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THE GERMAN ARMORED ARMY

PREPARED BY

MILITARY INTELLIGENCE SERVICE

WAR DEPARTMENT

~~SECRETED~~

**MILITARY INTELLIGENCE
SERVICE**

WAR DEPARTMENT
Washington, August 10, 1942

SPECIAL SERIES

No. 2

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CONTENTS

	Page No.
FOREWORD.	
SECTION I. BASIC PRINCIPLES.....	1
1. Decisive Character of Tank Action.....	1
2. The Tank As a Strategic Rather Than Tactical Weapon.....	1
3. However, the German Theorists Perceived That the Armored Arm Would Succeed Only If It Coop- erated with Other Arms.....	4
4. The Organization of the New Mechanized Division Did Not Bring the Leaders of the Third Reich to Give Up the Conception of a "Nation in Arms".....	5
II. THE TRANSFORMATION OF THE ART OF WAR EFFECTED BY THE ARMORED AND MOTORIZED ARM.....	6
III. THE ARMORED ARM IN ACTION.....	14
1. The High Command.....	14
2. Duties of the Various Echelons.....	15
3. General Characteristics of the Action of the Armored Army in Battle.....	19
4. Combat of the Armored Division.....	25
5. Defense against the Armored Division.....	31

FOREWORD

The document here published is based upon a study made by the French General Staff immediately after the armistice. A lost war never permits the leaders of a defeated Army to rest and demands insistent searching for the reason of the defeat, but victory breeds self-confidence and a disposition to rest content with precisely the tactics that once proved successful. The clarity and incisiveness of this document are evidences of its coming from a staff that has learned this lesson, though at tragic cost.

The conclusions to be drawn from the study are obvious and are herein sufficiently underlined. It is worth noting, however, that while the German tactics appeared new, in certain respects they were simply applications to modern conditions of classical battle concepts formulated by the great captains of the past. The Western Front of 1914-18, after the Battle of the Marne, became a sustained struggle of position and attrition; before it could be transformed into a war of movement, the armistice brought the conflict to an end. The French were naturally left with their thoughts committed to a repetition of the methods that had gained them a victory. The theory of maneuver and all the principles based upon centuries of actual combat seemed to be forever obsolete

in 1918. On the other hand by 1940 the Germans had realized the tremendous advantage to be gained by a coordinated use of the air arm, the shock action of armored forces, and the motorized movement of the mass. They made the science of war once more conform to the maxims of long experience.

Section I. BASIC PRINCIPLES

1. DECISIVE CHARACTER OF TANK ACTION

At the end of the first World War two German generals,¹ Eimannsberger and Guderian, devoted themselves to developing the theory of the tank. They had been much impressed by the shock, even the panic, that the sudden introduction of the tank had caused among the German troops, but they were convinced also that the Allies had used the new instrument timidly and sparingly. They saw united in the tank the three main elements of decision in a modern battle: (1) surprise, (2) powerful and instantaneous fire, and (3) breadth, flexibility, and relative invulnerability of movement. They perceived that so redoubtable an arm could be employed with much greater effectiveness than the Allies had imagined.

2. THE TANK AS A STRATEGIC RATHER THAN TACTICAL WEAPON

The Allies had used the tank only for the rupture of the enemy front. The German generals conceived a more audacious use of it in the exploitation phase to disorganize the reserves and the enemy rear areas, so that

¹ It should be noted that this discussion is confined to German doctrine and methods only, and does not take into consideration developments in any other countries.

the enemy would be unable to delimit the defeat by establishing himself in new positions. The strategic consequences of such an action might well be incalculable. They drew the following conclusions:

a. Speed and the Radius of Action Must Be Utilized to the Utmost

“The attack by tanks,” wrote Guderian in 1936, “must be conducted with maximum acceleration in order to exploit the advantage of surprise, to penetrate deep into enemy lines, to prevent reserves from intervening, and to extend the tactical success into a strategical victory. Speed, therefore, is what is to be exacted above anything else from the armored weapon.”

Speed makes possible the maximum degree of surprise because it overcomes delay in concentrating forces at chosen points. Speed neutralizes the enemy defense by limiting the possibilities of fire from his antitank weapons.

b. Tanks Will Impose Their Rhythm on the Modern Battle

Infantry and artillery will link their action as closely as possible to that of the tanks. The German standard regulations stated the new law: “In the zone of action of the tanks, the action of other arms is to be based on that of the tanks.” In short, in the German plan of operations the armored weapon became, on the ground, the essential arm of combat and no longer figured, as it had in the French conception, merely as support for infantry and artillery.

c. The Combined Action of the Air and Armored Forces Will Govern the Battle

The decisive factor will no longer be the infantry-artillery team, because the air units, being better qualified to furnish immediate, brutal, and accurate support for the mobile and rapid tanks, will henceforth constitute the "attack artillery."

d. This Association Will Transform Not only the Pace but the Sphere of Application of the Modern Battle

Abandoning the idea of a more or less straight front line, the modern battle will take place throughout the entire depth of the enemy position as well as at all altitudes. The factor of time will play a decisive role. The modern battle will depend on speed multiplied by mass. The most rapid ground and air weapons will participate in it, in numbers never previously imagined.

"War will no longer be the war of airplanes and tanks; it will be the war of thousands of planes and thousands of tanks."

e. The Tank Army Must Be Made Autonomous

The armored Army must be capable of prosecuting war with its own means. Therefore, the German generals rejected the French formula of 1918 which, providing only for the distribution of tanks among the large infantry units, had thus reduced their speed and mobility.

3. HOWEVER, THE GERMAN THEORISTS PERCEIVED THAT THE ARMORED ARM WOULD SUCCEED ONLY IF IT COOPERATED WITH OTHER ARMS

General Guderian analyzed this problem at length in an article which appeared in the "Militär Wissenschaftliche Rundschau," dated October 15, 1936:

"The armored branch will include all other arms. Infantry, artillery, and engineers are necessary to the development of its action, but it will impose upon them its own method of combat by making them dependent on the motor. Supporting infantry, artillery, and engineers will be motorized and partially armored within the framework of the Armored Division² and the Motorized Infantry Division. They will adjust their new tactical program and employment to their new speed.

"An important role will be played by the engineers, who will have abundant matériel for crossing gaps, and who will be trained to use it rapidly and to oppose the action of enemy tanks by the rapid construction of antitank obstacles.

"The desire to protect the armored weapon against the counterattack of its most dangerous enemies, the tank and the plane, will require the incorporation of numerous and powerful antitank and antiaircraft weapons into the panzer division. Thus, the armored arm—minutely trained on the other hand for cooperation with the air arm—will be able to fight its own battle."

² "The German Armored Division," Information Bulletin No. 18, June 15, 1942, Military Intelligence Service, contains a translation of a captured German training manual which describes the principles taught by the Germans for the operation of the armored division.

4. THE ORGANIZATION OF THE NEW MECHANIZED DIVISION DID NOT BRING THE THIRD REICH TO GIVE UP THE CONCEPTION OF A "NATION IN ARMS"

The conception was affirmed emphatically in the book "Total War," the military testament of General Ludendorff, which has greatly influenced recent German policy.

Behind the motorized and armored elements, manned by a young personnel kept constantly on a war footing and permanently prepared for a bold attack, the "mass army" will be ready to act as soon as mobilization furnishes a formidable number of effectives from the enormous population of the Reich.

This vast national Army, itself with considerable motorized equipment, will assist the action of the armored groupments in the principal theater, will take care of the defensive missions in passive and secondary sectors, will fight its own battles in regions where the use of tanks is not advisable, and finally will occupy the conquered territory in order to liberate the panzer divisions for still further tasks.

Section II. THE TRANSFORMATION OF THE ART OF WAR EFFECTED BY THE ARMORED AND MOTORIZED ARM ³

The German doctrine of the motorized arm is in keeping with the classical conception of the aim of war as defined by Clausewitz a century ago, and reaffirmed by the masters of German strategical concepts—von Moltke, Bernhardt, and von Schlieffen—namely, the destruction of the enemy's armies. This destruction is achieved only after the dissolution of the "animistic cohesion" of the adversary, to use the expression of Ludendorff. In the pursuit of this objective, the blitzkrieg utilizes the new methods placed at its disposal by modern techniques and fully exploits their potentialities. Ultrarapid communications, photography, moving pictures, explosives, and engines both on the ground and in the air are thus militarized far more thoroughly than were the railways by the first von Moltke.

Therefore, from both the strategical and tactical points of view, the question for the different echelons of large as well as of small combat units is to determine the most effective means of bringing about the psychological and material disintegration of the adversary.

³ Cf. *The German Armored Division*, Information Bulletin No. 18, June 15, 1942, Military Intelligence Service.

German strategists consider the battle of Cannae the supreme example of perfect victory; in that engagement the Carthaginians, under Hannibal, enveloped and completely annihilated the Roman Army. Being skilled in military psychology, the German generals correctly estimated the decisive effect that could be produced on the morale of the fighting troops by the sudden appearance of enemy forces on their flanks or rear.

In modern warfare this maneuver is even more effective than at any time in the past. When moral forces alone were the predominant factors in the struggle, and only rudimentary matériel was required, seasoned troops could risk fighting on a reversed front. Today, fighting armies consume a prodigious quantity of munitions, food supplies, equipment, and combat matériel. To insure a continuous flow of these necessities, the armies must constitute a homogeneous and welded whole with their rear supply units. Hence an army which is obliged to remain on the defensive because of numerical inferiority is absolutely required to constitute and maintain a coherent front. Weak places always represent a grave danger, especially if they become breaches, and all the more so if they give the enemy a chance to cut the lines of communication so indispensable to the life and action of the combatant elements.

The problem facing the assailant is the destruction of the defense. He should accomplish his purpose by an envelopment or a penetration at a judiciously selected point of the front.

For the last hundred years, since the time of Napoleon, an equilibrium has been maintained in Europe between

the political powers and their military establishments. The opposing armies had approximately equal means, and attempts at break-through failed, as in the first World War, because there were adequate weapons available for the defense. As a rule, the decision was obtained on the flanks.

The day on which the Third Reich sacrificed the entire economic life of the country to the preparation for a long-premeditated aggression, and constituted such an offensive force that it no longer needed to fear any effective counteraction on the part of the chosen victim, a break-through became not only possible but preferable. However extended it might be, any attempted German envelopment on the right was sure to encounter an Allied front.

Thus the German outflanking doctrine, inaugurated by Frederick II, and applied with such success by his disciples in 1870, progressively made way for the doctrine of the "break-through" and "interior outflanking."

The mechanism of the penetration and subsequent interior outflanking may be summarized as it appeared during the campaign in the West:

1. First, cause the extension, if possible even the over-extension, of the opposing force by the threat of a large-scale envelopment. Cause the absorption of reserves and particularly the most mobile reserves of the adversary on the threatened wings (previous attack on Norway and attack on Holland by von Kuechler's 18th Army and the 9th Armored Division).

2. Then attack at a suitable central point chosen for its strategical importance or its tactical vulnerability. Form a mass at this point and assault with the maximum of

available means, without regard to the inevitable losses (as in the attack on Sedan by the von Rundstedt Group of Armies and the von Kleist Armored Groupment; Sedan was the "hinge" of the French set-up and whoever held it was master of the shortest roads to Paris or the English Channel).

3. As soon as the break-through is effected, exploit it immediately with the armored forces acting in close liaison with the air reconnaissance and the combat forces.

Assign them objectives in depth that will coincide as far as possible with the sensitive points indispensable to the material life of the enemy army (important cross-roads, regulating stations, and depots of every kind), and insist on speed.

Do not slow down the armored forces by requiring them to widen the breach. This role is reserved for the infantry of the normal divisions following after the assault of the fast-moving units. As a matter of fact, armor greatly diminishes the vulnerability of the exploitation forces initially confined in a narrow breach.

Also, do not require the armored units to maintain approximate alinement with other fast-moving units advancing to the right or left on parallel axes; on the contrary, demand that they push forward, seeking the point of least resistance without wasting time at the defensive areas they may encounter.

4. The enemy may endeavor to parry this form of attack by breaking off the battle and reconstituting a new front farther to the rear. Consequently, in order to prevent the enemy from reorganizing such a front, a drive should be made to gain control of important cross-

roads or bridges over rivers along which it might be organized, and to reach before the enemy does the last obstacles beyond which no maneuvering is possible (for example, the English Channel after Sedan).

Simultaneously, have the entire effort of the aviation concentrated on the assembly areas of reserves and on vital points of the communication system used for the movement of reserves.

5. In spite of the boldness of such a race forward, always insure protection against an eventual counterattack on one's flanks and rear. (Consider the constant flank protection of the von Kleist Groupment in its break-through toward the English Channel: one armored division maintained protection to the south against counterattack by the French, and was progressively replaced in this mission by normal infantry divisions as these came up. Compare this maneuver with the attack of the 4th Armored Division on Le Quesnoy, May 21, to protect the Hoth Groupment then engaged toward Arras in the north.)

6. As soon as the attack has been made in sufficient depth to effect the disruption of enemy formations and the definite isolation of different hostile masses, a defensive attitude should be maintained toward the masses temporarily neglected. This will be done by resisting on carefully selected positions in support of the bridgeheads necessary for the ensuing phases of assault (defensive attitude on the Somme and the Aisne of the German 12th and 16th Armies before the attack of June 5 while the armored groupments continued to the English Channel and reorganized for the drive to the south).

7. Once the objective is chosen, bring all the offensive

action to bear upon it; envelope its flanks and rear by means of rapid forces (von Kleist Groupment at Boulogne and Calais, May 23: the Germans, having defined the Channel ports as their objective, rushed the von Kleist Armored Groupment toward them leaving the following infantry to hold the Somme front on their left flank until the Groupment could be reorganized for the drive to the south).

8. Whenever possible, insure the early relief of the mobile elements which are always needed farther on. (Relief of the 10th Armored Division along the Somme by the infantry of the following armies. Relief of the von Kleist and Hoth Groupments by the 4th Army in front of Dunkirk and Lille, May 29, so that they could be reorganized for the drive to the south.)

9. If the enemy offers a strong degree of resistance in a front on which he has massed a dense concentration, then effect anew its break-up and envelopment by making new break-throughs (Cassel and the Mont-des-Cats, during the battle of Flanders; fast-moving divisions were sent as far forward as possible between the retreating French armies after June 8).

10. Thus reduce the sections of the enemy Army one after the other, or simultaneously, according to the means available (group of Allied Armies of the North, then the Armies of the Weygand position, then the Armies of the Maginot Line).

This analysis shows clearly the role devolving upon the armored and motorized arm: to be the advance guard of normal divisions at the points of attack, and the instrument of exploitation and envelopment.

However, one should not lose sight of the fact that this arm—an expensive one, an arm of quality rather than of quantity, an arm subjected to an extreme attrition of man and matériel—cannot do everything. It must be constantly relieved by the armies composed of normal infantry divisions that endeavor to follow it closely. The close union effected between the armored units and these following armies must be emphasized. They are two echelons of one force and not two separate and independent armies. (Typical in this connection, during the first phase of the operations in the Ardennes, was the subordination of the von Kleist Groupment to the von Rundstedt Group of Armies, and that of the Hoth Armored Groupment to von Kluge's 4th Army.)

Furthermore, without denying the strategical effectiveness of the blitzkrieg, it is well to recall at the end of this analysis that a blitzkrieg is feasible only when the enemy does not possess a striking force of equal power. It implies at the very outset a considerable superiority of the means of attack over those of the defense. It requires uninterrupted supplying; otherwise the rapidity of its advance, an indispensable condition for its success, will be slowed down. In this respect, the use of airplanes for supplying armored units with ammunition and fuel cannot be considered wasteful. Also, it is apparent that a success comparable to that of the German campaign in the West could not be expected in a theater of operations not provided with such a dense road system, nor with such large resources as would permit the invader to live almost entirely off the country.

Finally, if failure is to be avoided, the blitzkrieg

demands a long and extraordinarily minute preparation of the contemplated operations. The conduct and especially the supplying of motorized warfare limit the possibility of improvisation. The many details of the indispensable plans for the development of the "drama" of a blitzkrieg imply a long period in which the plan may be secretly prepared before the country to be attacked becomes alarmed.

Section III. THE ARMORED ARM IN ACTION

1. THE HIGH COMMAND

In conformity with their conceptions of the use to be made of the armored mechanized arm, the Germans constituted in time of peace the various echelons of the High Command destined to become cadres for the armored and motorized units.

The Heeresgruppenkommando IV at Leipzig, set up in October 1937, served as the headquarters and staff for the armored army to which all armored, light, and motorized divisions were subordinated.

The staffs of the XIV, XV, and XVI Corps were fully organized, and grouped under their orders were two motorized divisions, three light divisions, and four armored divisions, respectively.

Furthermore, on the eve of the campaign in Poland, the staff of the XIX Corps was being organized in Vienna. It was to comprise the 4th Light Division and the 2d Armored Division, both stationed in Austria.

Finally, the first four armored divisions had all of their organic elements at war strength. The 5th Armored Division was being completed, and the creation of a sixth armored division (the 10th) had been started. The transformation of the four light divisions had been

studied and there was a possibility of motorizing a certain number of normal divisions in addition to the four already existing.

Thus a number of generals and cadres of the German Army had been able to make themselves perfectly familiar with the handling of units that were complete in all their combat elements. Thanks to the experience gained on maneuvers, the lessons of the marches into Austria and Czechoslovakia, and the combat training acquired in Spain, a doctrine for the employment of these units had been progressively drafted and perfected.

By the beginning of the war the organization of the armored units was complete, and by May 1940 had been further tested in the Polish campaign. Three units in the chain of command had been established:⁴ Armored groupments, which consist of two or more armored corps, which in turn consist of a number of armored divisions.

2. DUTIES OF THE VARIOUS ECHELONS

a. Armored Groupment

The armored groupment was essentially the instrument of strategic action. It corresponded practically to the field army and was, in general, directly under the commander of the group of armies. Thus during the first phase of operations, von Rundstedt commanded a group of armies in front of Namur which included the three armies of von Kluge, List, and Busch, and also the armored groupment of von Kleist. However, the term

⁴ Seven army corps (XIV, XV, XVI, XIX, XXII, XXXIX, and XLI) capable of serving as cadres for other units, either armored or motorized divisions—10 armored divisions, 6 motorized divisions.

“armored army” was never officially used by the German High Command during the campaign in the West.

The fact is that in the matter of hierarchy the analogy that might be drawn between the armored groupments and the armies does not mean that the two are exactly similar. Their tasks, depending on their respective organic characteristics, are often dissimilar.

The predominant qualities of the armored groupment are mobility together with a certain amount of fire power. That is to say, it is capable of surprise action as well as shock action. The speed of motorized weapons has upset all traditional notions of time and space to a greater extent than any invention of the past. The armored arm is capable of disrupting the defense in its entire depth; furthermore, by the speed of its action, it can paralyze the reactions of the defender to the point of denying him any possibility of organizing, or even of conceiving, a parry if he does not have similar units available.

The armored force must deliver its blows ahead of the armies. More than ever, in the German doctrine, the advance forces actually conduct the battle. For this reason, in defining the mission of the armored groupment, everything that might limit its action is carefully eliminated. In particular, a zone of action is seldom prescribed in advance. The armored groupment selects its terrain in the course of operations according to whatever information is obtained about the weak point of the adversary; any opening in the enemy's formation must be exploited without delay.

As a rule, the zone of action in which the armored groupment operates does not coincide with that of an

army. The army, with its large units of normal infantry and its artillery, has available the means to carry out methodic destructive action (in particular the attack on fortified positions), to mop up the terrain, to occupy conquered ground, and especially to carry out defensive operations—in short, all operations in which the factor of surprise gives way to fire power and which primarily demand continued action. On the other hand the armored groupment is essentially the weapon of break-through attacks quickly conceived and executed.

Also, the armored groupment is exposed to rapid wear and tear and must be frequently reorganized. Therefore, it is up to the armies to widen the breach whenever the enemy's defense is solidly organized and coordinated, and to relieve the armored groupment at the strategic objective assigned by the High Command in order that the groupment may reorganize for possible future operations. This is well illustrated in the statement of the missions assigned to the von Kleist Groupment and to the armies of the von Rundstedt Groupment, respectively. With von Kluge and List, von Kleist was to break through the French fortified front on the Meuse: like von Kluge, he had to reach the English Channel as quickly as possible, but he proceeded at a more rapid pace, far ahead of von Kluge, constantly insuring his own protection to the south and enveloping the group of Allied Armies of the North by quickly occupying the ports suitable for their reembarkation.

Meanwhile, in rear of von Kleist, the von Kluge and List armies advanced by forced marches. They progressively relieved elements of the von Kleist Armored

Groupment in order to constitute a defensive front on the Aisne and the Somme. As soon as a decision was obtained and without waiting for the Dunkirk bridgehead to fall, the Hoth and von Kleist Armored Groupments left that situation in the hands of the armies and withdrew in order to reorganize before participating in the second phase of the operations on the Aisne and the Somme. While on the Somme, Hoth and von Kleist attacked in close liaison with the von Kluge and von Reichenau armies; on the Aisne, the von Weichs and List armies were charged with opening the way for the Guderian Armored Groupment.

b. The Armored Corps

The armored corps appears to be the battle unit. It receives from the commanding general of the groupment instructions as to the direction to be taken, and, attacking on that axis, it commits its divisions successively or simultaneously, combining their action, at times converging and at times parallel, insuring their protection, and when possible providing for their relief. By its very nature, the armored corps is able, to a certain extent, to hold captured ground.

c. The Armored Division

The armored division is the basic combat unit. It receives from the corps commander the direction in which it is to exert its effort; its zone of action must necessarily be limited except when the defense is weak, in which case it can push forward toward the ultimate objective of the entire groupment.

It is in the division echelon that the tactics of the German armored-mechanized arm should be studied in detail. However, it is well to set forth first the principal features which characterize this arm in all echelons.

3. GENERAL CHARACTERISTICS OF THE ACTION OF THE ARMORED ARMY IN BATTLE

a. The Officers

Commanding officers of large and small armored or motorized units were chosen for their strong personalities. In all echelons and at all times it is they who conduct the action of their units.

The obligation for them to grasp the situation rapidly in order to exercise effective command requires that they move to the front. Most of the time they are in the midst of the battle. According to the narrative of a combatant of the 4th Armored Division, the colonels of tank regiments and the commanding generals of brigades were always in the very front of the fight, in their own tanks. As a rule, the citations awarded to commanding generals of armored divisions mention the personal part they played in the front lines. These high-ranking officers also used airplanes, preferably the observation airplane Fieseler-Storch.

The desire to leave freedom of action and initiative with the various commanders is illustrated in the orders issued at the end or at the beginning of the day. They are always short, clear, and easily read. They do not pretend to regulate every minor detail.

In the course of operations, battle orders adjust the

initial missions of subordinate units to the unforeseeable development of events. However, the rapidity of the reactions of a command is dependent on the presence of the commanding officer at the front.

All vehicles that are not actual combat units—all administrative, supply, and maintenance equipment—are kept at the absolute minimum consistent with the rapid movement of the command. The armored division staff is divided into two sections. One assists the commanding general close to the battle line and handles decisions of a tactical nature. It includes all the officers charged with conducting the operations. The remainder of the staff, whose duties are of a more administrative nature, comprises the group handling questions of matériel and the group charged with questions of personnel and morale. These operate in the rear section of the headquarters.

b. Importance of Signal Communications

Immediate effective action of the command is possible only because of the intensive development of signal communications in the German Army. In this connection it should be remembered that the direction and development of the Signal Corps have been entrusted to very capable officers, such as von Kluge, in 1933. Hence the Germans had simple and practical sets in all arms, and the personnel was trained in all methods of communication.

In the motorized arm, every armored vehicle has its radio set. The commanding general of a division or of a brigade communicates by radio not only with his immediate subordinates but with the air forces operating with his headquarters. In the lower echelons, every com-

manding officer issues his orders by radio, reports to higher commanders whatever difficulties he encounters, and receives their instructions by the same means.

This extensive signal communication is one of the most evident superiorities of the German motorized arm over similar units of the French Army. In an article written by a German who participated in the battle of tanks at Merdorp against a French cavalry corps, tribute is frequently paid to the quality of French matériel and to the courage of those who manned it, but on several occasions mention is made of the fact that "the action of French tanks is completely dispersed; one has the impression that there is neither command nor direction during the combat."

c. **Judicious Offensive Spirit**

At all echelons, the action of the command is exercised in a resolutely offensive, if not actually bold, spirit. This aggressive spirit has become part and parcel of the reflexes of the combatant himself. This should cause no surprise when one recalls the high quality of the armored troops and the training they generally were given by the National Socialist Automobile Corps (the automobile educational agency of the Nazi Party) even before their entry into military service.

This determination of the combatant to push forward at all costs in the direction assigned gives the commanding officer valuable contact information and enables him to grasp the situation accurately. German regulations attach great importance to reconnaissance. The enemy cannot be overcome unless one first acquires exact data

as to his methods of combat, his available means, his units, and the weak points of his defense. Even before securing such contact information in combat, every possible means will have been employed for that purpose: espionage, ground and aerial observation, etc.

Cultivation of the offensive spirit does not mean that the commander should neglect the ordinary exercise of prudence. Boldness must not become obstinacy. Should the tanks encounter an obstacle, they do not try to force their way through but search elsewhere for an opening; when they discover it, they plunge forward without worrying about the resistance remaining in their rear, and without endeavoring to maintain a rigid alinement with adjacent units. If the attack encounters a continuous line or an obstacle liable to render the advance impossible or hazardous, other means (such as bombardment aviation), are brought into play.

d. Combined Action of the Motorized Arm with the Aerial Arm

As a matter of fact, the armored-mechanized arm does not fight alone. It constitutes but one part of the tank-aviation team. It must constantly be borne in mind that in every phase of action, tanks have acted in close liaison with aviation:

(1) Reconnaissance aviation informing tank groups at long distances as to their axis of march.

(2) Observation aviation equipped with Fieseler-Storch planes enabling the command of large armored units to follow the development of the battle.

(3) Pursuit aviation protecting the troops against

enemy bombers or intercepting the pursuit planes liable to attack dive bombers.

(4) Especially dive bombers. In fact, the dive bombers, or "Stukas," became the principal auxiliaries of tanks.

No doubt the war doctrine of the armored arm continues to give an important role to truck- and tractor-drawn artillery, not only for the purpose of supporting the attacks of riflemen but also those of the tanks. An authoritative article published in March 1941 in the "Artilleristische Rundschau" recalls the fact that artillery insures to tanks a more permanent support than does aviation; a support less dependent on the hour of the day or on the seasons, and supplying a greater volume of explosives. Unquestionably a heavy- or medium-caliber armored artillery would constitute the most effective solution of the problem.

Nevertheless, the rapidity of the advance and the relative invulnerability of the tank in the midst of a coordinated enemy unit frequently isolated it from its artillery, even though the artillery was fast-moving and maneuverable. In such cases, the action of the "Stukas" proved to be the determining factor in almost every instance. "Stukas" actually constitute the accompanying artillery in close support of the armored arm. They are capable of going everywhere and of accompanying tanks, and they can observe immediately the effects of their fire.

Their methods of intervention vary. Sometimes they operate according to a preconceived plan, as in the 4-hour air bombardment by General von Stutterheim's bombers in preparation for the attack by the Guderian Corps on Sedan. At other times they operate upon a radio request

from the armored units; in this way the "Stukas" reduced the resistance at Vendresse west of the Ardennes Canal on May 14 and that of Liancourt north of the Avre on June 6. The impression was often gained that the tanks would have been powerless without the assistance of the dive bombers.

e. Defensive Precautions—"Flak" and "Pak"

In the same manner in which they studied the attack, the Germans had studied at leisure the defense against similar attacks to which they themselves might be subjected.

Commanders of large units are always careful to insure their protection against hostile air attacks, notably on river banks. They go so far as to emplace their anti-aircraft artillery (or "flak") in the very midst of their armored brigade when the latter has not been rejoined by the brigade of riflemen. Frequently a complete battalion of anti-aircraft artillery organized for use against tanks is assigned to an armored division.

A still more important role is reserved to antitank guns (or "pak") of the tank-destroyer battalions. They are pushed boldly forward, close to the tanks, or even ahead of them when the riflemen attack in first echelon. At Sedan their fire on the embrasures of the casemates contributed to a marked degree to the break-through at Frenois. In the race to the sea and on the Somme they caused the failure of the attacks by the De Gaulle Groupment.

However bold may be the action of the German motorized arm, the command never fails to deploy and put into

action the defensive means capable of insuring its protection.

4. COMBAT OF THE ARMORED DIVISION

a. Attack

Quick and brutal action is of primary importance. The maximum effect of surprise must be produced. The adversary must not be allowed time to recover from his surprise and to react. From beginning to end, the fight must have the pace of a fast boxing match. Blows must be dealt in such a manner that the enemy is not given a chance to catch his breath. His morale must be completely shattered.

For this purpose, both from a tactical as well as from a strategical point of view, the selection of the maneuver to be carried out must always be inspired by the desire to disconcert the enemy command through its very boldness and rapidity. If necessary, "what seems most improbable must be accomplished at the improbable place," as remarked an officer of the staff of the 1st Armored Division in justification of the maneuver at Sedan. By spectacular and even horrible combat methods, one must annihilate any will to resist on the part of the enemy. The fury of the "Stukas," the whizzing of their bombs, the din of their machine guns, the onrush of the tanks, the thunder of their march and of their fire, the spurt of flames from the flame throwers, the explosion of melinite charges, everything must be brought into play to affect the morale of the combatant and give him the impression of an "apocalyptic" scene.

Therefore, the predominant aspect of the combat is brutal and continuous thrust. One must strike hard and quickly. All maneuvers, all deployment of units, must be governed by this requirement. However, an attack by an armored division should not become a disorderly onrush. This superior, methodically trained, powerful organization is governed by rigid regulations.

In the armored division it would be an error to compare one weapon with another. Far from encouraging rivalry among the various weapons, the new organization has developed their harmonious association, and utilizes the motor to give them previously unrealized possibilities of speed. Armored weapons (light or heavy), infantry, artillery, engineers, signal communications, not to mention the air forces—all these arms contribute to the common aim: overcoming the adversary by an irresistible assault, followed by a complete destruction.

b. Tactics

Speed is the primary factor that determines the different tactics of the armored division.

(1) Should the terrain be open, and the enemy have a discontinuous front—

(a) The armored brigade will rush forward in first echelon.

(b) Its reconnaissance group will keep it informed as to the possible points of penetration.

(c) Frequently motorcyclists are sufficient to keep the armored elements informed.

(d) At other times, heavy armored cars, followed by

motorcyclists, are themselves kept informed and on the alert by the radio of the light-armored cars.

(e) When informed by aviation that there is nothing ahead of them, the brigade advances, the light tanks in the lead; the reconnaissance detachment insures the protection of an exposed flank (1st Armored Division at Peronne on May 17).

(f) The armored brigade moves along the road in column on several routes, always ready to deploy as soon as it encounters resistance and ready to seek immediately the first fissure capable of being exploited in the enemy's formation. Once the fissure has been found, the brigade continues its advance, neglecting temporarily the roads blocked by the enemy. Moving along with it are the reconnaissance and liaison detachments, artillery observation, elements of the antitank battalion, and elements of engineer troops capable of dealing rapidly with any terrain incident such as a road to be cleared, the preparation of detours, the improvement of fords, etc.

(g) In rear of it, in the second echelon, follow the brigade of riflemen, the artillery, the main bodies of the antitank battalion, the engineer battalion, and the services. This infantry brigade will be charged with the frontal attack, and the reduction and mopping up of the centers of resistance outflanked by the tanks.

(2) Should the terrain prove to be held in depth by a determined enemy, though not protected by a continuous line of obstacles—

(a) The armored division will maintain a formation in depth, tanks in first echelon, riflemen in second echelon. The armored brigade will deploy on an extended front,

regiments in line and each regiment in column of battalions. As the fight progresses and reveals new resistances in width, the battalions deploy their light companies, the heavy companies being held in reserve for overcoming more serious resistances.

(b) The battalion in the second echelon is held in readiness to intervene, either to extend the flank, or to relieve the leading battalion should it be held up or suffer heavy losses.

(c) Kept on the alert by its liaison and observation detachments, and advancing with the tanks, the artillery of the armored division deploys and insures to the tanks the most rapid, accurate, and intense fire support possible.

(d) Abandoning its motorcycles and detrucked from its cross-country vehicles, the infantry overcomes such points of resistance as the tanks have left behind by pinning them down frontally, outflanking them, and then mopping them up once they have been overcome. The assaulting engineer detachments assist with their flame-throwers and their explosives, and without loss of time reestablish the roads blocked or damaged by the enemy.

(e) In principle, the two echelons do not remain together, and the tanks continue to advance at their own pace. If the defense areas put up too energetic a resistance, the assault of the "Stukas" will neutralize them and will permit the riflemen—once more in their vehicles—to close up on the armored brigade.

(3) Should the armored brigade encounter a mechanized unit of a type comparable to its own and in good order (as was the case of Hoepner's XVI Corps opposed to the French Corps in Belgium)—

(a) The armored division will gain contact in such a manner as to determine the exact nature of the resistance encountered, its weak points, its flanks, and its support. Observation aviation completes the investigation. Protected by its light elements, the armored division deploys in line of regiments or battalions, maintaining proper intervals and distances between the tanks, with the heavy ones to the rear.

(b) The artillery deploys with a view to firing before the enemy antitank arms can open fire. The infantry organizes positions with a view to constituting an eventual line of support.

(c) Bombardment aviation prepares the attack by dive bombing on the enemy's supporting artillery and on his concentrations of tanks.

(d) The tanks move to meet the enemy tanks. The rule is to impose one's will by sheer boldness, by deploying first and being the first to open fire. In order not to be hit, a tank must fire first at the greatest possible range and with the greatest accuracy. The fire discipline so highly developed in the German mechanized arm is thereby justified.

(e) The combat must not degenerate into fragmentary individual combats. A team spirit must prevail down to the smallest units. From the brigade down to the section, tank leaders must continue to wage the combat as a whole, violently but with flexibility. The presence of the commanding officers at the front and the existence of good radio communications appear to be absolute necessities.

(f) Envelopment and attacks from the rear are sought as being the most profitable.

(g) Any weakening on the part of the enemy must be exploited at once. Here again, a weak place must be converted into a breach, the tanks forming a mass at the point disclosed. The widening of the breach must entail the disintegration of the adversary's formation and the lowering of the enemy's morale, and the assault of the tanks must then be converted into a pursuit.

(4) However, the armored division may have to attack a fortified front, supported by concrete fortifications, bristling with barbed wire, protected by obstacles which the tanks cannot cross, and held by an enemy who is not disorganized. (This was the case on the Meuse at Sedan in front of the Guderian Groupment on May 13.)

Here the tanks become easy targets for well-emplaced and sheltered antitank artillery, and so may be destroyed. The desired speed of the armored division can no longer be materialized. Therefore, the infantry must now precede the tanks. We have here a complete change in tactics. The commanding general of the armored unit will then plan a classical attack:

(a) Preparation of the attack by bombardment aviation according to a coordinated plan prepared by the aviation and motorized units.

(b) Crossing the river in pneumatic boats under the protection of the last wave of dive bombers.

(c) Reinforcement of the infantry by assaulting elements of engineers armed with flame-throwers and explosives, as well as by elements of light antitank artillery.

(d) Support by the artillery of the divisions, reinforced,

if possible, with heavy artillery and kept informed by ground and aerial observers.

(e) A thoroughly energetic attack will be made and the casemates resolutely attacked by the engineers and anti-tank guns; the infantry will advance without regard to losses. Its objectives are in depth. At Sedan the Grossdeutschland Regiment penetrated as far as 8 kilometers from its jumping-off point, and into French artillery positions.

At this point the infantry "turns the terrain over to the tanks." The tank then becomes more an agency of exploitation than of penetration.

As soon as the breach is sufficiently widened and conditioned to enable the tank to pass, the tank resumes its place in the first echelon in order to insure maximum speed to the advance of the armored division.

These four situations, selected as being the most characteristic, are not the only ones encountered, for the possibilities are unlimited.

5. DEFENSE AGAINST THE ARMORED DIVISION

This study cannot be ended without endeavoring to determine the means of parrying the action of the motorized arm. Analysis of each method of attack will reveal a corresponding method of defense.

a. **Morale**

The tank demands of its crew a very high morale. The defender must be able to create a still higher morale. The action of tanks is based on speed. This speed must be checked.

b. Speed of Attack

The speed of tank units results in the conquest of objectives in depth. It must be parried by resistance in depth.

c. Obstacles

The advance of a tank is stemmed by obstacles. They must be placed not only in front of defense areas, but also in their depth and rear where they will constitute actual "stopping lines" for the mechanized units already reduced and worn down by the defense.

d. Villages and Woods

A tank fears villages and woods. If these are organized for defense and offer a stubborn resistance, they can isolate the tank from its infantry, artillery, and means of supply.

e. Armor

The armor of the tank has proved to be superior to the fire of the defense. The shell must reconquer its superiority over the armor plate.

f. Antitank Guns

Too often the antitank guns of the defense have been submerged by the onrush of tanks. Prior to the war the Germans calculated that each antitank gun attacked by compact tank units could hardly destroy more than three tanks before being destroyed itself. On this basis, they had reckoned that a nonalerted defense could rarely oppose sufficient antitank guns to any massive attack

(such as 60 tanks per kilometer). Therefore it would be necessary—

(1) To protect the antitank weapons effectively against observation and hits.

(2) To reestablish rapidly the balance between the attack and defense by opposing to the mass of tanks a flexible and mobile mass of guns on self-propelled mounts capable of strengthening the position of resistance at least in depth.

(3) It should be possible to oppose a mass of airplanes and tanks with an equally large mass of airplanes and tanks.

g. Lessons from Operations of a German Armored Division

A study of the operations of the armored division south of the Somme is instructive and comforting in this respect. It discloses—

(1) The great difficulties encountered by the German armored units which had penetrated deep into the position, far from their infantry and artillery which were held up by French centers of resistance that had been neglected or avoided by the tanks.

(2) The impossibility for armored units acting alone to capture villages held by a resolute defense.

(3) The great difficulty the German command encountered in supplying the tanks and furnishing them with indispensable repair material.

(4) The vulnerability of the tanks thus slowed down and paralyzed, when counterattacked by airplanes and tanks.

(5) Finally the very great attrition suffered by the armored divisions on the Weygand position both as to infantry and tanks.

Unfortunately, the Frency Army had lost the best, if not the major part, of its effectives and had seen its matériel, already tragically inadequate on May 10, dwindle to practically nothing.