphasized in addition the effectiveness of the German 20-mm AA cannon which is distributed throughout all columns.

This air officer suggests that troops should not feel disappointed if, despite their fire, an enemy plane gets away apparently unscathed. Few planes vigorously attacked escape without some damage. Some are seriously shot up. Not only must all serious damage be repaired, parts replaced, and sometimes even entire engines replaced, but every bullet hole must be patched, and a thorough, painstaking check made of the aircraft to discover hidden spots which may have been hit. All this takes time and requires labor, with the result that the aircraft is grounded during the time needed for inspection, repair, and subsequent re-check. All of these points should be remembered. Consequently, the need for an all-out attempt to inflict damage on attacking aircraft with the weapons available should be of paramount importance.

This same British officer, when asked if there was any difficulty in determining the nationality of columns of troops in the desert, said: "No. All columns of troops in the desert look alike from the air, and both friend and foe shoot at you; but their nationality is immediately apparent. If they are our own, the fire is disturbing, and one fires the identification signal; if they are German, the fire is terrifying, of unbelievable volume and intensity, and leaves no doubt as to the identity of the column."

ANTITANK

5. TACTICAL USE OF GERMAN 20-MM DUAL-PURPOSE GUN

The Germans are firm believers in the dual-purpose antiaircraft-antitank gun. German Fla-Bataillone (independent antiaircraft battalions which are organic to the infantry) are equipped with such a weapon, the 20-mm self-propelled gun (for details, see this publication No. 5, p. 14). What follows is adapted from what appears to be the notes of a commander of a Fla platoon; note the importance attached to ground targets.

a. Ground Targets

The 20-mm gun on a self-propelled mount combines the fire power and mobility of an AA gun with the accuracy and penetration of an AT gun. Its disadvantage is that it is insufficiently armored, and this fault must be offset by good use of ground and fire control. The smallest unit in battle is the two-gun section. Use of single guns is exceptional.

As in all land operations, ground observation is most important. Every spare man must be employed on this, and must be made personally ambitious to spot enemy targets. Owing to the amazing accuracy of the gun "it is possible to say that when the enemy has once been spotted, he no longer is an enemy."

b. Protection during Deployment

During deployment, platoons usually take over protection against air or land attack. Guns must be sited so that attacking aircraft can be engaged from reverse slopes, while approaching ground targets can be brought under fire as quickly as possible by moving up the slope to a forward position.

c. The Attack

The Fla platoon supports the advance of the infantry and other arms. For this purpose it should be placed on the flank to enable its range to be fully utilized without endangering friendly troops. A hundred yards more or less to the flank hardly affects the efficacy of the 20-mm gun.

During operations the following are the only men on the vehicle: driver, gun commander, No. 1, and No. 4. The gun commander often has to dismount to reconnoiter the terrain or a position, when No. 3 takes his place. The other men, including ammunition handlers, give protection and observe to the flanks of the gun. If there is no mine-spotting section available, the ammunition handlers must cover the terrain to be traversed.

The platoon or section commander follows directly behind the attacking infantry or the pioneer assault detachment with his runners. He reconnoiters for good positions and opportunities for the employment of the gun. Signalling by means of the machine-gun company's number code has proved effective.

The guns usually approach their targets backwards, and use all folds in the ground and other cover.

d. Firing

Good fire discipline including good observation is of the greatest value. This needs practice and will be made easier by cooperation with the attacking troops and the various observation posts. Zones of observation must be laid down. Telescopes and rangefinders will be used to the full.

e. Movement

Changes of position must be made rapidly. Movement parallel to the front must be avoided if possible. The guns will advance by bounds. If there is only slight opposition, which can be broken by one section, the other section remains in readiness and then goes forward as the advanced section, while the first gets ready for action again.

When close to the enemy and when breaking into his positions, the guns fire on the move. Thus they force the enemy to take cover, and achieve a strong effect on morale.

f. Defense

When in an assembly area or holding a defensive position, the guns occupy prepared positions under cover. Several alternate positions are prepared, battle outposts are put out, possible targets are spotted, landmarks identified, etc.

g. On the March

On the march, when in the rear or when contact with the enemy is likely, the platoon is disposed as follows:

No. 1 gun--protection to the front and right;
No. 2 gun--protection to the front and left;
No. 3 gun--protection to rear and right;
No. 4 gun--protection to rear and left.

In case of aerial attack, a similar formation will be adopted. Fire will then be opened at the halt on the section commander's orders. Aircraft will only be engaged if they spot or attack German positions, if bridges or observation posts have to be protected, or if the aircraft present an especially good target.

The communications section and unit transport travel with the forward echelon trains of the unit under whose command the platoon has been placed.

h. Tanks

It has been proved that the gun rightly used can put even the heaviest tanks to flight, even if it cannot put them out of action. The most effective range against tanks is under 400 yards. Every effort must be made to attack tanks from the flank.

6. GERMAN TACTICS IN THE DESERT

The support of tanks by the other arms is essential to success of tank operations. German application of this principle is illustrated in the following information on the Axis 1942 spring offensive in North Africa.

Great alertness was shown by the German forces in covering their front with antitank guns when their tanks were halted or stopped to refuel, and in protecting their flanks at all times with an antitank screen. A threat to the German flanks by tanks was immediately met by the deployment of antitank guns while the German tanks continued their movement. The enemy appears to have a rapid "follow the leader" system of deployment and a system

of visual control by means of colored disk signals.

Every effort was invariably made to draw the fire of the defense, especially the fire of antitank weapons, by the deployment and advance of a few tanks. These tanks advanced, and were then withdrawn, and the enemy concentrated his artillery and mortars on all the defenders' weapons that had disclosed themselves. After a thorough preparation of this kind, the real tank attack was launched.

In at least one instance, a passage through a minefield was cleared for German tanks in this manner: A detachment of tanks advanced to the edge of the minefield and engaged all the defending weapons they could see. Pioneers then dismounted from the tanks and proceeded to clear mines on foot, covered by the fire of the tanks. Tanks that were hit were pulled out by other tanks and then replaced.

7. INCENDIARIES

The following article is a reprint of "Chemical Warfare Intelligence Bulletin 3" emanating from the office of the Chief of Chemical Warfare. It comprises an excellent summary of information on developments in incendiary munitions, and as such would be of interest to readers of Tactical and Technical Trends.

* * *

The past year has seen changes in design, construction, and tactical use of incendiaries on the part of all warring nations. Each of the Axis nations has developed new types of aerial bombs and incendiary munitions, with Germany taking the lead. This bulletin provides information on these changes, with a chart which gives a late compilation of all known types of enemy incendiary bombs.

a. Germany

The outstanding incendiary developed by the Germans during the past 12 months has been a combination of an antipersonnel and incendiary bomb. Using the 1-kilogram (2.2 lbs.) incendiary as a base, they removed the explosive charge from the tail and added a steel extension to the nose, containing a much more powerful charge (at first thought to be TNT but later believed to be a picric acid derivative) and fuze. This change was due to the British having perfected a plan for combatting the regular oil, thermite, or magnesium incendiaries and to the civilian personnel having become thoroughly trained in defense measures.

The effect is essentially as follows: If fire wardens attempted to put out the fire as in the case of ordinary incendiary bombs, the explosive nose -- timed with a fuze to go off in from 1 to 5 or more minutes -- would catch them unawares. In some cases the bomb might break in half and the two portions could roll in different directions; thus, while fighting the incendiary section in one location, the fire warden would be endangered by the explosive portion, possibly lying unnoticed in a dark corner. With a lethal velocity 50 feet from the point of explosion, this new-type bomb has meant a delay of 5 to 7 minutes in effective defense measures.

Another type recently developed contained a canister of small incendiary units scattered by a large high-explosive charge. As the bomb bursts, it throws out about 60 metal containers with a thermite-type filling, and 6 pre-ignited firepots of the magnesium electron type. Immediately thereafter the TNT detonates. The weight of this incendiary bomb (110 lbs.) insures penetration, and the explosive charge (16 pounds of TNT) produces a definite demolition effect, wrecking partitions, doors, ceilings, flooring, etc.

A 50-kilogram (110-pound) bomb, with a filling containing 10 percent rubber and 4 percent phosphorus in an oil gel base, has been used with questionable success as an incendiary agent, phosphorus burns occasionally being inflicted on personnel. Some pieces of gel remain exposed to the air a considerable time without catching fire, while others start smoking and ignite after only a few minutes.

[Initial information on the 3 incendiaries above appeared in Tactical and Technical Trends No. 6, p. 21.]

b. Italy

While to date not actively engaged in any large-scale utilizations of incendiary bombs, the Italians have produced a 1-kilogram type similar to the German, and in addition have developed two new ones. One of these, a 43-pound type, may be mistaken for the Italian 50-kilogram torpedo-type bomb; the other, a 62-kilogram bomb, carries a filling of 54 pounds of thermite.

c. Japan

The chart shows graphically several types of Japanese incendiary bombs which depend mainly on thermite, phosphorus, and oil. This may indicate a magnesium shortage. They have experimented also with the use of parachute-borne incendiaries, with action delayed in some cases up to 6 hours. One type used in the Philippines was made of a pasteboard composition. Stains and odors found near points of explosion indicated that they contained picric or sulphuric acid. However, the incendiary effect was limited.

[See Tactical and Technical Trends No. 12, p. 17 for information on incendiaries dropped on Rangoon by the Japanese.]

Two incendiaries were dropped by an unidentified plane on Mt. Emily, near Brookings, Oregon, in September 1942. Parts and fragments of one were recovered. The fuze had Japanese characters stamped on it; apparently the bomb was 125 to 150 pounds, with a nose of metal twice as thick as the body; it was evidently not a production job, but an adaptation from a mortar shell. Some 35 or 40 triangularly shaped pellets with a round hole in the center of each were recovered. They appeared to be of a hard rubber composition impregnated with particles of magnesium; it is also possible that a thermite mixture was in the bomb. (Note: In some cases this filling is believed to contain additional chemicals and organic materials, which may appear in later type bombs.)

See chart, next page, for other German, Italian, and Japanese incendiary bombs.

Known Types Of Enemy INCENDIARY BOMBS ÷ *As Of December 1, 1942*

ORIGIN AND SIZE	LENGTH (OVERALL)	DIAMETER	WEIGHT (FILLED)	CASING	FILLING	FUZE	CHARGE	REMARKS
GERMAN-						(PERCUSSION CAP WITH STRIKER		
1-kg.	14"	2"	2.2-lb.	Mg. Electron	0.2-kg. TH.		¼ lb. TNT or Picric Acid	Aluminum Color. Usually In Cluster of 120.
1-kg. (I.B.E.N.)	20¾"	2"	6 - lb.	Mg. Elec. & Steel	TH. & TNT.	"		Green.
2-kg.	15"	3"	4.4-lb.	Metallic Mg.	TH.			Similar to British ARP Practice Bomb.
5-kg.	18"	2¾"	10-lb.	" "	"			
10-kg.	22¼"	3¾"	22-lb.	" "	"			
12-kg.	23"	6½"	25-lb.	Mg. Electron	8.5-kg. TH.	D.A.		
50-kg. (B.L.C.)	43"	7¾"	110-lb.	Thin Steel	Al. Powder & TH.	No. 9.	12 lbs. TNT.	
50-kg.	43¾"	8"	75-lb.	Machined Steel	Mg., Gunpowder, TH.	No. 28 A.	20 lbs. TNT.	Green Tail & Nose. (Sprengbrand C-50).
50-kg. (S.C. Type)	43"	8"	90-lb.	" "	Benzine 86%, P. 4%, Rubber 10%	No. 25 B	16 lbs. TNT.	Green Nose & Body With Red Band Around Middle. Dark Gray Tail - Yellow Stripes On Cone.
110-kg. (C-250)	64"	14½"	240-lb.	Sheet Steel	50 kg. Oil	ELA Z-26 Pale Green	2 lbs. TNT.	Green (and Red). Nose & Tail Rings Blue. 2 Red Bands
550-kg. (C-500)	65"	18"	460-lb.	Sheet Iron	Oil		H.E. Burster	⅞" Red Band 9.5" & 33" From Nose.
FRENCH-								
1-kg.	14½"	2"	2.2-lb.	Mg. Electron			Gunpowder	Red Body, Green Tail. Conical Tail Assembly - 8 Vanes.
1-kg.	14"	2"	2.2-lb.	" "				" " " " Cylindrical - German Type Tail.
10-kg.	22"	3½"	17.6-lb.	Steel Nose, Mg. Body	12 Mg. Tubes	Type H		" " " " Sheet Steel Tail.
JAPANESE-								
1-kg. (AP & IB)	10.2"	3"			Red Phosphorus	Detonator	Picric Acid	Black Body, White Tail.
15-kg.					TH. or WP.		Bl. Powder Burster	
50-kg.	40"	7"		⅛" Drawn Steel	Rubber; P. Pellets	No. 97	TNT.	Blue Gray, White and Red Bands.
50-kg.	40"	7.9"	156-lb.	Steel	Electron & TH.	No. 97	Black Powder	Light Gray, Tail Fin Supports Red.
60-kg.	43"	9.5"	132-lb.	Steel Inner Case	TH., Paraffin, Kerosene	No. 97-Nose	Bl. Powder Burster	Blue Gray - Red Band at Tail.
60-kg.	41.6"	9.5"	132-lb.	" " "	Solid Oil & TH.	No. 97	Black Powder	" " - Red Tips of Tail Vanes.
70-kg.			150-lb.	½" Mg. Alloy	TH.			Gray Body, Green Fins, Red Tail Assembly.
ITALIAN-								
1-kg.	7"	2¾"	2.2-lb.		0.8-kg. TH.	K (Tail)		Gray Body - Black Nose.
2-kg.	12½"	2"	5-lb.	Mg. Electron	TH. - Oil	"		" "
20-kg.	34"	6½"	45-lb.	"	TH.	E (Tail)	Al. Powder, Fe. Ox.	" "
62-kg.	47"	10"	136.7-lb.	"	54-lb. TH.	G (Tail)	Mg. Powder	Steel Cap on Nose.
100-kg.	53½"	10¾"	220-lb.			X (Nose)		

Abbreviations:

LB. - Incendiary Bomb. E.N. - Explosive Nose. A.P. - Anti-Personnel. Mg. - Magnesium. Elec. - Electron. TH. - Thermite.
Al. - Aluminum. P. - Phosphorus. WP. - White Phosphorus. H.E. - High Explosive Bl. - Black.

c. Other Incendiary Munitions

(1) Grenades

Under this heading is grouped information regarding frangible grenades ("Molotov Cocktails"), antitank grenades, and similar weapons.

The German "T B" hand-thrown prussic acid grenade is a glass cylinder approximately 4 inches in diameter, packed in sawdust in a cardboard container, and the container packed in sawdust again inside a metal canister.

The Japanese have a similar type, filled with prussic acid, several cases of these grenades having been washed up on the beach in the beginning of the Malayan campaign. As HCN may inflame, it must be considered as an incendiary as well as a toxic agent.

From Russia have come unconfirmed reports of the use by the Germans of incendiaries (frangible grenades dropped from planes?) to set fire to the high grasses of the steppes.

An Italian incendiary grenade, devised for close defensive work against tanks and armored vehicles, consists of a quart of gasoline in a glass bottle fitted with a metal cap. An igniter fuze, match, and wooden handles are attached to the side of the bottle. For distances of 65 feet or more, a safety device is utilized which operates after a long trajectory.

The Japanese developed a grenade in the form of a liquid-filled beer bottle stamped "B Kirin Brewery Co. LTD." The fluid is essentially coal tar. This bottle is equipped with fuze, safety lid, and safety pin.

(2) Shells

The German Schwere Wurfgerät 40, mounted on an armored half-track vehicle for field use, is a weapon for firing both high explosive and incendiary ammunition. The latter is reported to be as follows: weight of projectile, 174 pounds; filling, 11 gallons of oil; markings, green and yellow band. The projectile is reported to be a rocket type, fired electrically, with a range of over 2,000 yards.

[See Tactical and Technical Trends No. 8, p. 28 and No. 12, p. 12 for additional information on this weapon.]

(3) Disks

Samples of incendiary disks, used by the Germans to fire crops, woods, fields, etc, have been examined. They appear to be made of sponge rubber - colored bright yellow - and catch fire spontaneously, forming a black oily substance. Roughly oval in shape, 3/8-inch thick (the largest being 9 by 16 inches and the

smallest 4 by 3 inches), they are harmless when wet, and may be moved in this condition to a safe place where they can dry and burn themselves out.

(4) Tracer Bullets

A 13-mm (0.514-inch) incendiary tracer bullet used by the Italians is similar in appearance to their 13-mm explosive bullet, except that the body is colored blue instead of red.

ENGINEERS

8. JAPANESE CAMOUFLAGE GARMENT

The garment shown in the accompanying sketch was captured in the Solomons area. A number of similar garments were found packed in bales, and in at least one instance, one was found on a Japanese sniper shot out of a palm tree by U.S. marines.

It is made from the shaggy, reddish-brown fiber that grows at the base of the fronds of the coconut palm tree. Sheets of this fiber are sewed together to form the garment.

It can serve as a camouflage garment to be used in areas where there are quantities of coconut palms. It has been used by snipers strapped in among the fronds of palm trees, and it could also be used effectively on the ground under suitable color conditions.

Comment: This type of garment is widely used in Japan as a raincoat. Those made of coconut palm fiber are used by Japanese fishermen, while the Japanese farmer makes his with reeds or rushes.

9. TRAINING OF ENGINEER UNITS

The following remarks on British training problems for engineer units are presented in order to indicate methods of obtaining thorough performance and creating realism in the technical elements of field exercises.

a. Umpiring

In training exercises an unusually large number of umpires are assigned to Division and Corps engineer units. One senior umpire is assigned to each Headquarters and three officer umpires are allotted to each Field Company. In the case of an exercise including large numbers of minor demolitions, a number of noncommissioned officer umpires are added. Each officer is provided with

Japanese Camouflage Garment

his own transportation and also has at least one motorcycle messenger.

Umpires are instructed to give full consideration to technical as well as tactical details of operations. For example, in the case of demolitions, umpires are reminded that in actual combat no large demolition plan ever functions at 100 percent efficiency. Where there appears to be a valid reason to suppose that a demolition might not function (e.g., because of inadequate waterproofing precautions in appropriate cases) the demolition might be ruled a failure or a partial failure.

b. Demolitions

In order to emphasize the selection of explosives available in combat, and their limited quantities, wooden blocks to represent standard charges, sand to represent bulk explosives, packets of gravel to represent special types of explosive charges, and varied kinds of cord and string to represent primacord, safety fuze, and instantaneous fuze are prepared and carried by troop units. Each time a demolition is prepared, the correct amount of dummy explosive is placed in position. When the unit's supply of dummy explosive is exhausted, no more demolitions can be prepared until additional stores are received.

When the camouflet method is used in a cratering operation, units are required to drive a hole in some suitable nearby waste ground, to fire an actual camouflet charge, and then to fill the chamber produced with an adequate amount of dummy explosive.

No demolition is considered complete unless the demolition party actually fires a primer or a small, token explosive charge as near as practicable to the site of the planned demolition.

c. Repair of Standard Bridge Equipment

After a simulated shelling or bombing of a temporary bridge, the umpire directs the actual removal of those parts of the bridge considered to have been destroyed or badly damaged. The removed parts cannot be used again during the exercise. This procedure emphasizes the need for adequate spare elements of standard bridges and of bridge materials for improvised structures. It also brings out the necessity for having adequate transportation equipment and maintenance parties required for the repair of structures during actual operations. It is apparent that these lessons are not learned if the umpire merely rules a bridge out of action for a specified period of time.

In the case of enemy demolitions, opposing troops are in many cases presented upon arriving at a structure with a sketch depicting the existing condition of the structure. In case repair of an existing bridge is possible, passage is allowed over the original bridge once the requisite materials have been produced at the site and working parties have been there for the time calculated as necessary to effect the repairs.

10. GERMAN METHODS OF CLEARING MINEFIELDS

The following report shows the Axis methods of clearing minefields during the attack on the El Alamein front in August 1942.

a. During the Night

(1) Three or four men worked with spades, picking up mines to make one narrow gap. Immediately behind each man was a mechanized vehicle covering him with its weapons. As the digger moved a pace or two forward, the vehicle followed. No lights were visible.

(2) Transport or mechanized vehicles were driven straight at the minefields in an attempt to find at least one clear route through.

(3) It is not known whether or not this was successful, as the British abandoned the first minefield before daylight. Mines were seen to explode, however, and it is considered that several vehicles must have been destroyed.

b. Daylight

(1) Mechanized vehicles advanced about 50 yards apart on a front of about 400 yards. In front of each vehicle were men picking up mines covered by the weapons of the armor. Between the tanks, infantry advanced across the minefield in line, about 3 yards apart, with bayonets fixed. In one area, an infantry gun was seen being brought into position on the near edge of the minefield, covering the advance.

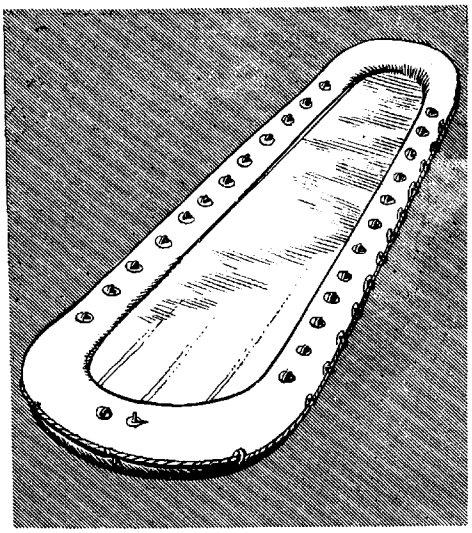
c. General

(1) Artillery fire was concentrated on the far edge of the minefield before the advance began. This fire appeared to be on areas selected for the breakthrough.

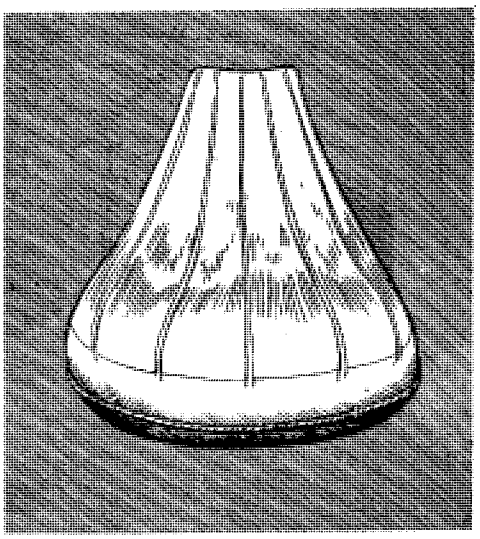
(2) No attempt was made to clear mines before the moon was up.

11. GERMAN LARGE PNEUMATIC BOAT

This German pneumatic boat is 31 1/2 feet long. It is similar to their 18-foot type, except that both ends are prow-shaped, and have a rake. The weight is approximately 800 pounds. (See accompanying sketch).



General View



View of Bottom

When deflated the boat rolls up into a cylinder 8 feet 6 inches long, and 2 feet 9 inches in diameter. The floor boards fold into a square bundle 2 1/2 by 2 by 3 1/2 feet.

The boat contained the following equipment: a number of plugs for temporary repair; 4 paddles, each 5 feet 3 inches long; two bellows-type footpumps for inflating; and wooden gratings for stiffening the floor.

The method of inflation is by using footpumps attached to the two inflation valves, one of which is located at each end of the boat. It is possible, however, to inflate the boat by using only one of the valves. The boat has eight compartments, each of which is fitted with a valve to permit passage of air from the adjacent compartment. During inflation all valves are open, but upon completion of inflation these valves are closed, thereby separating the boat into compartments. Should one compartment become damaged, the hole can be repaired, and a balanced pressure obtained by opening all valves.

As a result of trials, the boat was found to have a capacity of 26 men. Estimated capacity for men with full pack was 24.

Using 10 paddles, the boat made 2 knots in calm water, with 24 men aboard. An additional paddle was used for steering.

The boat was towed with 24 men aboard, one operating a steering paddle, at various speeds up to 9 knots. Above that speed, the boat had a pronounced tendency to buckle and was no longer safe.

Comment: The design of the boat, with tapered prow and rake, does not lend itself to the attachment of an outboard motor as easily as does the flat-bottomed 18-foot German boat. The rake undoubtedly helps in rough water.

The skids under the bottom seem to provide a definite advantage in beaching, under conditions when the boat is used either in assault crossings or landing operations. These skids are made of ordinary garden hose, seated in a rubber base so that they will fit flush against the bottom of the boat. The base and hose, after attachment to the bottom of the boat, are covered with a strip of fabric about 6 inches wide, which effectively seals the skid to the bottom of the boat.

It was not possible to determine if the material from which the boat was made was rubber or synthetic rubber. It was repaired, however, with ordinary rubber patches. There were no cementing troubles. The boat is not vulcanized.

12. ITALIAN SMALL-SCALE COUNTERATTACKS

The inferiority of the Italian to the German Army is apt to obscure certain Italian qualities which it would be unwise to ignore. Among these is the skill and promptitude of Italian small-scale counterattack from prepared positions. During the battle of Keren in Eritrea, for example, the Italians, through this tactic, succeeded more than once in dislodging the British from newly taken positions.

Since many junior Italian officers have not been sufficiently trained, these counterattacks do not always materialize. But, whenever the junior officer happens to be well trained and keen, he may prove to be a formidable opponent, and preparation to meet such action should be taken whenever fighting against the Italians.

In this type of operations, the excellent Italian 81-mm mortar (see Tactical and Technical Trends, No. 11, p. 44) plays an important role. It is significant that the 81-mm mortar allowance of the Italian infantry division in Italy has recently been increased from 24 mortars to 36, and to 45 in the latest type of motorized division. However, it remains at 18 in the North African theater.

Since July 1942, there have been three separate occasions when Italian resistance in Egypt has been an unpleasant surprise. In all of these, they were dug in and deployed in very favorable positions. At least once the 81-mm mortar was identified, and caused considerable damage.

13. INITIAL ACTION ON THE EL ALAMEIN LINE

In the initial stages of the recent British offensive in Egypt, the 51st Highland and 9th Australian Divisions were assigned the mission of pushing a salient through the minefield in the northern sector of the El Alamein line, where the terrain is absolutely flat. After a penetration had been achieved, the British X Armored Corps was to move through and fan out in rear of the Axis positions. Because of the effective fire with which the Germans and Italians covered the minefield, most of the operations had to be conducted at night, and sufficient time allowed after completion to permit the infantry a minimum of 4 hours to dig in, construct their own fortifications, and prepare to resist any Axis counterattack.

The Australian division, which was in the extreme northern position, employed two regiments forward and one in reserve. The regiment on the right flank used one battalion forward on a front of 1,000 yards. In addition to the mission of attacking frontally, this battalion also had the task of securing the northern flank of the salient opened up by both the British divisions. The left flank regiment of the Australian division used two battalions forward and one in reserve, and coordinated its advance closely with the 51st Highland Division's right flank elements, which were immediately south of them.

The Australian division, operating on a 3,000-yard front, was heavily reinforced with artillery and was reported to have used 336 guns. Thirteen of these artillery regiments (probably about 300 guns) used 25-pounder weapons. In general, the preparation by the artillery was set to begin 20 minutes before H hour, and all guns were employed in counterbattery work for 15 of the 20 minutes. It is stated that in general the British employed their artillery on counterbattery missions at a ratio of 20 to 1 (presumably this means for all divisions at the front).

The tremendous artillery barrages were apparently extremely effective, and it is reported that for 2 hours after the initial attack was launched the German artillery was practically silent, unable to answer requests from their own infantry for defensive fire. Mention is made of attacks supported by a rolling barrage which was moved forward at a rate of 100 yards every 2 1/2 to 3 minutes, but it is not apparent whether this reference is to the British operations or to the heavy Axis counterattacks.

One observer in this theater believes that the tank has definitely been beaten by the antitank gun, and consequently the use of the tank in forward positions will be primarily strategical rather than tactical. He predicates this conclusion on the fact that the German 50-mm antitank gun and the British 6-pounder (57-mm) antitank gun, as well as higher calibers, can effectively disable any tank used today. The same observer also points out that mines have assumed major proportions in any defensive system, since infantry are prevented from making direct contact with the enemy until they have cleared and crossed intensive minefields swept by the defensive fire. Apparently, the British attack did not come as a surprise to the Germans, who expected it any time after October 14. The exact sector in which the main effort was to be made, however, was definitely not known to the Axis, and the British infantry thereby gained tactical although not strategic surprise.

14. JAPANESE TACTICS AND THE EMPLOYMENT OF PARACHUTE TROOPS

The following report was obtained from observers who watched the Japanese employment and tactics of parachute troops during the occupation of Timor.

Twenty to twenty-five troop transports approached supported by bombers and fighters. The bombers flew in flights of nine in V formation.

There was no wind, and the operation took place in bright sunshine at 0830.

The objective on each occasion was a position astride our line of communication. The area chosen was comparatively flat, and covered partly with high palm trees, in places 15 to 20 feet apart, and partly with thick underbrush. There was absolutely no air opposition, and the objectives chosen were about

a mile and one-half from the nearest forward defended area, and about 5 miles from the fixed defenses.

Descents were made on 2 successive days; on each day approximately 350 parachutists were dropped, making a total of 700, which is believed to be a battalion. The jump was made from a height of 300 feet, while escorting planes bombed and machine-gunned the area. It is also reported that troops carried and fired Tommy guns during their descent.

It is estimated that each transport carried 15 to 24 parachutists, organized in groups of 6 to 8 men each.

There were apparently no containers either for arms or supplies. Men carried radio-telephone sets with batteries, and compasses were strapped to the wrist.

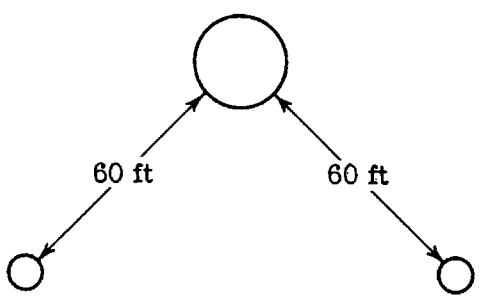
Emergency rations were carried in cellulose wrapping and consisted of rice and dried compressed fish.

Section commanders' parachutes were blue, and platoon commanders', red. Uniforms were green, buttoned to the neck, and rubber boots were worn.

15. GERMAN CONSTRUCTION AND DEVELOPMENT OF STRONGPOINT

The following steps are reported to be typical of German methods in the construction and development of a strongpoint.

STEP I Antitank gun position (diameter 13 ft, depth 1 1/2 ft).

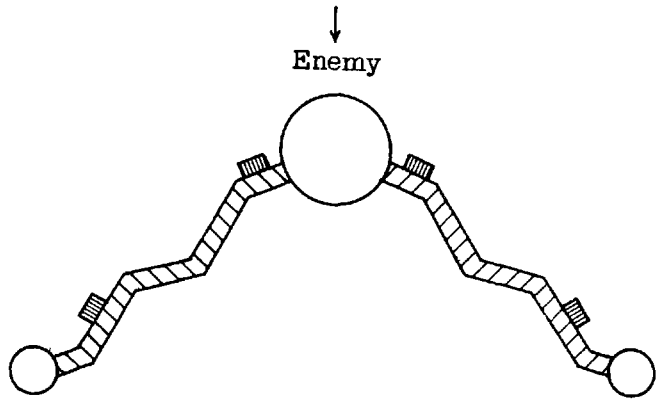


Machine-gun position (diameter 5 ft, depth 5 ft).

All three positions must be chosen so that each has an all-round field of fire.

Whenever possible, rocky ground which is likely to be exposed to heavy enemy fire must be avoided. Officers themselves should lay out the positions with the greatest care.

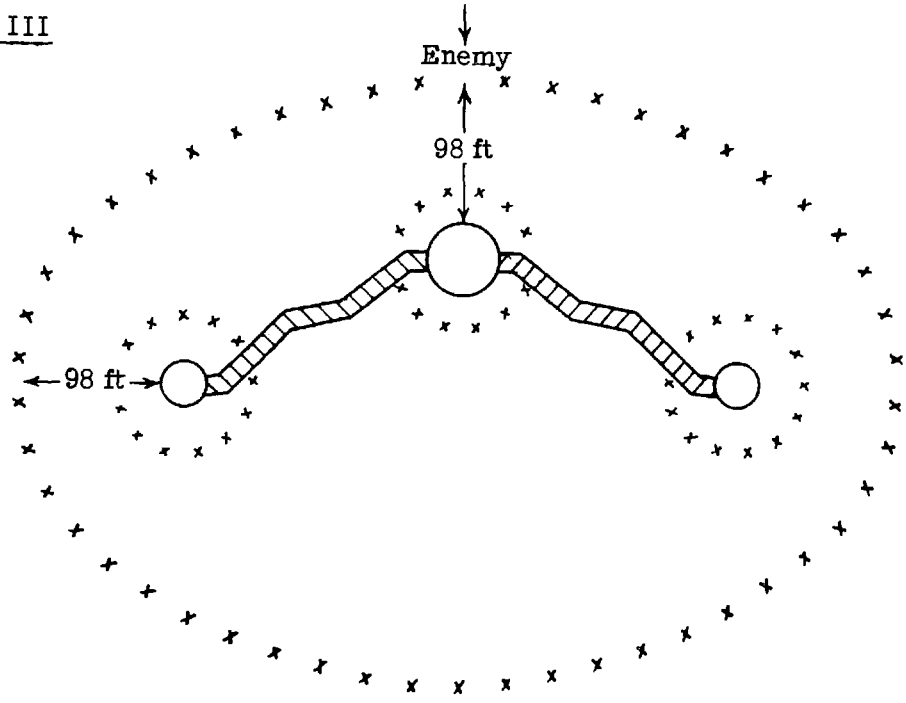
STEP II



Communication trenches, 5 feet in depth, between the three positions and dugout will be added.

Later, the trenches will be covered with boards and stones in order to make them splinter-proof and difficult to recognize from the air.

STEP III



(a) Wiring of the strong point;
(b) Laying of antitank mines in the wire;
(c) Wiring of individual positions (antitank and machine gun);
(d) Covering of communication trenches between the positions.

16. GERMAN ASSAULT DETACHMENTS

a. General

The flexibility of organization and willingness to form special groups, which is characteristic of the German army, is illustrated by the small parties known as Stosstruppen (assault detachments) formed to attack enemy positions.

This term has often been loosely used, even by the Germans themselves, to denote any assaulting troops.

A German Army High Command paper gives the following essential characteristics of an assault detachment:

(a) Specially formed for a particular object;
(b) Composed of picked men, normally volunteers;
(c) Specially equipped for its tasks;
(d) Specially trained, and, if possible, rehearsed for the operation.

It will be seen that an assault detachment is necessarily, therefore, something to be employed only in position warfare, however temporary the enemy's defensive positions may be; and that although it is principally drawn from the infantry, it will make use of other weapons besides those normal to the infantry, and will be reinforced by engineers.

The occasional nature and varying composition of assault detachments do not prevent the regular training of troops for this employment. The High Command paper referred to above observes that this method of attack was everywhere practiced during the winter 1939-1940 in view of the prospective attack on the Maginot Line and the extended field fortifications in Belgium and Holland; and that this constant practice caused attacks by assault detachments to be the one operation which the mass of the German infantry had thoroughly mastered by the spring.

b. Composition, Armament, and Equipment

Information secured during the campaign in the Western Desert last winter gives details of assault detachments which it is believed were to be used against Tobruk. From these it is possible to infer the teaching of German manuals.

The following elements are regularly included:

(1) Wire-cutting party (Hindernissprengtrupp, Sperrensprengruppe) of three or four engineers, with wire-cutters and bangalore torpedoes.

(2) Pillbox attacking party (Schartensprengtrupp, Stosstrupp, etc.) of four or eight men. This normally includes four engineers with two flame-throwers: pole and other charges may also be carried. The infantrymen are armed with hand grenades, or even with one or two light machine guns.

(3) Smoke party (Nebeltrupp) of two or three men armed with smoke candles and smoke grenades, or even with a mortar for firing smoke.

(4) Infantry support or covering party (Deckungstrupp) of varying size. It may be only 2 or 4 men with 1 or 2 light machine guns, or as many as 17 with light machine guns, heavy machine guns, 3-inch mortar, AT rifles, or even an AT gun.

There is also usually:

(5) Supply party (Nachschubtrupp) of varying size, from the infantry; often 15 men. For their function, see below. They may further be used to carry reserve ammunition.

The following can also be included:

(6) Bridging party (Bruckentrupp) of 3 or 5 men. More than one party may be taken. These may be engineers, or for simpler tasks, infantry; e.g. two parties of 4 infantrymen may carry planks and ladders for crossing an antitank ditch, and at the same time be responsible for carrying away captured materiel (Beutetrupp).

(7) Mine-searching party of 2 men with a pack radio set: this has only been found in one very elaborate detachment.

Those taking part are armed partly with rifles, partly with pistols or submachine guns. Ammunition is carried in the jacket pocket, not in pouches. All are armed with hand grenades, which may be carried in a special haversack. Spades and pickaxes are carried by some, and at least one Very pistol; panels are sometimes carried for air-ground communication. The troops wear field-service uniform with steel helmet and gasmask, and carry iron rations and canteen. The remainder of their equipment is brought up by the supply party.

An assault detachment may total anywhere from 14 to 40 men, and sometimes as many as 4 detachments may be sent out together. Detachments are organized under battalion or company arrangements, according to the size of the task. Engineers will be provided from the regimental pioneer platoon or from the divisional engineer battalion: always from the latter, when flame-throwers are used. Close-support weapons are allotted as necessary.

c. Employment

In action, the first task is a thorough reconnaissance. The assault is planned in great detail, and the assault party depends for success on coordination of the various arms supporting it. Once the attack commences, unified command is impossible. It is therefore necessary that the assault should be so organized as to run itself.

The course of a typical attack on concrete fortifications is as follows: The attack is preceded by a short artillery concentration on the objectives. Then the artillery puts down smoke, under cover of which infantry and their supporting weapons get into position at short ranges. These supporting weapons will include AT guns and possibly field guns, placed under command of the infantry, as well as heavy machine guns, mortars, and infantry guns.

When the smoke clears, all weapons open fire on the loopholes allotted to them; and under cover of this fire the infantry and engineers move to the assault.

The assault on casemates or pillboxes can be made in several ways; all depend on the principle that if you are near enough to a casemate or pillbox, you can get inside the angle of fire of its guns and be safe. Casemates however will usually be placed so that they are covered by machine-gun fire from their neighbors; and therefore they can only be attacked in this way either if supporting fire keeps the embrasures of neighboring casemates shut, or if more smoke is put down to isolate the particular fortification to be assaulted.

The actual attack on casemates may be made either with explosives or with flame-throwers.

Infantry can sometimes get close up under the embrasures and push grenades inside. Engineers, who carry more powerful charges, can blow up casemates and attack embrasures which they cannot reach by mounting charges on the ends of poles. These pole charges are a common engineer weapon. The infantry can improvise a similar charge by tying the heads of six stick grenades around a complete central grenade.

Two sizes of flame-throwers are carried by the engineers. The range of both is claimed to be about 30 yards, but may in practice be no more than 20 yards. The smaller gives a jet for 10 seconds, the larger for 25. The larger has to be hauled on a two-wheeled cart.

17. DEVICES FOR CROSSING STREAMS

The following report shows a method of crossing streams used by forces operating in India. By this method, swimmers or non-swimmers have been able to cross streams with full packs and sidearms.

The requirements are a bamboo or wooden pole 14 feet or more in length, and about 3 inches in diameter; practice if there is time; confidence and strict obedience to instructions.

The method used is to float the pole into the water at the edge of the river, and wade in keeping the pole to the front. When about chest deep, the pole is placed in a vertical position facing the direction of the current, i.e. upstream. The end of the pole is then forced down until it is between the feet; the pole is

held firmly between the feet and knees. It is easier for beginners if they hold the pole by crossing the feet over, and then between the knees. The pole is then held between the insteps.

To float, the body is inclined slightly forward while the pole is held firmly between the feet and knees.

The important point is that the knees must not be bent and the pole must be firmly gripped.

It will be found that the upper end of the pole will project out of the water about 2 feet in front. Direction can be maintained by paddling with the hands. No attempt should be made, or need be made, to grasp the pole with the hands.

Provided that the butt remains between the feet, and that the knees are not allowed to bend, one is bound to remain afloat and right side up.

A toggle and loop device for river crossing is believed to have originated with the Commando troops. Each man carried a 4-foot length of rope with a loop at one end and a toggle at the other, as shown below. By linking several of these together, ropes of various lengths are made, which are very useful in overcoming obstacles, crossing streams, etc.

Toggle and Loop

18. CONSOLIDATION AFTER A COUNTERATTACK

A newly won position must be rapidly organized if it is to be held successfully. During the May-July 1942 fighting in North Africa, British troops successfully attacked a desert depression, but were then counterattacked and overrun by a superior force of German troops. The following points of interest were noted in enemy methods of consolidating the position.

Enemy salvage parties came in and began recovering vehicles and antitank guns before the evacuation of prisoners of war had been completed.

During the day the enemy used the depression very skillfully as an assembly area for tanks and antitank guns, with the tanks in hull-down positions. Tanks and guns were concentrated at any point where a threat appeared to develop or a target presented itself. The enemy appeared to operate on a shift system, fresh tanks coming up during the day to relieve those on duty.

At night the enemy had listening posts on a line marked by yellow lights showing only to the rear. The area immediately behind his outpost position was constantly covered by light mechanized patrols. Dogs are reported to have been used in conjunction with the listening posts.

A further report on the same action lays stress on the role played by tanks in enemy defensive practice. The enemy keeps groups of tanks stationed along the whole line of the position, behind the forward line. Attached to each group is a reconnaissance vehicle of the Volkswagen type (comparable to U.S. 1/4-ton), which moves about continuously and whose role is to lead the tanks against any hostile attacking party. The tanks are ready to operate at any time during the night, provided there is sufficient moonlight to give them some field of view.

19. INCREASED PROTECTION ON GERMAN TANKS

Recent Middle East reports point out that the Germans are taking considerable pains to provide additional protection for their tanks. Thus far, the measures employed for this purpose may conveniently be considered under two main headings, namely, spaced armor and improvised protection.

a. Spaced Armor

More detailed information than that previously submitted on the Mark III tank indicates the extent to which these improvements have gone. The accompanying sketches, based on actual photographs, illustrate typical arrangements of spaced armor on this tank and throw some light on these developments.

Figure 1 illustrates the general appearance of the tank when fitted with spaced-armor; figures 2 and 3 are side views of spaced-armor arrangements on the front superstructure and gun mantlet; and figure 4 is a perspective view with the spaced plate of the gun-mantlet assembly removed.

SPACED ARMOR -- GERMAN MARK III TANK

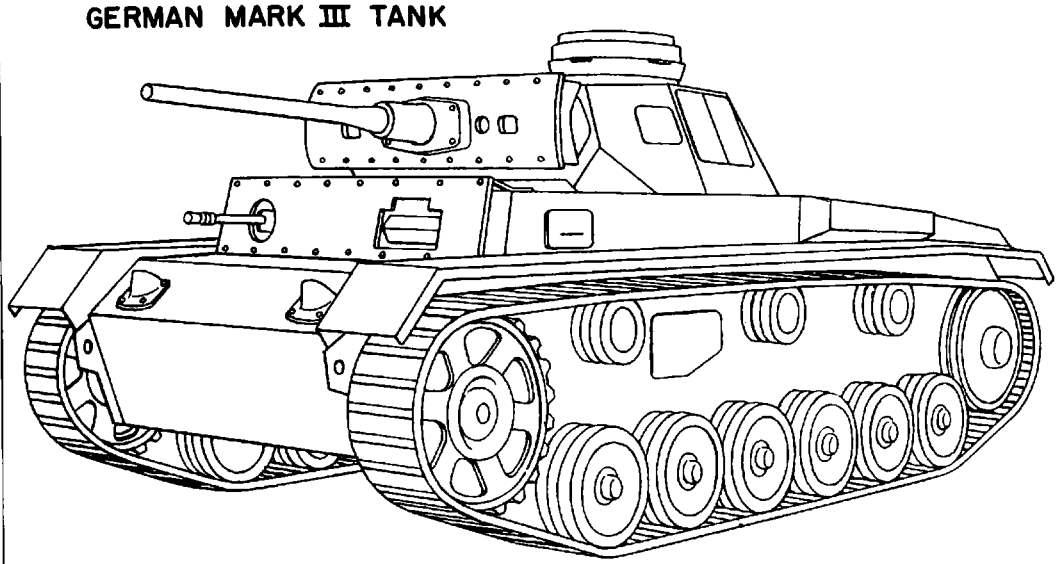


FIG. 1

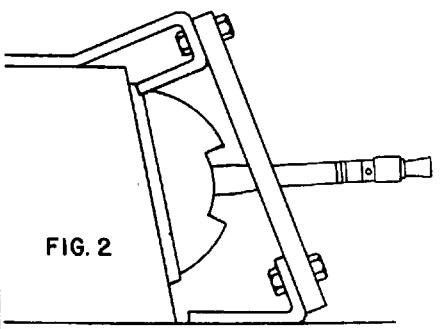


FIG. 2

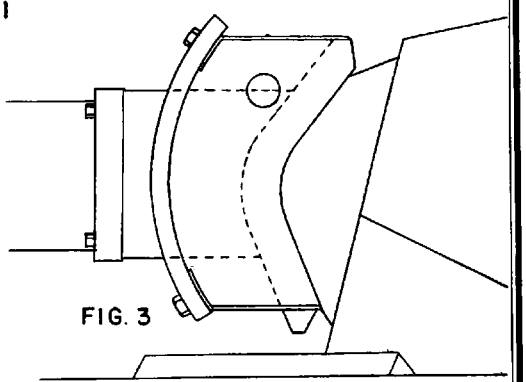


FIG. 3

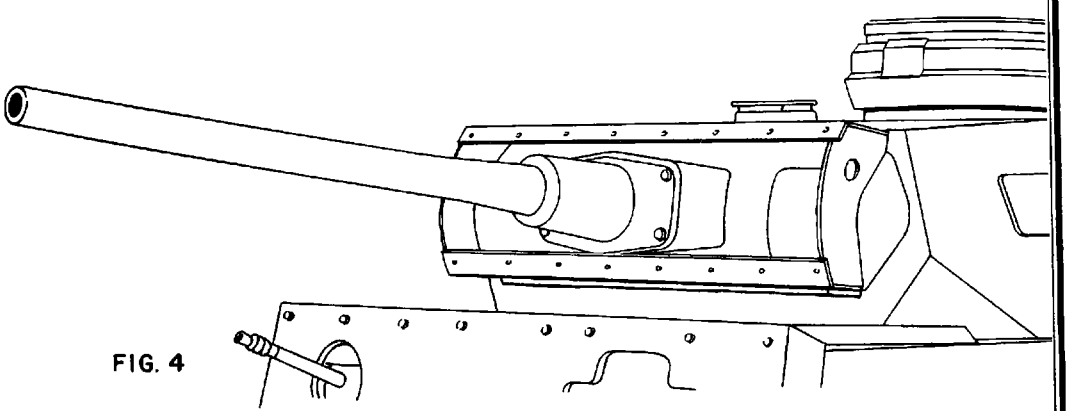


FIG. 4

The arrangement of the spaced armor on the gun mantlet appears to be more or less uniform in all the photographs so far received. In all cases the additional plate on the mantlet is curved, as shown in figure 3, and forms the front wall of a box structure, the rear wall of which is constructed of the 50-mm front shield of the gun mantlet, and the sides, top, and bottom are formed by thin sheet-metal plates arranged as shown in figure 4. In one example recently examined in the Middle East, the additional plate was 20-mm thick and was separated from the mantlet proper by an air space of approximately 120 mm (4.7 inches), the air space being somewhat larger than this at the top and somewhat smaller at the bottom.

The spaced armor on the front superstructure is arranged in at least two different ways, the sides for the air space sometimes closed, and sometimes open.

In this tank, the sides of the space between the front of the superstructure and the additional plate were closed by thin sheet metal, the only purpose of which was apparently to keep out the dust. The additional plate was fixed parallel to the 50-mm front plate of the superstructure, from which it was separated by an air space of 100 mm (3.9 inches). It was 20 mm thick and of machinable quality, Brinell hardness tests giving a figure of about 350 on both sides.

In another tank recently examined in the Middle East, the air space in the front superstructure assembly was open-sided. The space plate, which was again 20 mm thick and of machinable quality, was bolted to angle iron supports at the top and bottom; those at the top were welded to the roof of the superstructure, and those at the bottom, to the front sloping top plate of the hull. In this case the additional plate was arranged at an angle to the basic plate as shown in figure 2; the space at the top measured horizontally 108 mm (4.25 inches), and at the bottom 195 mm (7.68 inches).

In every case the additional plate on the front of the superstructure is formed with two openings, one to accommodate the driver's visor and the other for the hull machine gun. It is reported that these openings are such that the fitting of spaced armor does not seriously affect the traverse and elevation of the machine gun and does not in any way impair the driver's vision.

Although, in these two tanks, the additional plate was of machinable quality, a sample from a third tank appeared to be face-hardened, the Brinell value of its front surface being 468, against 359 on its rear surface.

So far, spaced armor has only been reported on the J series Mark III tanks with 50-mm basic frontal armor and the new long 50-mm gun. Since, however, the fitting of spaced armor is probably at present in an experimental stage, it may be found on other models of the Mark III or even on the Mark IV. If it proves a success, it will no doubt be standardized in due course.

b. Improvised Protection

Middle East also reports that German tanks are now frequently provided with improvised additional protection in the form of sand bags attached wherever possible, and lengths of track secured over vulnerable parts. (See Tactical and Technical Trends, No. 13, p. 33).

It is common for some of the sand bags to be arranged on the roof of the superstructure in front of the turret so as to shield the turret joint and the space below the bottom of the gun mantlet, and others around the front and sides of the superstructure. Precautions are taken so as not to obstruct the driver's vision or the free elevation and traverse of the ball-mounted machine gun.

Lengths of track are usually attached across the upper and lower nose-plates. They have also been found secured on the front of the superstructure between the driver's visor and the machine gun, as well as draped over the top of the turret and gun mantlet.

The length of track across the lower nose-plate is generally held in position by means of a transverse bar welded to the plate at its ends, while that on the upper nose-plate has been found attached by S hooks to the air inlet cowls of the track brake cooling system.

20. ITALIAN TANK SIGNALS

The following report gives some Italian tank signals used by Italian forces operating in the North African theater.

(a) A triangular white (wooden) signal;
Shown repeatedly, means, "Pay Attention."
Shown continuously, "Go on or Stop" according to whether the signal is made at the halt or on the move.

(b) A triangular white signal above a triangular red signal;
Shown repeatedly, "Increase distance and space between tanks."
Moved sideways intermittently, "Form line."
Moved sideways continuously, "Form wedge."

(c) A triangular red signal above a triangular white signal;
Shown repeatedly, "Reduce distances and spaces between tanks."
Moved back to front intermittently, "Form columns."
Moved back to front continuously, "Form half platoons in line abreast."

(d) A triangular red signal;
Shown continuously, "I am in trouble," "I cannot carry out my task."

All of these signals, except that last, which is made only by the tank that is in difficulty, are made by the unit commander; and individual tanks repeat the signal to show that they have been understood.

21. TANK WARFARE IN STREETS

The following comments were compiled from observations of the recent tank battles in the streets of Stalingrad.

The German commander held the mass of his tanks in the rear areas, throwing only small groups of from three to five tanks down any one street.

The accompanying infantry precedes the tanks, and only when the surrounding buildings are overcome do the tanks advance. Thus, the best defense against tanks in street warfare is to place the most experienced automatic riflemen out in front.

It is necessary to deploy tanks in the defense so that they will form a dense crossfire, enfilade, and flanking fire. This can best be obtained by controlling the street intersections. Infantry and artillery must be disposed in the intervals between, and in front of, the tanks.

It is desirable that tanks held in reserve be assembled near intersections.

Tanks should be controlled by radio. Messenger service is too slow and telephone wire is too easily broken.

The infantry commander must be located near the tank commander, and the commanders of the smaller rifle units must be with the commanders of individual tanks. The rifle commanders locate targets for the tanks, and correct and change their fire from one target to another.

22. BURNS IN THE BRITISH MIDDLE EAST FORCES

a. Causes of Burns

A report has been received which is an interesting analysis of the causes and treatment of burns in British Middle East forces. Significant is the observation that the greater number of burns are of accidental cause and could be prevented. The ratio of accidental burns to battle-casualty burns in Middle East forces is 2.3 to 1. During a period of 2 months when there was little fighting on the desert, 250 cases of burns were treated at a general hospital at Tobruk among troops of the British Eighth Army. In a series of 83 fatal cases, 15 were burned during land fighting, 15 during the bombing of ships, and 13 as a result of airplane crashes, and 40 of the fatal cases were accidentally burned - 48 percent of the total.

The cause of accidental burns is almost always ignited gasoline, and most frequently accidents occur from using the "desert stove," an improvised gasoline fire in which the fuel is mixed with sand in a can. When the fire burns low, more gasoline is poured on the stove with disastrous results. In bright sunlight it may be difficult to see whether the fire is still burning. In other cases, clothes become soaked with gasoline (it is common to use gasoline in washing clothes), a match is struck, and the clothing is ignited.

Accidental burns are often extensive and dangerous to life. A burn which is extensive, and also in parts deep, is a very serious injury and its treatment is one of the most difficult surgical problems in the Middle East.

Battle-casualty burns are a common form of battle injury. During recent fighting, burns constituted 27 percent of wounds in personnel admitted to hospitals. In tanks, the majority of such injuries are flash burns, caused by exploding ammunition. Ordinary clothing, even light khaki, gives a high degree of protection against flash burns. Study is at present being made to determine the suitability of special protective clothing for tank crews.

b. Treatment

The treatment of burns is a controversial subject, and many of the opinions expressed in this report as regards treatment will not meet with universal approval. The treatment administered depends greatly on the circumstances. Where facilities are available and time permits, "full" treatment is given: the wound is cleansed and prepared for the local application thought most suitable. This is carried out as a rule under general anaesthesia and may be preceded, accompanied, or followed by resuscitation treatment for shock. There are three main methods of local treatment: coagulation, dyes, and non-coagulation.

(1) Coagulants

The experience in the use of coagulants (tannic acid, and tannic acid--silver nitrate) in Middle East forces has not been too satisfactory because: (a) in superficial burns the surface is said to be dry and less pliable than when greasy substances are used; (b) in deep burns the coagulant remains adherent

for long periods and delays the opportunity for skin grafting; and (c) in extensive burns, sepsis is a common sequel. Also, the relationship of the absorption of tannates to toxemia and liver damage when tannic acid is used in the coagulation treatment of burns is still a disputed question.

(2) Dyes

Observations in the use of dyes (gentian violet, brillant green,and euflavine) in the local treatment of burns in Middle East forces have shown that this method of local treatment has most of the disadvantages without some of the advantages of coagulation treatment.

(3) Sulfanilamide-Vaseline Treatment

Use of a sulfanilamide-vaseline mixture in the Middle East has shown this form of local treatment to be: (a) comfortable, especially when the injured part is immobilized with a plaster-of-Paris cast, (b) in superficial burns, healing may be complete when the plaster is removed 2 weeks later, (c) in deep burns, sloughs become separated more quickly than with the coagulation treatment, and skin grafting can be done at an earlier stage. This method of local treatment is considered at present the most suitable which is available.

c. Treatment of Shock

In the treatment of the shock associated with severe or extensive burns, morphine, body warming, and transfusion of adequate amounts of plasma or serum are advocated--with the employment of rapid transfusion when the blood pressure is very low or unrecordable. If plasma is not immediately available, blood is preferable to saline or glucosesaline solution. In the treatment of the anemia which appears in the latter half of the first week and in the second and third weeks, transfusion of blood is often disappointing. The use of liver extracts and iron have been strangely neglected in the treatment of the anemia associated with burns.

d. Transportation of Burned Men

Men with extensive burns travel badly; in fact, they are more upset by travel than men with other types of wounds. Men with large septic burns are most affected, and their condition deteriorates rapidly during long journeys by road, rail, or sea. For the purpose of transport, the burned limbs are often encased in plaster-of-Paris. This practice seems to be of recent development and has been employed mainly with the sulfanilamide-vaseline form of treatment.

e. Causes of Death in Burns

In an analysis of the cause of death in 83 fatal cases of burns, shock was found to be responsible for 23 deaths, toxemia for 22, and sepsis for 38 (46 percent).

From these figures, it is seen that the most frequent single cause of death from burns in Middle East forces is bacterial infection. The organisms found are of the usual variety: staphylococci, streptococci, B. pyocyaneus, B. proteus, and coliform bacilli, etc.

Even when burns are only superficial and of moderate extent, bacterial infection occurs in many cases, especially in those burns that involve deep or extensive areas of tissue.

23. GERMAN AMBULANCE SLED

The evacuation of battlefield casualties over rough country always presents a major logistical problem. This is particularly true where evacuation must be made through deep snow; one solution to the problem of snow may be indicated in a photograph from a German newspaper showing a small snow-sled, evidently for use as an ambulance. It is equipped with three runners, one forward and two in the rear. It is powered by a small 7-cylinder radial airplane engine mounted on the back. The propeller is 2-bladed and made of wood. The propeller guard consists of what appears to be a tubular steel frame protecting only the lower half of the propeller's arc. The sled would probably carry a driver and two patients.

24. CIVILIAN CONTROL

No campaign is fought without entailing problems concerning the adoption of measures for the control of the civilian population. A recent report from a Middle East theater, outlines some of the issues involving British procedure and policy in this regard.

a. Control of Civilians

The key question is the control of civilian movement. The policy is to prevent civilians from hindering the efficiency of troops and at the same time to upset civilian life as little as possible (at least in the countries of Allies). Provost officers must bear in mind political as well as purely military considerations in friendly countries, and should use civil police officers as much as possible.

b. Refugees

It is the duty of the staff to see that adequate arrangements are made for the control of refugees. "G" Branch (General Staff Branch--roughly equivalent to U.S. G-2 and G-3) will indicate which roads must be kept free of civilian traffic and refugees. "A" (Adjutant General's Branch--roughly comparable to U.S. G-1)* will then ascertain from which direction the flow of civilians may be expected and will then issue instructions for their diversion to roads or trails not being used for military traffic. Usually it will be quite outside the capacity of the provost company to undertake this task, and units or sub-units, each working under its own commander must be specially detailed for the purpose.

c. Inhabitants of Friendly Countries

The keynote of all dealings with an allied population is that everything should be done through the responsible civil official. In warfare of movement, control of civilians is necessary but difficult to organize in the time available. The aim is to prevent information being given to the enemy, either unwittingly or by agents. For this purpose "G" (I.) [Intelligence] will impose certain restrictions on movement and telephone communications which will have to be enforced by the Deputy Assistant Provost Marshal with the Military Police, in conjunction with the civil police of the country, if still functioning. The DAPM must therefore be well forward, and provide himself with the necessary proclamations relating to restrictions in the use of telephones and roads, to be read out and posted in towns and villages. When operations have become stabilized, the principle is to interfere as little as possible with civil organization in the rear zones. In the forward zones, military control has to be more stringent, and restrictions on the normal life of civilians have to be imposed. Control in rear zones is usually exercised by "G" (I) and Field Security Police; in the forward zones by the Deputy Assistant Provost Marshal and the Military Police. Evacuation of civilians from the forward zone would be the most satisfactory solution, but this is seldom practicable.

* See Tactical and Technical Trends, No. 11, p. 32 for reference to the British General Staff, Arms and Services.

d. Inhabitants of Hostile Countries

Evacuation from the zone of operations is the safest and most satisfactory solution, but this is difficult to arrange. "A" must make the fullest use of the existing system of civil administration supplemented by special military regulations. Provost service and Field Security Police are responsible for enforcing such regulations. Disarmament of the civil population must be carried out. (Note: Field Security Police bear a relationship to the provost service similar to that of detectives to the civil police.)

e. Cooperation Between MP and Civilian Law-Enforcement Agencies

It has been the British principle so far in Middle East theaters to persuade civil police authorities to retain and maintain control over civil populations - the Military Police confining their activities to the control of military personnel. The head of "A" Branch, accompanied by the Deputy Assistant Provost Marshal, interviews the local civil governor or Chief of Police, and having received a promise of full cooperation, ascertains the local laws. Provided the attitude of the civil population permits, particular local laws are brought to the notice of troops for observance. The central local police headquarters will generally become a "central clearing house" for complaints from both sides, and provided prompt action is taken against offenders, active cooperation will usually be secured. It will generally be necessary for a close watch to be kept by Intelligence agencies and Military Police agencies on the activities of the local police to see that they are cooperating fully; if they are not, it probably will be necessary to take over greater control, in which case it may be necessary to ask Army HQ to send additional men for police duties.

25. BRITISH SECURITY CONTROL OF PRISONERS OF WAR

Highly mobile units are faced with a special problem in handling enemy PWs. From one Middle East theater of operations, it is reported that no specific procedure seems to have been developed by the British in this particular theater, for the handling of prisoners of war by such units. The somewhat general nature of the following remarks seems to indicate that a great deal is left to improvisation in this matter.

* * *

Units capturing prisoners are responsible for delivering them to the divisional collecting center. The location of this place is fixed by the "A" Branch of the Staff [see reference in preceding article] and notified in operational orders. The provost service takes them over at the collecting center and is responsible for them until they are evacuated to the rear.

PWs are sent back in empty transport vehicles under a guard supplied from the reserve brigade or units. The strength of this guard is gauged by the physical fitness of the prisoners and the existing circumstances. One guard to every 10 PWs is considered adequate.

Anticipated fast movements of motorized troops and the conservation of striking power may preclude the detachment of sufficient guards, in which case PWs will be immobilized as far as possible, by removal of shoes, trousers, etc. A lull in the battle may then permit the detachment of troops for escort or guard duty until "B" echelon (second echelon) transport is available for movement to the rear.

26. CLEARING OBJECTS DROPPED ON ALLIED AIRDROMES

Several references have already been made in Tactical and Technical Trends to the use by the enemy of metal spikes - "crowsfeet" - dropped from the air on landing fields and motor transport roads.

In addition to dropping several hundred spikes on one of our airdromes in North Africa, according to a recent announcement antipersonnel mines, said to resemble pencils and fountain pens, were also released.

It was reported that a skirmish line of all available men provided the best method of removing spikes.and shrapnel and bomb fragments. Shells and dud bombs are flagged for subsequent removal. In the case in question, the engineering unit furnished sand bags for collecting stakes and the flags for spotting the location of duds or holes.

Following each of these attacks, it was indicated that commanding officers must prescribe that all available personnel report for duty.

27. EFFECTS OF DUST ON MOTORS

When it comes to the question of the effect of dust on motorized equipment, dust works advantageously in one respect, but in other ways has a contrary action.

Up to a point, dust has a beneficial effect on camouflaged, externally painted surfaces and serves to blend those surfaces with the color of the surrounding landscape.

On tires and rubber parts, the erosive action of sand and dust considerably shortens the effective life of such articles anywhere from 50 to 80 percent.

The most injurious action of dust is found in its adherence to oiled bearing-surfaces, such as springs and shackles, axles, bushings, etc.

To guard against this condition, constant and thorough care must be exercised, particularly on those parts which are close-fitting. Protection of precision parts, such as axle bushings and front-wheel bearings, requires close watching. Where the moving part is covered with leather or other material, easily removable for cleaning (gun axles), or entirely dust proof (traversing gears), the need for special attention is obvious. In any case, whether totally or partially protected against dust, or where there is no such insurance, it is always necessary and advisable to make regular and frequent inspections for dirt removal and fresh lubrication.

Internally, since a motor breathes air, dust is present in varying quantities depending on the equipment furnished and the precautions and care observed. The problem of letting in dustless air has been solved almost completely by the motor manufacturers, but the driver of the vehicle and the motor

mechanics of the unit must continually implement this excellent beginning. All concerned must be taught the far-reaching importance of dust wear, made dust-conscious, and thoroughly educated to properly understand the harmful effect of grit accumulations in their motors.

28. MOTOR TRANSPORT PROBLEMS IN FRENCH EQUATORIAL AFRICA

In view of the high degree of motorization in our army and the world-wide operations of our forces, the problems of motor transport movements over difficult terrain are of particular importance. A report on the difficulties encountered by the Free French in motor movements between certain points in French Equatorial Africa is therefore of interest.

The route in question is about 500 miles long. The first 300 miles are covered by a two-lane clay-surfaced road with occasional sandy stretches; little, if any, road maintenance is undertaken. Over the remaining 200 miles, the route is a desert trail, and it is over this portion that most of the transport problems are encountered.

The difficulty of the route can readily be appreciated when it is realized that a round trip normally takes a month (some vehicles have required even 6 weeks despite the fact that they had no motor trouble), and the weight of gasoline, lubricants, and water consumed per truck is 1 1/2 tons.

The major difficulties which must be overcome are heavy rains, sand, and heat; also the lack of water, refueling points, and maintenance facilities.

The rainy season lasts for about 3 months. However, it affects only the first 50 miles. After a heavy downpour, roads are usually impassable for about 2 days.

Over the last 200 miles, frequent sandstorms reduce visibility to a very few yards and make the wearing of goggles essential. Vehicles frequently bog down in the sand, and much time is thereby lost because of the difficulty of extricating them. Even if there were roads in this area, they would be covered by shifting sands in a single day; furthermore, the trail itself changes frequently because of the shifting sand. Hence, native guides must be employed to lead convoys over firm ground and at the same time maintain direction. Were the necessary navigating equipment available, it might be practical to navigate across this area as across a sea. A partial effort has been made in this direction by painting on the hoods of some vehicles a crude sundial arrangement which serves as a rough compass.

Sand fouls carburetors, gas lines, and engines, and as a result vehicles must be completely overhauled every 6,000 miles; this generally calls for new piston rings, oil and air filters, and clutch plates, and occasionally new piston-rod bearings, new differentials, and new transmissions. Experience has also

taught that an oil of exceptionally high viscosity must be used (S.A.E. 60 or 70). Furthermore, the sand makes necessary the frequent use of low gear, which means greater wear on the engine, overheating, and greater gas and oil consumption. Tires also wear more rapidly; the increased friction not only wears the tire badly, but also results in overheating which causes blowouts.

Not many precautionary measures can be taken against the sand. As far as helpful equipment is concerned, each truck should be equipped with a shovel and two metal plates, pieces of wire mesh, or similar material for use under the wheels when the truck is trapped in the sand. The French have improvised a very satisfactory system for use on trucks having 4-wheel drive on the rear axle. They use two rough-hewn poles having a diameter slightly larger than the distance between the inflated tires on the same side of the axle. By placing the poles between the tires on each side of the axle, the truck is virtually able to climb the poles to firmer ground. Treadless tires are recommended,on the theory that treads tend to cut through the hard crust of the sand, whereupon the vehicle will bog down.

Military and civilian transportation authorities in this area agree that a truck especially designed for the desert is a necessity; they claim that the Italians have such a truck operating effectively in the Libyan desert. Its general characteristics are: 8- to 10-ton maximum load, large tires (4 feet 6 inches in diameter), 4-wheel rear axle drive, super-low gear, and large horsepower. They maintain that this truck has been able to go anywhere in the desert without fear of bogging down in the sand.

The extremely hot weather causes both engine and tires to overheat. Because of the intense heat of the sun and because of the friction of the tires on the roadbed, the tires often become too hot to touch. This results in increased pressure. Unless tires are periodically deflated (dependent on the heat, but generally hourly) so as to maintain a constant pressure, there is great danger of blowouts. Tubes have been known to literally explode into as many as 16 separate pieces simply because this elementary precaution was not observed.

Because tires must be deflated periodically, each vehicle should carry a tire gauge, so that the tire pressure can be accurately checked. Obviously, at the end of a day's run tire pressures will be low and will have to be increased before the departure the next day. For this reason and also because of the high incidence rate of blowouts, one truck in five should be equipped with an air compressor which runs off the motor. In convoys, there should be a minimum of two trucks so equipped, so that in case one must drop out of the convoy for any reason whatsoever, there will always be another left. Also because of frequent blowouts, each vehicle should be equipped with two spare tires and two additional new inner tubes. Experience has demonstrated that cold patches do not hold when inner tubes become hot; evidently the rubber cement melts. Consequently, repair kits should contain materials for vulcanizing patches onto tubes. Four other precautions which are generally taken are: (a) Vehicles are not driven during the hot part of the day (1100 - 1530) except in emergency. (b) Driving is frequently done at night. (c) Whenever tires are deflated en route, they are also

doused with water. (d) During halts vehicles are always parked in the shade whenever possible.

Water is always a great problem in this region, not only because of its scarcity but also because of its impurity. One can ordinarily obtain water along the route by stopping at native villages. It is not potable, however, and can be used only for filling the radiator or cooling the tires. Drinking water is habitually carried in each vehicle; the quantity consumed during the day is replaced at the end of the day's journey. In order to do this, the water has to be treated in some manner; i.e., filtered, boiled, or treated with some chemical such as potassium permanganate.

The problem of carrying drinking water can be solved by mounting a 10-gallon barrel, with spigot or detachable plug, on the running board of each vehicle. This is the preferred position, because of the ease of getting at it. It should be detachable and should be so constructed that the inside can be cleaned periodically. This container should be covered with an inch-thick layer of absorbent material; by soaking this covering, the contents will be cooled by the subsequent evaporation of the water in the absorbent covering. In convoys this drinking water should be supplemented by water carried in several four-wheel trailers.

Fuel is a problem because of the utter absence of European settlements. As a consequence, gasoline and oil for an entire trip must be carried by each vehicle. It is never desirable to put all of the fuel for several vehicles on one truck, because if that truck breaks down, either the entire convoy must be delayed for repairs to a single truck, or part of the load of each truck must be discharged in order to take on gasoline for the remainder of the trip.

Lack of maintenance facilities is a major difficulty. It has not been possible to establish repair shops along the route; when a truck breaks down on the road, spare parts must be dispatched from the base shop and repairs then made in the field. This results in long delays for repairs which otherwise would require only a few hours.

The reporting officer makes the following recommendations:

(a) Vehicles sent to the desert should have as standard equipment: tire gauge, 2 spare tires, 2 additional new inner tubes, vulcanizing patches, 10-gallon water container covered with absorbent material, 2 or 3 quart-size oil containers, a shovel, and 2 pieces of flat metal or wire mesh 2 feet by 8 feet.

(b) One truck in five should have a mounted air compressor, run off the motor, for inflating tires. This ratio should be preserved in convoys, except that there should be a minimum of two such trucks.

(c) Trailers of 500-gallon maximum capacity should be supplied for hauling gasoline and drinking water for convoys.

(d) Standard American military and commercial trucks must be modified for use in the desert,with attention being given to: super-low speeds, two differential speeds, extra-large radiator, six- or eight-bladed fan, extra-large oil and air filters, four- or six-wheel drive, treadless tires, and tires of large diameter and great width.

(e) A truck similar to the Italian model should be especially designed for use in the desert; i.e., having as characteristics 8- to 10-ton maximum load, 4-wheel rear axle drive, super-low gears, high horsepower, tires of extra-large diameter, and with the characteristics listed in the previous paragraph.

(f) Each truck should be equipped with a small medical kit containing sodium hypochlorite or other pills for purifying water, as well as containing quinine and such emergency medicines and bandages as are normally put in such kits.

(g) Motor transport companies should be issued certain navigating equipment, and personnel should be instructed in the use of same.

29. GERMAN 120-MM MORTAR

Recent reports indicate that the German Army is preparing to adopt a 120-mm mortar either identical with or based on the Finnish 120-mm mortars made by Tampella.

This mortar is muzzle-loaded and fired by means of a trigger. Its most effective angle of fire is 45 degrees. Its range, however, is controlled more by a variation of charges, of which there are 5, than by a variation of the angle of fire.

An optical sight is used with the mortar.

Smoke bombs, which are the same weight as the high explosive, may be fired. The light bomb contains 2 3/4 pints, and the heavy, 1 gallon, of the smoke producing compound. Tested in an atmospheric temperature of minus 15 degrees Centigrade, the heavy bomb produced a smoke cloud about 40 yards in diameter.

Particulars of the Finnish 120-mm mortar, which the Germans are copying, are shown below:

Muzzle velocity	1,083 f/s
Maximum range - light	7,546 yds
Maximum range - heavy	4,921 yds
Weight of bomb - light	27.5 lbs
Weight of bomb - heavy	47.3 lbs
Total weight in action	562 lbs

Weight of barrel	187 lbs
Weight of bipod	154 lbs
Weight of base plate	220 lbs
Effective radius of burst - HE	131 ft
Practical rate of fire	6 rpm

The Finnish Army transported this weapon on a two-wheeled carriage with or without a limber, drawn by one horse. The equipment included pneumatic tires, and on the Finnish model there is no indication of a spring suspension. For use in the German Army, the suspension may have been modified to permit transport by motor vehicles in the same way as the light antitank guns. It could be very easily transported in a light truck.

Further reports indicate that the Germans intend to equip their airborne troops, including parachutists, with this mortar. As the weights of the three main parts are each not above that of a fully equipped soldier, it appears suitable for this purpose.

30. JAPANESE PARACHUTE TROOP EQUIPMENT

The information available on Japanese parachute troop equipment is somewhat sketchy as compared to the report of German equipment, analyzed in Tactical and Technical Trends, No. 13, p. 45. The following report regarding Japanese equipment gives certain details that follow substantially the same outline as in the case of the German report.

a. Personal Equipment

(1) Uniform

Information from Timor has been received indicating that uniforms worn by Japanese paratroops were green and buttoned all the way up to the neck. Rubber boots were worn. As part of their personal equipment, key sets and compasses were carried; the latter, strapped to the wrist. In the Netherlands East Indies the following uniform equipment was observed: buff-color crash helmet with ear flaps and chin strap, very light canvas webbing equipment, and water bottle.

Another report dated September 1941 indicates the following uniform equipment provided for officers, NCOs, and privates. All men wore flying jacket and trousers, and flying helmet with glasses. Officers carried an electric torch and a haversack with maps and writing utensils. NCOs and privates carried a haversack with corn, a complete change of clothing, an extra pair of boots, and one mug.

(2) Weapons

The following arms and ammunition were observed during operations in the Netherlands East Indies as part of the Japanese parachutists' personal equipment.

A pistol with 1 clip of rounds and 13 rounds loose; an unstated number of clips for rifle or light machine-gun ammunition—each clip containing 5 rounds; 5 or 6 hand grenades; and bayonet.

(3) Rations

At Timor, emergency rations were observed, carried in cellulose wrapping and consisting of rice and dry compressed fish.

In the Netherlands East Indies, parachutists were observed to be carrying glucose sweets, minor medical supplies (iodine, bandages, and so forth), cigarettes, and rum flask.

b. Unit Equipment

(1) Parachutes

Information is unavailable beyond those observations made at Timor:

section commanders' parachutes were blue, and platoon commanders' parachutes were red.

(2) Containers

The only information obtainable from the source reporting with reference to parachute containers was that at Timor it was observed that apparently no containers, either for arms or supplies, were used.

(3) Rations

Information dated September 1941 with regard to unit rations for parachute troops indicated that a 3 days' food supply for each man consisted of:

Rice -- 2 kg - 250 grams (21 lbs 4 oz)
Fish -- 2 tins
Meat -- 2 tins
Tea -- 1 oz

In view of the weight of the above-mentioned food supply, it would not seem practicable for the individual parachutist to carry this as part of his personal equipment; in other words, it would seem more probable that these rations were either dropped in containers, or provided from the air or ground by other means. The following extract from a report dated July 7, 1942, is submitted as further information pertaining to rations for Japanese parachutists.

Parachutists in Sumatra and Celebes had to carry food in large quantities, which, however, had to be as low in weight as possible. Colonel Kawashima spent 17 years in research on this problem and the following is taken from his statement:

"Iron rations for parachutists are in wafer form and consist of ground rice and wheat with a content of sesame. In addition to this, they are fed on extract of mussel-flesh, dried plums, preserved ginger, crushed bean meal and nori (a typical Japanese product used as a foodstuff for hundreds of years, made from dried seaweed and containing alkaline substances, soda, and iodine). One meal of these rations weighs 200 grams. The wafer form was chosen, as tins or boxes carried by parachutists can get damaged on landing and they constitute superfluous weight. These iron rations stand up to the climatic conditons in eastern Asia, and have been thoroughly tested by experts in Malaya, East Indies, the Philippines, China, Manchuria, and Siberia. All foreign army iron rations were tested before the selection of this type as most suited to the Japanese soldier."

31. CONSERVATION OF CLASS III SUPPLIES

It is axiomatic, yet sometimes forgotten, that tactical operations cannot be supported without the necessary supplies. In this connection close cooperation must exist between G-3s and G-4s.

It is well known that in the various Egyptian-Libyan campaigns, the availability of class III supplies has been a major factor in the success or failure of tactical operations. This fact is highlighted by Axis instructions to units in Libya on the subject of restrictions on fuel consumption.

During February 1942 the Axis ground forces (about 10 divisions) consumed 3,700 tons of fuel, a daily average of about 132 tons; between February 15th and 28th, the Afrika Korps (15th and 21st Armored Divisions, and 90th Light Division) was issued 1,038 tons of fuel, a daily average consumption of about 75 tons. The instructions state that these quantities were brought forward only with great effort, and that this rate of consumption could not be maintained with the available transport facilities. It was therefore directed that all movements should be considered most carefully with a view to saving fuel, and that the rate of consumption was not to exceed one-sixth of what is referred to as "normal" consumption.

The significance of the figures given above is extremely difficult to assess. First of all, it must be remembered that major operations ceased in January 1942 and were not resumed until May. Secondly, it is not clear as to whether these amounts of fuel were actually consumed or merely issued to units from supply points; however, the general sense of the statement would appear to imply actual consumption. Thirdly, it is not definite as to what weight ton is used. Finally, it is not clear whether the 1,038 tons consumed by the Afrika Korps is included in the 3,700 tons attributed to the Axis ground forces. Assuming "fuel" refers to gasoline, lubricants, and diesel oils, and that "tons" refer to metric tons (approximately 2,200 pounds), and using an average figure of seven and one-half 42-gallon barrels per short ton (2,000 pounds) of all types of fuels, it is estimated that 3,700 "tons" would constitute about 1,280,000 U.S. gallons, and 1,038 "tons" about 360,000 U.S. gallons.

As a sidelight to the above, it is of interest to note the following figures on the fuel consumption of German mechanized vehicles, based on a German manual. Light armored cars are said to average about 8 miles per gallon, medium armored cars 7 miles, and heavy armored cars 5 miles. The Mark I tank gets about 3 miles to the gallon, the Mark II about 2 miles, the Mark III and IV about 1 mile. In the case of both armored cars and tanks, the engine oil consumption is about 5 percent of the gasoline consumption.

Based on 15 gallons per vehicle, it has been estimated that it requires about 16,000 gallons of gasoline for a German infantry division, 44,000 gallons for a motorized division, and 32,000 for an armored division.

32. MOBILIZATION OF IRON STOCKS

The availability of iron stocks is essential to the conduct of total war, as witness the efforts to collect scrap in this country. That Germany is not without problems on this score is evidenced by an item in the Swiss newspaper Neue Zuricher Zeitung of July 15, 1942, according to which "the German Minister for Armaments and Munitions, Speer, decreed the institution of a very thorough campaign for the collection of scrap ferrous metal. All available iron which is not being utilized will be collected, and all sections of sizes for which there is no demand are to be returned. Completed parts for types of machinery which have now become obsolete but which remain in stock, and the machinery of laid-up installations, are to be disposed of unless it is probable that such plants are likely to start up again within a reasonable time. In general, scrap value only will be paid for this metal, with small exceptions in special cases. It appears that considerable official pressure will be put upon managers of factories to insure that they produce as much metal as possible. Russian manpower will be provided for breaking up scrap at delivery points."

GENERAL

33. FACTORS RESPONSIBLE FOR BRITISH VICTORY IN MIDDLE EAST

A U.S. observer, thoroughly acquainted with the operations in the Middle East, has concluded that the following factors were mainly responsible for the recent British victory in this theater: (a) definite superiority over enemy in fire power and personnel; (b) coordination of action by all arms; (c) determined generalship; (d) careful planning and diligent training; (e) elaborate measures to insure deception; and (f) complete enforcement of security precautions.

Most of these factors could be called the essentials of any successful offensive, but some are peculiarly related to past performances in this theater. The changes made in the British high command undoubtedly had much to do with the success of the British offensive. The primary effect of the change in leadership was a change in tactical doctrines. With regard to the measures taken to secure deception, it might be pointed out that this went far beyond the usual feint in one sector followed by the major thrust in another. The lack of natural cover on the desert battleground has caused both sides to resort to extensive use of camouflage. In this particular operation, camouflage played a very important role. British tanks were camouflaged as trucks, and complete dummy armored brigades were spotted over the desert.

Certain other factors were deemed to have been contributory to the British success, such as: heavy and effective use of artillery; concentration of armored strength; deliberate choice of limited objectives; and clearing of minefields in the rear after the initial breakthrough.

SECTION II

AMERICAN AND BRITISH TACTICS -- AS VIEWED BY THE JAPANESE

AMERICAN AND BRITISH TACTICS--AS VIEWED BY THE JAPANESE

The translation of a Japanese document (obtained from U.S. Marine Corps sources) which appears below throws considerable light on Japanese tactics. It is entitled "Land Warfare Tactics to Use against U.S. and British Forces." Apparently it was written prior to December 7, 1941, since it contains no reference to specific operations against Britain or the United States, and this omission would be unusual in a document of this nature written subsequent to that date.

Even if this document were the only available evidence on Japanese tactics, it could be readily seen that they are strong proponents of the attack. The defense plays but a relatively small part in their tactical doctrine. They apparently to do not approach the problems of a defense as we do, but think of it rather in terms of the counterattack.

Possibly the most striking features of the tactics recommended are the great emphasis placed on aggressiveness and deception, and the importance given to the envelopment as opposed to the penetration. Of interest also is the respect for the superior firepower of American and British units, which in turn leads Japanese to place great reliance on maneuver and speed of execution.

So far the Japanese have been very successful in the application of their tactical doctrines, and have accomplished much with considerable economy of force. It remains to be seen whether their offensive spirit can stand the test of attrition, and of determined opposition on terms more equal than those that have, for the most part, heretofore obtained.

The translation follows.

* * *

LAND WARFARE TACTICS TO USE AGAINST U.S. AND BRITISH FORCES

(Selections from the text compiled by the Staff of the Army in China)

PART I

U.S. ARMY METHODS AND JAPANESE COUNTERMEASURES

a. Tactics and Strategic Leadership

(1) One peculiarity of the U.S. forces is that the orders of the higher commanders are given in minute detail and leave little room for subordinates to use initiative. For this reason, if the supreme commander does not display a great deal of ability, versatile change of tactics to cope with the situation as it develops is not possible.

The training of all ranks of officers in the handling of troops, because it is based on the peacetime organization, is not of benefit. Because of this, none of these placed in command in wartime, is qualified. U.S. strategy is based on fighting a battle of fortified positions; but their rules for the conduct of battles encourage mobile warfare. In actuality, however, this is not often practiced in training and maneuvers.

Under normal conditions, the Americans display their might in carefully planned operations; but once their planned strategy is spoiled, they must get one or two high commanders to straighten things out. Hence, we must grasp every opportunity not to give them time in which to do this.

In order to capture one of their positions, they must be induced to come outside their fortifications and fight a decisive battle, or else all efforts must be made to put a hitch in their plans; and a policy of throwing them into confusion must be practiced.

Also, because U.S. tactical ideas are simple, deceptive displays of force are one of the most valuable of all anti-U.S. strategic weapons.

(2) Because the U.S. forces sometimes institute action that baffles our expectations, we must not jump at conclusions, but we must take heed of all warnings given us as a result of reconnaissance.

Again, because the character of the American is simple and lacking in tenacity, in their tactics and battle leadership they also lack tenacity; and if they meet with one setback, they have a tendency to abandon one plan for another. For this reason, we must not fail to hammer at this weakness.

The Americans are very poor in scouting, patrolling and security measures, so the effects of a sudden attack and the benefits to be gained therefrom should always be kept in mind.

b. Specific Characteristics of U.S. War Methods, and Japanese Counter-Measures

(1) The Americans make much of firepower, especially the power of artillery, and lay small stress on bayonet charges. So under the cover of night, fog, or a smoke screen, we must take advantage of the lack of flexibility of their plans, cut down the advantage they may have gained by having registered their artillery fire on us, and lead our troops into an attack which will decide victory or defeat.

(2) The decision of the U.S. forces on whether to attack or defend will depend largely on their estimates of the strength of their artillery compared to ours, so it is essential that we conceal our artillery strength and thereby cause them to underestimate it.

(3) The Americans, in forming their attack plans, regard as most important the enemy artillery dispositions. For this reason, if we utilize mobile warfare and either conceal our batteries or establish fake artillery positions, we may reap great benefit and make the Americans fail in their offensive.

(4) The U.S. forces vigorously recommend the offensive, and constantly practice it in maneuvers and training; and unless they feel a definite inferiority in manpower and more particularly in artillery, the view should be taken that they will attempt an offensive.

(5) As the rise of the U.S. forces took place during the World War, it is no wonder that they developed a definite tendency toward position warfare. Even in encounters that are not according to the "book", their leadership follows a fixed path; and they are extremely fearful of enemy counterattacks. For this reason, it is especially necessary for us to utilize constantly mobile warfare tactics.

c. Attack

(1) Attack Plans

(a) The Americans do not minutely reconnoiter the movements of the enemy, and they are particularly poor in determining the direction from which enemy attacks will come. They simply make broad plans for combatting enemy attacks against their fortified positions, but have no idea of our active defense.

We must search for ways of attack and defense against the Americans with their superior firepower; and we must avoid a stationary defense as much as possible. Even when we are, unavoidably, fully on the defensive, we must work to keep our forces mobile.

(b) In an active defense, if we base our defense on firepower in our advanced positions and do not seize every opportunity to counterattack, we will never make any gains. However, if the U.S. forces should have a marked superiority in firepower, then plan an active defense by disposing your forces so as to increase the units in the reserve. Do this by increasing the frontages assigned to front-line units. In doing this, your chances to again use reserves for flanking will be many.

(2) Leadership in an Offensive Action

(a) If the U.S. forces are in a meeting engagement or in an attack on a position (excluding heavily fortified positions), their columns will usually first diverge and then deploy; and in deciding on the plan for deployment, they consider the enemy artillery fire as a factor of first importance. These dispositions will usually be made on a much narrower front than our assembly positions are, and therefore room for their maneuvering will be lessened.

It will be beneficial to study the methods of deployment of the U.S. forces. It should be remembered that at this time communication facilities will not be complete. Also, as their leaders will not have regained control as yet, we may discover good opportunities through maneuver. For this reason, do not relax your reconnaissance of the enemy's movements.

(b) It is bad judgment to fail to use a charge to bring about a final decision. U.S. charges appear usually to be penetrations of enemy positions which have already lost all power of resistance (i.e., after fire superiority has been gained); and their training in hand-to-hand fighting is not sufficient. Because of this, it is well to consider ways of destroying them by desperate fighting within our defensive positions.

(c) We must not overlook the fact that the Americans, who believe in a principle of mutual support, are paradoxically inclined to reckless and headlong advances; and at times, they do not consider a coordinated advance, but instead rush forward alone. Consequently, when their forces are separated, crush them individually, or, by a counterattack by all your forces, endeavor to deliver a crushing blow.

(3) Meeting Engagements

(a) In meeting engagements, it is usual for them to commit their forces only when control has been regained, so take advantage of this by sending up an advance guard to hold fast, and use your main body to maneuver and strike at the enemy's flanks. Again, because the initial artillery fire of the enemy will be unorganized, bring up to the front at once a strong force of artillery to press the enemy. It is essential that the initiative be taken from him and that he not be allowed to regain it.

(b) Their advance guards have a tendency to carry out independent attacks and also often deploy the front line too broadly. By advancing a small part of our troops, we can in most cases make the enemy deploy prematurely. Also, by bringing up an advance guard, we can gather our offensive strength in one spot for a decisive attack, break through the enemy front line, and strike the main body during deployment. By training yours troops to go on to the offensive quickly, you will prevent the enemy completing their deployment.

(c) When we examine the methods of deployment of the U.S. forces, we find that there are few occasions on which unforeseen battles will result. Because this is a definite weakness of the Americans, we must train ourselves to take advantage of it.

(d) In dawn attacks, there are times when contact between opposing forces is lost. Therefore, when you fear that the Americans may launch a dawn attack at the same time that you are changing your dispositions in preparation, take advantage of the fact that while they are advancing to the line of departure, their covering fire will not yet be ready, and carry out a small attack against them. Or, depending on circumstances, if you are well acquainted with the

terrain within the enemy's lines, you may make a definite counterattack.

(e) Thus, while American attacks are not to be feared, it is most desirable that we investigate fully the ways of combatting his superior firepower. An attack or defense based on firepower will never bring good results when used against the U.S. forces.

d. Defense

(1) The American defense does not utilize the ideas incorporated in our active defense system.

(2) Defensive Dispositions

(a) In cases when there is not much time, their organization of fire is weak and there are gaps in it. The machine guns are particularly fond of displaying their independence, and coordinated fire between machine-gun units is not often seen.

(b) When there is time to spare, they display magnificent, systematic organization of fire by using many types of weapons, and aim it in front of the position; but they have no minute organization of fire (i.e., fire distribution by squads, etc.).

(3) From the preceding, it can be seen that when they are pressed for time, the American dispositions, and especially their organization of fire, are not coordinated. Therefore, we must not fail to move fast and attack quickly, giving them no time in which to prepare their positions.

However, on the whole, in deciding on a plan of attack against American positions, the possibilities of maneuver must not be overlooked. Utilize a deceptive display of strength in order to draw the enemy out of his positions. When he attacks, by using your infantry guns, keep him from breaking through. Then, practice the principle of manifesting your whole might in a counterattack.

e. Night Fighting

Insofar as night fighting is concerned, they are unlike our troops, who can attack at night and bring about decisive results, but instead, the Americans simply use the night hours to better their preparations.

For the Americans, in view of the organization of their military forces, national characteristics, and habits, it is best to make use of superior firepower and not indulge in night fighting. This is a point of which we should take advantage.

f. Pursuit and Retreat

(1) Pursuit

U.S. pursuit of the enemy starts only when the enemy has left his position and begun the retreat. In the drill regulations, it is emphasized that the whole result of battles may be decided by energetic pursuits. In actuality, because they fear enemy counterattacks and demand order in the ranks, their manner of pursuit is not vigorous. And if their pursuit is delayed by forces of the enemy, they will finally go on the defensive in order to collect their strength.

(2) Retreat

In general, their leadership in a retreat is very incapable. For this reason, once you have defeated them, great advantage may be gained by pursuing them relentlessly.

g. Duty in the Field

Duty in the field is poorly performed by the Americans, particularly their security measures and patrols that operate over short distance. Many weak points and defects are to be found here, and because of this, concealment of our movements and execution of surprise attacks is comparatively easy, especially at night. Their use of cover and concealment is poor.

h. Tanks and Automobiles

(1) Tanks

(a) Their tanks are considered able to fight independently, but coordinated action with the infantry is difficult. In consideration of this, after the tanks have smashed the enemy positions, their infantry is brought up to exploit the gains. But calm, individual soldiers, well trained in throwing explosive charges, will be able to accomplish their destruction.

(b) The movement of their tanks is extremely skillful and they are able to pass through practically any type of terrain. Consequently, we should expect attacks from U.S. tanks and be on our guard. However, their antitank measures, on the whole, are crude, and if we use our tanks well, we may crush the enemy line or break through without much difficulty.

(2) Automobiles

A great many automobiles are included in the organization of the U.S. forces, and they are thoroughly experienced in their use, planning strategic and tactical actions with them that are unthought of by us, so this is a point that demands attention. In a place where automobiles can travel, regardless of how bad the roads may be, you must consider that they will try to use them.

i. Vulnerability of the Rear

As the rear of the U.S. forces seems very vulnerable, threats and raids on their rear confuse them extremely and produce many advantageous possibilities for the conduct of operations.

PART II

ENGLISH ARMY METHODS AND OUR COUNTER-MEASURES

a. General Rules

(1) Although the English army has some mechanical mobility, in general, it does not have much maneuverability. Therefore a quick decisive battle should be sought by flanking and encirclement.

(2) Since determined action is generally better than prudence, we should avail ourselves of the enemy's hesitation in completing his preparation to gain the initiative.

(3) We must gain victory by taking the offensive and seizing the initiative, and overcoming the enemy.

(4) Since their front is generally strong and the distribution of firepower especially thorough there, we should strive to operate on their rear and take advantage of surprise. Since they are unskilled in night fighting, we should make extensive use of it.

(5) As they have great numbers of vehicles and their use of them is skillful, we must make our dispositions carefully so as to limit use of these vehicles. It is essential to be on the alert for motorized flanking and encircling movements.

(6) They definitely use gas; therefore, antigas measures are essential.

b. Attack

(1) They are generally cautious in attacking, and in planned attacks they have a tendency to use positional warfare and make exhaustive reconnaissance and preparations. We should strengthen our position more and more while they are getting ready, and at the same time, by stratagem, try to take the offensive.

(2) In attack, they endeavor to encircle or break through. However, as they are cautious when carrying out an encirclement, we should strive to utilize our maneuverability, further encircle the enemy's encircling force, and fight a

decisive action at a point where the enemy does not expect it.

Do not use a passive defense if you can help it, as it has the disadvantage of making it easy for the British to build up their strong firepower. On the defensive, choose a position where the front line will not be under the enemy's fire.

(3) Although they realize the necessity of a charge, particularly in gaining the final decision in a conflict, they do not concern themselves much about its strength, but rather strengthen their firepower and their positions. The infantry weapons for hand-to-hand fighting are few, and automatic weapons are many. The infantry just follow the curtain of fire and occupy the ground. For this reason, it is necessary to plan to split them by means of artillery and machine-gun fire and isolate the infantry. Then, by taking advantage of a good opportunity, we can counterattack. It is necessary to carry the battle out of the area selected by him so as to not come under the concentrated fire of the enemy artillery and to prevent his pouring fire on the charging infantry.

It is especially necessary, when our forces are weak, to rely on the bayonet against the enemy troops who penetrate our positions, and to be prepared to drive them back by this means in the final melee.

(4) They are also over-cautious in selecting the main objective of their attack in a meeting engagement, and ordinarily do so after the battle has begun and they have detailed reports of the enemy's dispositions and strength. For this reason, it is essential to bring about, by swift and resolute action, a decisive battle before the enemy's preparations are completed.

c. Defense

(1) Because they often utilize an active defense, it is necessary to dispose your troops carefully, and at the same time, so that they will not discover in this disposition a good opportunity, you must make them abandon their aggressive plans by fierce and resolute attacks.

(2) They generally do not give much consideration to their flanks and make their front strong; therefore, it is best that we carry out encircling movements.

(3) As they spend a great deal of time on their defensive preparations, it is essential to attack swiftly in open warfare and not give them any time to spare. Also, as they sometimes do not make a thorough disposition of troops so that they can move them to suit the situation, it is necessary to attack unexpectedly and swiftly and prevent their making suitable dispositions.

(4) Their firepower, particularly that of the artillery and machine guns, is disposed densely in front of their position, and therefore it is, of course, necessary to choose a deployment which utilizes the terrain and to move quickly. You must particularly pay heed to secrecy and the concealment of your movements and utilize darkness and smoke screens.

(5) Since they hold out large reserves, particularly mobile reserves, you must endeavor to keep your plan hidden and take advantage of surprise. Also, you must use strong striking forces and break through the enemy's lines at one stroke.

(6) When their dispositions are in great depth, to break through, you must also organize in depth and break through the position at one stroke. This is especially necessary to prevent their counterattacking with their mobile reserves and breaking up the attack. To cope with this situation, you must press home the attack with superior force and crush them. Even if there is a deep and somewhat flexible resistance in front of their main position, attack this with the necessary strength, but seek to keep your forces from getting mixed and to keep losses down.

(7) Although the artillery is under a unified command, it has various sorts of duties and is kept mobile; you can expect fire almost anywhere. For this reason, you must attack in strength and, using concentrated fire to the fullest, try to neutralize their guns.

(8) Where the position, especially a position in the rear, is established in depth, and a mobile reserve is used, particularly when a breakthrough is countered by mobile artillery, the coordination of the infantry and artillery, for the action after the penetration of the enemy's position must be very carefully planned.

(9) When they discover the attacker's penetration, they call down concentrated fire on it. Therefore, the attacker must make the penetration difficult to observe; and his artillery must take appropriate measures to neutralize this fire.

(10) They use tanks to good advantage; and measures against them are essential.