Chapter 4

OPERATIONS OF COMBAT AIR FORCES

Air Defense of the Army: Supply System and Power Resources

As a rule, air defense did not constitute a separate mission. Under normal circumstances it was bound up with the mission which had to be accomplished in order to secure air supremacy or at least temporary and local air superiority. As early as 1935 Air Field Manual No. 16, in paragraph 103, had described action against enemy air forces with the object of achieving air superiority as the primary mission of airpower throughout the whole duration of a war:

> Combat action against enemy air forces must be taken from the very beginning of a war. Neutralization of enemy air power weakens the whole military power of the enemy, and serves to protect the friendly military forces, the civilian population, and the country. It also releases aggressive friendly air forces for the execution of other missions which are of vital military importance.

In a critique marking the close of a command and general staff field exercise in June 1939 General Hans Jeschonnek, Chief of the Luftwaffe General Staff, emphasized that defeat of the enemy air forces must initially be the main objective of the Luftwaffe; hence, the forces participating in the first attack must be as strong as possible. The mission of providing air support for the army forces, he went on, was not as important in the first few days of a war as the mission of counter-air action. "The damage which can be inflicted on a hostile army in the first two days of a war" Jeschonnek observed, "is in no way proportionate to the damage an enemy air force can inflict if it remains completely operable."[1] Early in the Allied invasion of Normandy (1944), Hitler, speaking from German experience, stated that air superiority was vital. It was more decisive in warfare, he remarked, than any other single factor, since air superiority gives almost complete freedom of movement, while its lack leads to immobility. Indeed, Air Field Manual No. 16 described counterair action against the enemy air forces as action in support of the Army (paragraph 121).

It was a fundamental necessity prior to the commencement of each campaign to examine whether the Luftwaffe had a sufficiently large superiority to commit certain forces in army support missions immediately the campaign began, or whether all forces available would be required initially for combat action against the enemy air forces. After the Allies had built up their air forces to a strength which placed the maintenance or establishment of German air supremacy or general superiority completely outside the realms of possibility, the Luftwaffe found itself compelled to restrict its efforts to the establishment of at least temporary and local superiority over the zones of army operations. When even this was no longer possible in combat against the Western Allies, first in Italy, and, later, in France after the invasion, the operations of the German ground forces inevitably also had to fail.

Forces for the protection of the Army from enemy air attack were dispersed among the major Army components. As a rule a fighter wing of three or four groups was assigned in the command zone of each army group. This group was under command of the air fleet of air corps headquarters responsible for air operations in the zone. During friendly or enemy offensives, or when the air situation was critical, these forces if at all possible received temporarily assigned reinforcements. From 1943 on, however, this was as a rule only possible at the expense of other segments of the front which had to be stripped of forces for the purpose.

The sketch "Air Defense Forces in the Eastern Theater on 26 March 1944"* (Die Luftverteidigungskraefte an der Ostfront am 26. 3. 44) shows the strength and disposition of the German fighter forces available in the eastern theater on that date. The figures show that the forces thus available definitely must be considered as having been inadequate considering the recovery made by the Russian air forces and in view of the long frontages involved. However, the home air defense situation made it impossible to allocate reinforcements to the eastern theater. Another circumstance that imposed a constant drain on the fighter forces in the eastern theater was that combat action in the east was considered as a training mission. The majority of the fighter pilots committed in the theater were transferred

* See Appendix 2.

to fighter units committed in home defense as soon as they had enough combat experience, and were replaced by newly trained fighter pilots without combat experience.

Luftwaffe tactical principles of air defense as a rule provided for fighter aircraft to go into action from a scramble takeoff the moment enemy air forces were reported approaching. For this purpose a certain percentage of each unit was held ready for immediate action under what was called a "seated alert" (Sitzbereitschaft); other pilots were under normal alert. As a rule rest periods could only be granted during the dark of night or during spells of bad weather.

German regulations rejected the idea of maintaining constant fighter patrols in the air over or in front of the main line of resistance. It was only during offensive operations that the armored units spearheading a drive on the ground were given more or less continuous fighter protection. The same fighter units were also employed, when necessary, to provide escort protection for attacking German bomber forces, or were required to establish air superiority over the current target area during a bombing mission.

One problem which practically defied solution was that of adequate action against Russian ground attack air units, which made up the bulk of the aggressive branch of Russian air forces. These aircraft approached the front at low altitudes in squadron strength (varying between three and eight aircraft) to attack the forward German positions, returning immediately to Russian territory. Even when going into action in a scramble takeoff the German fighters usually arrived too late for counteraction because the radar instruments failed to detect planes approaching at low levels. Pursuit over Russian territory was usually a fruitless endeavor, since the Russian planes flew too low for air combat. Furthermore, they had protective armor plating and therefore were difficult to shoot down. German fighters which did attack came under intense defensive fire from the ground. The only practicable remedy for this problem was for the troops to protect themselves by their own defensive fire and by going into cover. As a rule the damage done in these attacks was very small.

In spite of the deficiencies outlined above, the German fighter forces in the eastern theater acquitted themselves quite well in the

accomplishment of their mission of protecting the ground forces and their installations against air attack. This was possible primarily because of the superior quality of German flying personnel and German aircraft. The best evidence of this was to be found in the rail and road traffic behind the German and Russian front lines. Except during major offensives the roads and rail routes behind the Russian lines were completely quiet during daylight, while on the German side traffic proceeded on road and rail routes almost without hindrance. Matters were naturally different in other theaters of operations, where the German fighter defense was practically neutralized by the superior aircraft available to the enemy.

Types and Scope of Air Support

It is in the nature of airpower that more profitable results can be achieved in attacks against large, compact targets than in attacks against small targets within the battle area. The latter as a rule were widely separated, and usually were dug into the ground to protect them against artillery fire. Even during mobile operations, however, moving targets within the near front areas frequently were found only in widely dispersed order, and took every opportunity to seek any cover the terrain offered.

Another factor which had to be taken into account was that the enemy concentrated the bulk of all weapons in the areas near the front, and a large percentage of these weapons could be brought to bear against aircraft. This was particularly so because the small size of the targets under air attack compelled the German aircraft to operate at low levels. The outcome was that heavier aircraft losses were incurred in these operations, some of them shot down and permanently lost, some of them rendered inoperable for a considerable time because of extensive damage.

The two air photos attached as Appendixes 3 and 4 show a tank factory and tanks operating in dispersed order on a field of battle, and clearly reveal the type of target against which an air attack could produce the most profitable results. In a tank battle, even if heavy commitments of German aircraft (operating in the area of main enemy defense and at a correspondingly heavy loss) succeeded in destroying all of the tanks, the factory shown in Appendix 4 would

have produced enough tanks in one day to make up the loss. An attack resulting in destruction of the tank factory, or putting it out of operation for any length of time, would reduce the enemy output in tanks by numbers which represented a multiple of the tanks which could have been destroyed individually in the terrain.

Therefore, Air Field Manual No. 16 established in paragraph 120 that "Within the scope of the overall conduct of the war, combat action by air forces will generally provide indirect support for the combat operations of the other military services." It was obvious that this indirect support would only become evident after some time, but that it then could become evident in a decisively important form, having as a rule an impact all along the line and not restricted to any specific segment of the front. However, decisively important operations on the ground were often designed to produce more speedily effective results, which might remain restricted to specific areas. The German air field manual therefore provided in paragraph 121 for more speedily effective direct army support in certain circumstances, support in the form of operations directly coordinated with those of the Army on the ground.

According to paragraph 20 of the manual, operations in direct support of the Army were of more urgent necessity than were actions against distant targets when the operations to be supported were "of decisive importance within the scope of the overall conduct of the war." Expressed in different words, this is the same principle formulated in World War I, that is, "The aim must be to insure that no decision is forced in combat without the Luftwaffe making its full contribution."

The object of the following passages is to closely examine this direct cooperation between the Luftwaffe and the Army in operations of decisive importance and to examine the prerequisites for such cooperation together with the manner in which it was accomplished. In such an examination two methods become apparent for the execution of the direct support or direct cooperation mission, as outlined above, namely, 1) Air action against enemy transportation movements and communications, the object of which is to isolate the battle area; and 2) air action against targets in an area closer to the front line, described as tactical or close air support. As a rule German air forces supporting the Army ground forces during operations designed to force a decision on the ground applied both methods--combined in

timing but divided in place.

The combination of the two methods of army air support was applied as early as the Polish campaign, and was used with great success during the 1940 campaign in France. This same method, which during the initial years of the war formed an integral part of the whole Blitz war concept, also played a decisive role in later phases of the war. A few examples (which could be added to considerably), such as the 1941 battle at Kiev,* or the capture of the Russian fortress of Sevastopol,/ serve to show how these two methods were always applied simultaneously and in combination.

Among other factors, this was in part the result of technological reasons. Thanks to high maneuverability, the single-engine dive-bomber and ground-attack aircraft were the only types which could be committed in close army support missions on the field of battle without incurring the risk of insupportably heavy losses. However, conditions were frequently such that the striking range of these types of aircraft was inadequate to permit their use in action in the enemy rear designed to seal off the battle area. Conversely, the multi-engine types of bomber aircraft were not suitable for commitment in close support action within the battle area.

Another tactical effect which was achieved by this combination was that enemy elements which succeeded in passing through the interdiction belt unharmed, a thing which was bound to happen, again found themselves threatened by destruction through air attack within the battle area. In addition, this type of operation coincided with the tactical principle that once a target is taken under attack, the attack should continue until the target is destroyed.

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* Editor's Note: One of the seven great battles of encirclement during 1941.

/ Editor's Note: For a detailed and interesting account of the capture of Sevastopol, see Field Marshal Erich von Manstein, Lost Victories (Chicago, 1958), pp. 222-259; also, "Das VIII Fliegerkorps im Einsatz Sewastopol 1942 (Juni)" (The VIII Air Corps in the Operations at Sevastopol, June 1942), from a study the 8th Section, Luftwaffe General Staff: "Experience of the Luftwaffe in Operations Against Fortresses." Karlsruhe Document Collection, F III 1.

Although the two forms of direct army support were thus as a rule applied in combination, they will nevertheless herein be treated separately, inasmuch as each form had to be applied in accordance with separate principles. Since the operations were separate in area, it is possible to examine them separately.

On the basis of operational plans or acting on requests by the Army High Command, the Wehrmacht High Command in each case issued directives to the Commander in Chief of the Luftwaffe governing air support to be given to the Army. * In accordance with the basic directives thus received, the Commander in Chief of the Luftwaffe coordinated the mission of Army support with the other missions of the Luftwaffe and reached appropriate agreements with the Army High Command.

Based on these agreements an appropriate order was issued to the air fleet headquarters responsible for air operations in the areas involved and, if necessary, the air fleet was assigned the appropriate forces for the purpose. In agreement with the army group to be supported, the air fleet then issued the necessary orders to the air corps or air division responsible for the commitment of the air forces involved.

Normally, the Wehrmacht High Command did not decide whether the army support operations were to take the form of interdiction action to seal off the battle area or of direct air combat action within the battle area. The decision was to be reached in agreement between the lower level commands concerned. On this subject Colonel Kusserow, who served for a long time as Chief of the Air Operations Section of the Luftwaffe Operations Staff at headquarters of the Luftwaffe High Command, / wrote in a report dated 2 September 1954:[2]

> Practical experience in the preceding campaigns had proved that in this respect direct cooperation between the two locally responsible commands on the spot in the battle area

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* See Appendix 12.

/ Editor's Note: Colonel Ernst Kusserow held this post from March 1941 to the summer of 1943.

produced the best results, better than those /which/ a control from some higher headquarters over the air forces involved could produce. The zones of the air fleets coincided with those of the army groups.

Concerning the allocation of the necessary units to the air fleet headquarters, Colonel Kusserow observed that allocation of air forces was dependent on the missions of the individual army groups. The point of main effort in Army operations at the beginning of the campaign was also the area of the main concentration of airpower.

Interdiction of the Battlefield

The German air command realized at an early stage that during large-scale army operations on the ground air action to prevent enemy movements to the front represented a highly effective means to influence the course of combat operations. Large-scale operations on the ground necessitated a continuous flow of gigantic masses of personnel and materiel to sustain combat action. These personnel and this materiel had to be moved forward from the enemy training areas and armament factories, usually situated far in the rear. Interdiction of these replacement movements normally had an impact on combat action at the front within a few days. The larger size of the targets for air attack here insured more profitable results than attacks against the dispersed targets which could be found in the battle area.

The views of the Luftwaffe High Command on this problem are formulated in paragraphs 129 and 161 of Air Field Manual No. 16. The manual asserted that the closer the decision in battle, the greater would be the effect of bomber attacks against targets on and near the front. Targets attacked in the enemy rear would disrupt enemy supply installations and impede the forward movement of replacements. It would be essential also, the manual continued, to assign vitally important targets, commensurate with the decisive nature of airpower.

As a rule German air action against enemy rear communications were designed to weaken the enemy and to create favorable conditions for German operations or to influence such German

operations. Nevertheless, the objectives aimed at in such action varied in accordance with the current situation. At the beginning of a war or during mobile operations it was possible to assign the Luftwaffe the mission of preventing enemy forces from reaching certain areas or phase lines in time. This gave the German troops an opportunity to reach these areas or phase lines and occupy them before the arrival of the enemy. Prior to or at the beginning of a decisively important offensive it was possible to assign the Luftwaffe the mission of so weakening the enemy through attacks against their rear communications that operations would proceed favorably for the German side. On the other hand, if the enemy were preparing to stage an offensive, the mission of the Luftwaffe might be to take action which might prevent the offensive altogether, or at least to so weaken the enemy forces that the German forces on line would be able to repel the attack.

Another task, which became an almost permanent mission of the German air forces in the eastern theater because of the weakness of the German ground forces there during the later phases of the war, was to influence the strength ratios in favor of the German side, either temporarily or permanently. This was designed to gain time for an increase in German strength, or to prevent the arrival of further enemy reinforcements and thus avert the possibility of the enemy achieving an overwhelming numerical superiority. In some cases, on the other hand, the air mission was to prevent the departure of enemy forces from specific areas. The necessity could arise when the enemy planned the movement of personnel and materiel from certain areas during successful German operations in order to prevent their envelopment or destruction, or in order to use them for the establishment of a defense or support line in the line of advance of a German shock force. Interdiction missions were also necessary in situations where the enemy intended to move materiel and personnel from one segment of the front to another for offensive or defensive purposes.

Air Field Manual No. 16, in paragraphs 162-177, established certain principles to be observed by the various field commands of the Luftwaffe in action designed to interdict troop transportation

routes.* Troops and supplies could be moved forward by the following means: cross-country marches on foot; truck transportation on roads; rail movements; in special circumstances by ships using inland or other waterways. And the mission of the air forces was either to destroy the means of transportation or to interrupt the transportation routes.

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* Editor's Note: The substance of paragraphs 162-177 provided that in the circumstances of enemy concentration and regroupment, operations against transportation networks must be in close cooperation with the Army. Combat operations against troop concentration and other troop movements must be primarily a rail interdiction mission. A key factor is proper timing. The fact that part of the movement can occur by road and across country reduces the time available for attack. Exploitation of the hours of darkness makes timely detection and attack a difficult matter. Valuable results may be achieved through attacks against particularly important and large structures; targets of this type include river bridges, viaducts, and tunnels. Timely recognition of a movement is possible only if all intelligence sources are fully exploited, and if constant air reconnaissance is maintained. If signs of a movement multiply, air reconnaissance must be employed to the utmost. Lack of night air reconnaissance must be compensated by early morning and late evening missions. In urgent situations, air photo reconnaissance and interpretation must be complemented by visual observation and, in certain cases, by radio. Important factors of success are (a) In troop concentration movements, the distance behind the enemy lines at which railroads are destroyed, (b) In regrouping movements, the distance from enemy unloading points at which railroads are destroyed. The attacks must interdict the entire movement, without any possibilities to reroute it. Particularly effective results can be obtained through the destruction of structures at points on which routes of the rail network converge. Destruction of the rail lines between rail depots is usually more easily achieved but less effective. In general, rail depots and rail junctions should not be targets for interdiction attacks. Attacks against moving railway trains, however, are effective. Generally speaking, attacks against loading and unloading operations do not offer prospects of success of an operational magnitude. The results achieved in attacks on roads can at no time reach the scope of those against the rail system.

In order to achieve such a program of interdiction, Air Field Manual No. 16 also laid down categories of targets. The principal categories were: 1) All types of moving columns and march movements; 2) troop concentrations; 3) rail interdiction targets (including rolling stock and permanent installations); 4) road interdiction targets; 5) waterway interdiction targets; 6) man-made structures; and 7) port installations. Because of the large number of targets, a careful selection was necessary. Thus, the air field manual mentioned that it is essential to determine the vitally important targets.

In order to be able to assure success in operations designed to seal off the battlefield, precise information had to be available concerning the scope and capabilities of the transportation means and transportation system available to the enemy. It goes without saying that the conditions were fundamentally different in the case of each country with which Germany came into conflict.

The necessary information concerning all permanent installations and structures, particularly those of the transportation and communications networks, had to be procured during peacetime. All such data was compiled in a separate volume of the "Military-Geographical Description" (Militaergeographische Beschreibungen) for each country. Volumes of the descriptions were available for a number of countries, including France, Russia, North Africa. Some of the volumes were compiled in great detail and included, for example, tables showing all man-made structures, their location, construction, and vulnerability to destruction. *

Another valuable source of information was available in the rail routes and road routes maps published by the Army Transportation Division. These maps showed all rail and road routes in a country together with their carrying capacities.

After the outbreak of war the data thus available had to be supplemented continuously by information secured through other intelligence media, such as air reconnaissance, agents' reports, and prisoner interrogation. The information available was subject

* A specimen is extant in Appendix 9, unpublished appendices of USAF Historical Study No. 163. Karlsruhe Document Collection.

to frequent changes and modifications due to developments in the military situation and other causes. Thus, the delivery of 427,284 American trucks to Russia[3] produced a pronounced change in the Russian transportation system.

On the basis of available data, together with a knowledge of intended German conduct of operations in the event of war, it was often possible even before the war to prepare plans for air operations to interdict an enemy transportation system. Thus the "Instructions for the Strategic Assembly and the Conduct of Combat Operations" (Aufmarsch-und Kampfanweisung) prepared by the Luftwaffe General Staff against the eventuality of war provided for action to sever enemy communications. The instructions were issued for the first time in 1936 and were to apply in the event of war against an adjacent country. For purposes of concealment the instructions from 1938 on were issued as Tactical Problem White, Red, etc. (Planstudie Weiss, Rot, etc.), a separate color being used to designate each country.

The plans contained in these studies for action to interdict transportation routes were worked out in collaboration with the Army and with support from the Transportation Division of the Army General Staff as the best informed expert on the transportation systems in possible future enemy countries. A plan of this type was prepared against the eventuality of armed conflict against Poland.* In the French campaign, operational directives to the Second Air Fleet stated the most favorable points for interdiction attacks designed to prevent road transportation movements in France.†

It is only natural that precautionary planning of this nature for action to interdict the transportation system could not be restricted to rail routes alone but had to include plans for action against all roads which were of importance in the conduct of military operations,

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* Appendix 10 in unpublished appendices of USAF Historical Study No. 163, Karlsruhe Document Collection, consists of the rail route map of the plan. Those rail routes are lightly shaded which were to be interdicted by the Luftwaffe in the event of war against Poland.

† An example is extant in Appendix 11 in unpublished appendices of USAF Historical Study No. 163. Karlsruhe Document Collection.

whether it was likely that the potential enemy would use the roads for military transportation from the outset or might be compelled to shift emphasis in transportation to the roads after their important rail routes were destroyed. Plans were thus prepared during peace for the destruction of important roads in the event of war. Throughout the war similar traffic interdiction plans were prepared and put into effect at airfleet-army group, airfleet-army, and higher levels of command.

The decision to seal off a battle area could be taken by the Wehrmacht High Command, which could issue the necessary orders. It could be taken in response to a request from the Army High Command. If the area to be sealed off did not exceed the zone of operations of an army group or of an army, the decision was usually taken at the airfleet-army group, airfleet-army, or air corps-army level of command.* This presupposed that the air and army commands concerned had received the appropriate instructions from the Wehrmacht High Command or the Luftwaffe High Command to cooperate.

The mission was executed by the command headquarters responsible for the control of the air forces within the area concerned. As a rule this was an air corps or air division or, in exceptional circumstances, a local air command headquarters. The commanding Luftwaffe officer controlling the flying forces involved was solely responsible for the methods employed in the execution of his mission. According to paragraph 125 of Air Field Manual No. 16 the commanding officer directing the operations of the ground forces had to restrict himself to "stating the purpose to be achieved by the operations of the Luftwaffe." In the event of diverging opinions (which was a rare occurrence) the decision was made by the next superior headquarters.

This arrangement insured that the execution of air combat missions would be handled exclusively by officers of the Luftwaffe with the appropriate training, who were responsible for the proper application of the operational and tactical principles of the Luftwaffe. In this respect the Luftwaffe commanding officer was responsible for proper observance of the principle established in paragraph 13 of

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* See Appendix 12.

Air Field Manual No. 16 that "too frequent changes in the objective, which would prevent achievement of the maximum effects in the action, will not take place."

Before the officer directing the army operations on the ground stated the purposes to be achieved in the air action, he usually conferred with the officer directing the air operations or with liaison personnel from that officer's staff. This was the only way to insure that due consideration would be given to the capabilities of the air units available, and that the mission assignment would not state requirements which the air command could not fulfill because of the forces available to it and because of the limited range of its aircraft.

The mission assignment from the officer directing the army operations on the ground to the officer directing the air action was then formulated and, as a rule, contained the following points in a form more or less as follows:

> 1) The purpose of the action is to prevent enemy columns of all types crossing a line extending from A through B and C and farther westward--or--2) The purpose of the action is to interdict the rail routes from A to B, C-D, and E-F in order to prevent enemy transportation movements for a period if at all possible of four to five days.

For operations to seal off a battle area the responsible air command had available its assigned bomber forces, and during the first phases of the war its dive-bomber units, insofar as their operating range was adequate for the purpose. The dive-bomber units were particularly suitable for attacks designed to destroy point targets. Fighter units escorted the bomber and dive-bomber forces, both of which were extremely vulnerable to attack by enemy fighters. After executing their escort mission, or if the German side had air superiority in the area involved, the fighters attacked ground targets with weapons fire.

Basically, the execution of attacks against moving enemy columns and transportation routes did not differ widely from the methods employed in attacking other similar targets. As a rule the attacking units operated at intermediate altitudes. Aircraft capable of diving carried out their mission in dive-bombing attacks. This

applied to the Ju-88 and the Ju-87 type of aircraft, although Ju-88 units at times did their bombing while in a glide. If the air situation permitted, the units carried out low-level attacks, which greatly increased the effectiveness of the attack. Indeed, as Air Manual No. 16 observed, the effect on the morale of the enemy troops of low-level attacks on troop movements, "will often exceed the actual damage done." In general, the manual continued, bomber forces are not suitable for low-level attacks, but at the climax of a battle it might be advisable to throw all available units into the balance. If losses in this type of action are to be kept within tolerable limits, the manual insisted that the action achieve surprise.

In 1941, after the resounding successes of the Luftwaffe in its operations against the Russian air forces had created conditions which made such action possible, great success was achieved by sending out flights of only two or three aircraft carrying bombs on what were called armed reconnaissance missions. These small units were more easily maneuvered and were more flexible in their operations than larger units, and also could attack targets which would hardly have been worthwhile for larger units. Later, because of the more critical air situation, missions of this type could be carried out only by fighter bombers, with their smaller operating range. Planes on armed reconnaissance missions were also able to search out railway trains travelling alone or placed under cover in dense forests, or, if on early morning missions, to detect the tail end of night troop movements and take them under attack.

What complicated attack action against the type of target usually encountered in operations to seal off a battle area was that, except in the case of troop concentrations, the targets were generally very narrow but at the same time long. A special bombing pattern was developed for attacks against rail tracks, a particularly narrow type of target. The attacking plane approached the rail tracks at a sharp angle and dropped its bombs at short intervals in a stick-bombing run. In this method of bombing it was highly probable that at least one bomb would strike the permanent way directly or would detonate close enough to damage it by fragments.

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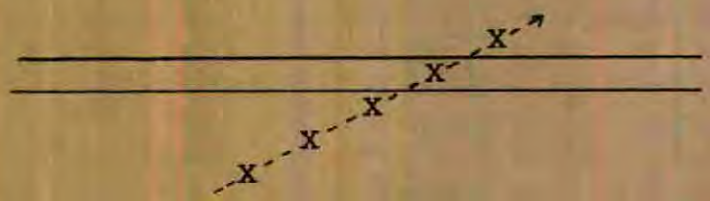

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In attacks with nose-spiked bombs, the planes had to operate at a low altitude. For this reason these attacks were often carried out against rail routes between depots, where defense fire from the ground was not likely to be very heavy.

The first condition for the successful accomplishment of a bombing mission was very close collaboration between the air reconnaissance units on the one hand and the bomber and other units on the other, except in the case of planes on armed reconnaissance missions, which searched out their own targets. Usually the command held bomber units under alert and ready to take off immediately to attack any target the moment reconnaissance planes located and reported any such target by radio.

In special circumstances it was sometimes found necessary to protect bomber units engaged on combat missions, either by means of direct fighter escorts or by means of fighters committed in roving missions within the target zone.

Numerous case studies of action by German air units in sealing off battle areas in the Second World War are available for all campaigns and theaters. For the Polish campaign, a study prepared during the war by the Military Science (8th) Branch of the Luftwaffe General Staff reveals that as a result of early and efficient air attacks against the railroads, the Poles were able to bring into battle only 37 infantry divisions, 11 cavalry and 7 border guard brigades, out of a total of 45 infantry divisions, 16 cavalry and 10 border guard brigades which had been mobilized.

A report by the Military History Branch of the Luftwaffe

provides a graphic description of Luftwaffe participation in ground combat by means of air operations to seal off the battle area. During the Battle of the Radom Pocket* the Luftwaffe completely halted rail and road traffic in northern and eastern Poland, making it impossible for the Poles to form a task force at Kielce. By 8 September the German Air Force had succeeded in bringing to a complete halt all traffic on the major routes Poznan-Kutno-Warsaw, Krakow-Radom-Deblin, and Krakow-Tarnow-Lvov, and all communicating roads. The rail routes were blocked by destroying depots, rails, and trains. As a result the Polish forces were driven from the rail routes and headed eastward on the roads. But by continuous attacks on the latter the Luftwaffe prevented an orderly retreat and the establishment of a line of resistance west of the Vistula River.[1] The success of the above air operations is substantiated by a report of General Kutrzeba, in command of the Polish Army of Poznan:

> Towards 1000 hours the enemy commenced vigorous air attacks against the bridges of Vitkovice.
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> In point of the number of aircraft committed, the severity of the individual strikes, and the acrobatic daring displayed, the /enemy air operation/ represented a record.
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> Every movement, every troop concentration, and all march routes were taken under annihilating fire from the air . . . . It was Hell come to Earth. The bridges were destroyed, the fords were blocked, the antiaircraft and part of the other artillery forces were annihilated . . . . Continuation of the battle would have been nothing but a matter of holding out, and to have remained in position would have posed the imminent threat that the German air forces would have turned the whole place into a graveyard, since antiaircraft defenses in any form were completely lacking.

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* Editor's Note: Reference is to the Tenth Army's breakthrough to the Vistula and the battle of the Radom Pocket, in which large Polish forces were effectively encircled by 12 September, resulting in the capture of 60,000 prisoners and 130 guns.

[1] "Der Feldzug in Polen in Stichworten" (The Polish Campaign in Brief), Records of Historical Division (8), Luftwaffe General Staff. Karlsruhe Document Collection, G III 2C.

The above presentation by a Polish general commanding an army can undoubtedly be accepted as proof of the decisive nature of the contribution made by the Luftwaffe through its participation in operations on the ground towards the German victory over Poland.

In the 1940 campaign in France German air power was also committed extensively in combat action against the enemy rear communications and in action to seal off battle areas. In the first few days of the campaign, for example, large elements of the air forces under the Third Air Fleet attacked French rear communications as far back as a line from Givet through Hirson, Laon, Rheims, Sainte-Menehould to Verdun, with main emphasis on the area before Charleville-Sedan. As soon as German air superiority had been securely established, air attacks to an average depth of 48 miles behind the enemy lines struck moving troop columns, troop concentrations, and rail routes. [4]

Situation reports of the Intelligence Division, Luftwaffe General Staff, for 15 and 16 May, gave an account of operations of Third Air Fleet to seal off the battle areas. The units of the air fleet were employed in continuous attacks supporting ground operations of the Army in the Fumay-Chalons-sur-Marne-Revigny-sur-Ornain-Metz-Longuyon area. In the Charleville-Stenay area, west of the Meuse River, strong forces from the air fleet attacked moving troop columns, troop concentrations, fortifications, and traffic routes. Single- and twin-engine fighter units were committed in escort missions and in action to maintain air superiority and in the Sedan-Charleville area alone 69 enemy aircraft were shot down in air combat. Continuous air attacks of the previous day, the harassing attacks carried out during the night, and the numerous daytime strikes against traffic installations and troops, prevented the timely forward movement of sizable enemy forces and effectively supported the continuing advance of the German ground forces to the Montcornet-Rethel-Attigny area. [5]

Strong forces from the other German air fleet committed in France, the Second Air Fleet, were employed in like manner. Thus, the same situation report contained the following wing supplementary passages:

The /Second/ Air Fleet had the mission of supporting the

advance and attack operations by forces of the Fourth Army /this was the main German assault army, which was to break through the French lines and by means of a drive to the Channel coast was to split the French forces/, and or providing cover for the left flank in a line from Abbeville through Amiens and Laon to Rethel; concurrently, forces of the air fleet were to prevent a French withdrawal across the Somme River.

A report of 19 May operations revealed the success of the Luftwaffe against French rail routes. Some 33 transport trains were halted between Revigny-sur-Ornain and Bar le Duc.

Attacks against rail targets made it difficult for the enemy to move reinforcements forward. The routes crossing a line extending from La Fère through Amiens to Abbeville in a northeastward direction, and thus into the rear of the German spearhead forces, were attacked repeatedly. Bombings caused particularly serious destruction to the rail installations at and south of Amiens.[6]

These examples suffice to show that air action supporting the ground forces by sealing off the battle areas (besides the close tactical air support given to army forces, which will be treated in a later section) also represented a decisively important contribution towards victory in the French campaign.

In the Balkan campaign, also, the air support given to the army ground forces in the form of action against the enemy rear communications made an important contribution towards bringing the campaign to a quick close. In the Yugoslavia operations, the final after action report by the Wehrmacht High Command[7] states that, "Through continuous combat action against the enemy communication and supply routes . . . the Luftwaffe did much to bring about the disintegration of the Serbian Army."

On operations in Greece, the final after action report on the campaign by the Wehrmacht High Command presented the Luftwaffe contribution:[8]

> Under overall command by the Reich Marshal /Goering/, the Luftwaffe through its speedy defeat of the enemy air forces and through action maintaining air supremacy throughout the

campaign made it impossible for the enemy to take air action planned to interrupt the planned progress of the operations.

In exemplary cooperation the Luftwaffe supported the Army through constant close and long-range reconnaissance operations; through combat action by dive-bomber forces facilitated the breaching of the enemy main lines of resistance; and through day and night attacks against the withdrawing enemy forces and their rear communications speeded up their disintegration . . . .

Particularly large successes were achieved by the bomber and dive-bomber forces in continuous attacks against enemy transport ships in the coastal waters around Greece. This prevented the planned withdrawal of the British forces and very seriously damaged British shipping.

In the Russian campaign, after neutralizing the Russian air forces stationed in Western Russia, the Luftwaffe, even in the first few days of the Russian campaign, changed over to operations in support of army operations on the ground. For this purpose the bomber forces and part of the dive-bomber forces were committed primarily in action to seal off battle areas. In the first few weeks of the Russian campaign so many moving columns of all types were detected all along the wide frontage that the forces available to the Luftwaffe were inadequate to take all of them under attack in addition to the execution of the other air missions, particularly the mission of rail interdiction.

In his study "The Luftwaffe in the Eastern Theater" (Die deutsche Luftwaffe an der Ostfront) General Plocher summarized the situation as follows:[9]

On the subject of troop movements it can be said that in the first few days and weeks of the campaign in particular, such movements were profitable targets for the bomber forces. Moving in two, and very often in three or four columns abreast on a single road (during the summer months the terrain on either side of the roads was used as a summer roadway, so that the roads then were often up to 100 yards wide) in close order, with motor and horse-drawn vehicles

between troops marching on foot /the Russian forces/ were pressing eastward and fell easy prey to the bomber forces.

During the first months of the Russian campaign in particular, when unbelievably large marching columns and troop concentrations were evident on the Russian side, unexpected technical difficulties were encountered by the German air forces in action against these targets. The principal problem was an insufficient supply of proper type bombs,* which seriously reduced the effectiveness of bombing attacks during this most crucial period of the campaign in the east. As a result, the enemy had far stronger forces available during the critical phases of the battles before Moscow than would have been the case if properly effective types of bombs had been available to the German side in adequate quantities.

Another air mission during the first year of the Russian campaign involved the support of ground operations during battles of envelopment. In 1941 strong Russian forces were compressed in large pockets on seven separate occasions./ During these battles 2,256,000 Russian prisoners were taken and 9,336 tanks and 16,179 artillery pieces were captured.

The mission of the German air forces in these battles of envelopment was to prevent the escape of the pocketed Russian forces through the German lines, and to frustrate attempts by Russian reserves to relieve the enveloped forces through attacks from the outside. In these operations the far sides of the pocket areas were closed initially only by small armored forces with their few motorized infantry elements, which had to prevent a Russian breakout until the German infantry divisions advancing on foot could arrive.

During the initial phases of a pocket, large gaps existed in the enveloping German lines, and if led by an energetic commander elements of the pocketed Russian forces could always find a point at which they could break out. The speediest and most effective way to seal off these gaps would have been to commit paratroopers, but the German command did not have enough of these forces available, since

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* Editor's Note: See Part I, Chapter 2.

/ See Appendix 7.

the units had to be reestablished after the heavy losses they had suffered in the seizure of the island of Crete.

The mission of preventing the escape of the Russian masses from the pockets thus fell to the German air forces.* However, the Luftwaffe was only able to accomplish this mission very incompletely, since escape movements were often concealed against observation from the air by large wooded areas. Furthermore, it was impossible as a rule to take appropriate action at night, since no salient terrain features existed which could have served for orientation. As a result, large masses of Russian forces succeeded in escaping from the pockets.

Throughout the entire campaign air action against troop concentrations and troop movements played a highly important role, although the Russians soon learned to restrict their movements to nights and to break up their movements into small units. During Russian offensives, however, and particularly during the great offensives launched after 1943, large Russian troop concentrations and movements were in evidence even during daylight.

As had been the case in earlier campaigns, air operations against the Russian railroads commenced all along the line immediately after the start of the campaign. Owing to the numerous other missions of the Luftwaffe, however, and because of the enormous size of the areas involved, clearly defined areas of main effort in rail interdiction operations developed only on rare occasions. In the first year of the campaign one such area of main effort was that of Smolensk-Bryansk-Gomel-Mogilev in June 1941. At the beginning of July, during the Battle of Kiev, forces of two air fleets were committed to develop a concentration of such action in the Kiev-Kazatin-Shepetovka-Korosten area.[10] Concerning the June 1941 rail interdiction operations in the Bryansk area of main effort, the Military History Division of the Luftwaffe reported that operations against the rail network were extended to include the Gomel-Smolensk-Mogilev area, the farthest line of the area under interdiction being roughly 420 miles east of the foremost German tank forces spearheading the German advance. Concurrently with direct support

* See Appendix 8.

action of the continued drive towards Smolensk, the Second Air Fleet directed attacks primarily against the rail system, which was interdicted to a depth of 180 miles.[11]

Interdiction of the railroad system in the areas referred to above was of particular importance for the progress of operations in the eastern theater as a whole, since main emphasis in operations on the ground was in these areas. Indeed, on 13 July 1941 (three weeks after commencement of the campaign), the Wehrmacht High Command considered it as an established fact that destruction of the Russian railroads had deprived the Russians of all possibilities for large-scale counteroperations.[12]

The scope of air operations in the first six months of the Russian campaign is evident from figures taken from an after-action report by the II Air Corps,[13] which was withdrawn from the eastern theater in November 1941 for transfer to the center. The II Air Corps was one of the five air corps initially committed in the eastern theater.* According to the report, units of the corps in the period from 21 June 1941 (the date on which the campaign opened) to 13 November 1941 flew 3,579 rail interdiction missions. In these missions the corps' units achieved the following results:

Railroads destroyed at	1,736 points
Number of trains destroyed	159
" " " damaged	1,584
" " locomotives destroyed	304
" " " damaged	103

The majority of the railway trains involved were ammunition trains, which exploded, and trains set on fire while en route. In addition, units of the corps continuously attacked loading and unloading operations.

Although 1941 must be considered as the peak year of interdiction operations against the Russian railroad system, air operations against Russian rear communications continued with a varying

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* Editor's Note: II Air Corps was assigned to Second Air Fleet which was committed in the zone of Army Group Center.

degree of intensity throughout the war. However, the countermeasures introduced by the enemy made it impossible to achieve results later in the war equal to those achieved in 1941. Besides exploiting the dark of night and periods of bad weather for their rail movements,[14] the Russians held large reserves of personnel and large supplies of repair materiel available along the routes, and this enabled them to repair within a surprisingly short time any damage done by attacking aircraft. Thus, the above-cited report by Zantke observed that the effects of bombing of the railroad in the Karkhov area were eliminated within 72 hours, traffic being resumed "on miles of tracks laid down on a landscape of bomb craters on the virgin soil to detour the destroyed route." Another complicating factor was the difficulty of destroying rail tracks in winter. Bombs usually bounced off the hard, frozen railroad and exploded harmlessly nearby.

The results achieved in the bombing of rail tracks continued to decrease, for which reason the decision was taken in 1942 to shift emphasis in rail interdiction operations to attacks against railway trains travelling at night in the near front areas. In order to be able to detect these trains, various bomber units organized special rail interdiction squadrons manned by specially trained personnel, as was the case with the 9th Squadron of the 3d Bomber Wing, and the 14th Squadron in each of the 27th and 55th Bomber Wings.* Although these squadrons achieved satisfactory results they were deactivated at the end of 1944 owing to fuel shortages.

As the war drew on the Russians resumed daytime railway traffic on a steadily increasing scale because of their improving position in airpower. Consequently, the German ground-attack air units which had been activated in the meanwhile and were equipped with FW-190 fighter type aircraft each received one special rail interdiction squadron. Since these planes could only carry a small number of bombs they were to concentrate primarily on the destruction of Russian locomotives, for which purpose they were also to

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* Editor's Note: In 1941, both the 27th and 55th Bomber Wings were in the Fourth Air Fleet (Army Group South), the former in the IV Air Corps, the latter in the V Air Corps. The 3d Bomber Wing was in the Second Air Fleet (Army Group Center), II Air Corps.

take the locomotives under direct fire with their guns.

In 1944 the Rail Transport Division of the Army High Command considered that the Russians were beginning to suffer under an acute shortage of locomotives. Thereupon emphasis in all rail interdiction action was shifted to attacks against locomotives. There can be no doubt that the Russians have Allied supplies to thank for the fact that these attacks also failed to produce decisive results. Thus, one American writer established that,[15] "In the three and one-half year period /October 1941-May 1945/ under consideration we delivered to the Russians 1,900 steam locomotives, 66 diesel oil locomotives, 9,920 flat cars, 1,000 dump cars, 120 tank cars, and 35 /rail cars for the transportation of/ heavy machinery. . . ."

Rail interdiction operations were resumed in the summer of 1944, when the IV Air Corps,* whose units were manned by personnel trained specifically for long range air combat missions, went into action. A number of bomber units had been withdrawn from the eastern theater at the end of 1943 for this purpose and given specialized training for missions of strategic air warfare. After completing their course of training these units were assigned to the IV Air Corps for operations against the Russian rail transport system.

In contrast with the methods employed formerly in rail interdiction operations, the decision was now taken to attack large rail depots. In the past attacks had been directed against such targets only on rare occasions, although events had revealed how successful such action could be. Thus, two unit after-action reports were available from former years on successful action against sizable rail depots. On 14 July 1941, units of the V Air Corps destroyed the depot at the important rail junction of Bakhmach (on the Kiev-Kursk route), together with approximately 1,000 rail cars. In addition, major damage was done to the Vyazma rail depot, which, according to prisoners' statements, was inoperable for 15 days following the attack.[16]

In view of the success achieved on these occasions it is

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* Editor's Note: IV Air Corps was in the central portion of the front, under Sixth Air Fleet.

astonishing that the decision was only taken in 1944 to change over from the system of pin-prick attacks against Russian railroads to concentrated attacks by massed air forces against the larger targets. In part this may have been due to the circumstance that worthwhile targets of this type were only to be found farther in the enemy rear, and to the fact that the Luftwaffe had no long-range escort fighters available and that the bomber units were not adequately trained for night operations.

In the 27 March-22 July 1944 period the IV Air Corps on twenty occasions dispatched large forces to attack important Russian rail depots, some of which came under attack as many as six times. The 55th Bomber Wing, one of the three wings operating under the IV Air Corps, reported that between 27 March and 5 May 1944 units of the wing flew 3,164 railroad interdiction missions.[17]

The Battle of Kiev in 1941 involved a typical air action to seal off a battle area. In order to gain possession of the Ukraine, the Wehrmacht High Command on 21 August 1941 ordered a "concentrated operation" by the left flank forces (Seventeenth Army and First Panzer Group) of Army Group South and right flank forces (Second Army and Second Panzer Group) to be staged from the lines Kremenchug-Cherkassi and Gomel-Pochep, respectively. The operation was executed in four weeks of continuous combat action and culminated in the Kiev battle of envelopment.

The air mission in these operations was to support the advance of Army forces on the ground and, by sealing off the battle area in the far enemy rear, to prevent countermeasures which the Russian side was definitely expected to take.[18] Developments in the operations reveal with striking clarity the varied missions which developed time and again for the German air forces during the large-scale offensive operations of the German Army, both in the west and in the east, in World War II. Emphasis during such operations shifted continuously between missions of close air support within the battle areas and air action in the far enemy rear to seal off the battle areas. The great flexibility and mobility of airpower was exploited to the utmost, and the capabilities of the troops were strained to the breaking point.

The air support mission in the operations under discussion

was assigned to the V Air Corps, under General der Flieger (Lieutenant General) Ritter von Greim in the southern area, and to the II Air Corps, under General der Flieger Loerzer in the northern area. *

The two air corps were assigned the mission of supporting the advance of the ground forces, particularly of the armored units spearheading the attack; of preventing the forward movement of enemy reinforcements from the east; and of breaking up enemy retrograde and evacuation movements of any type on rail and road routes leading eastward.

The initial situation was favorable for the air units committed, since the II Air Corps had just advanced its base airfields far forward. Furthermore, the important Kursk-Konotop-Kiev rail route available to the Russian side was largely parallel with a salient in the northern part of the German front on the ground. The fact that it was so close enabled the German bomber forces to make several repeat attacks daily. Operating from the area southwest of Kremenchug, the units of the V Air Corps had the Russian Karkhov-Poltava-Kiev rail route within a very favorable striking range.

In executing their air mission/ the two air corps employed the method of concentrated action to support the advance on the ground when it was necessary to break through fortified enemy positions, to force a crossing over rivers, or when other causes halted the advance on the ground, particularly the advance of the armored units. Culminating points in the operations developed for the II Air Corps on 14 and 23 September, for the V Air Corps on 19, 21, and 23 September 1941.

Whenever the tactical situation on the ground permitted, however, air attacks were directed primarily at the far enemy rear, to seal off the battle area. This led to the development of a systematic plan of rail interdiction action in addition to combat action against

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* Editor's Note: V Air Corps was under the Fourth Air Fleet (Army Group South), and II Air Corps was under Second Air Fleet, on the right wing of Army Group Center.

/ See Appendix 9.

columns moving along roads, the combined effect of which was systematically to seal off the battle area of Kiev.*

In the 1-11 September 1941 period the V Air Corps committed relatively weak forces to interdict the rail route leading from Karkhov through Poltava into the pocket area, but at the same time dispatched units to attack all other rail routes leading westward and southward from the west through Karkhov and farther east. Approximately on 10 September, the day on which the First Panzer Group commenced its drive on the ground, the V Air Corps shifted emphasis to attacks directed against targets within the pocket area; these attacks were apparently designed to prevent the movement of Russian reserves to the vicinity of the battle area. After the pocket was closed, V Air Corps units commenced lively combat action against the rail routes southeast of Karkhov to a depth of 180 miles in the enemy rear, in order to prevent the forward movement of Russian reinforcements and materiel from the rear areas.

For the II Air Corps, the necessity to protect the flank of the Second Panzer Group involved initially the most important task of interdicting the Bryansk-L'gov rail route and the rail routes within the Bryansk area. After this the air corps continuously dispatched strong forces against the Kiev-Kursk rail route, and from 11 September on, after the forward units of the Second Panzer Group had advanced to the close vicinity of this route, against the branch lines towards the south.

Besides air attacks against Russian troop concentrations within the pocket which was gradually shaping up, the approaching culmination point in operations on the ground again brought into prominence the necessity for action to interdict the rail routes to L'gov, since it was to be expected that the flank of the German attack would be threatened from there by new Russian forces which could be moved into that area. Weather conditions were not too favorable for air operations, and heavy rains repeatedly made the execution of air missions exceedingly difficult for days on end.

Some of the air strikes were executed by sizable forces which

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* See Appendix 10.

did their bombing from altitudes of between 6,600 and 13,200 feet. As a rule, however, air missions were carried out by small units of between two and four aircraft at low to almost ground levels in the form of armed reconnaissance operations. This was due in part to current weather conditions and in part to the aggressive spirit of the bomber crews resulting from their complete confidence in the superiority of their equipment. A few night attacks were directed against heavily travelled rail depots, for example against Karkhov on the night of 15-16 September, to increase the effectiveness of the overall air operations.

The primary target was railway rolling stock. During the most crucial periods of the battle, for example on 8 September, units executed as many as fifty strikes against locomotives and against complete railway trains. Special type SC-100 bombs were used repeatedly. Frequent use was made of 4.4-pound (2 kilogram) bombs in containers in an effort to cause fires.

It is no longer possible to determine to what extent the Russian rail system was permanently damaged. The fact that only very few man-made structures existed in the areas under attack resulted in few possibilities to do any lasting damage. However, reports from the period under discussion mention large numbers of trains halted and numerous trains derailed. Although it must be said that the effects of each individual air attack were not always great, the cumulative effects of the operations can be considered as adequately satisfactory. The Russian side was no longer in a position to maintain properly scheduled traffic, to move in essential supplies to the troops inside the gradually developing pocket, or to move the Russian forces out of the trap which was closing. Large numbers of trains were frequently observed halted on the main lines. At some points, however, and even within the area under German attack, the Russians did succeed in moving in reserves from the outside. On 18 September, for example, the Second Panzer Group came under attack by a Russian tank division and a cavalry division newly arrived in the area.

On the whole, however, the Russian Command was unable to commit forces which would have been strong enough decisively to influence the course of the battle. In retrospect the question must be asked whether the same results could not have been secured at smaller costs by means of a few heavy attacks by concentrated forces against

important rail junctions situated farther in the enemy rear instead of the thousands of individual attacks directed against the various rail tracks.

In the campaigns in Poland and France the destruction of bridges contributed largely to the success achieved in operations on the ground. In the opening stages of the Russian campaign this was also true. A case in point is that of the destruction of an important bridge in the eastern theater, which resulted in the capture of thousands of vehicles by the German forces.

However, events were to prove as early as 1941 that the growing strength of the defenses at bridges was to make their destruction increasingly difficult with the means then available, and that even large bridges could be repaired within an astonishingly short time. In 1941, for example, the Army requested air action to destroy bridges across the Dnepr River in the central sector of the eastern front. Destruction of these bridges was to prevent the withdrawal of Russian forces across the river, it being assumed that German forces would have been unable to capture the bridges in an undamaged state. Dive-bomber forces succeeded in damaging the big railway bridge at Bobruysk to such an extent that railway experts considered that it would be inoperable for a long time. Surprisingly enough, however, the bridge was in operation within a few days. After the area came under German control it was discovered that the Russian Command had moved in specialized personnel by special trains from Moscow immediately after the bridge had been damaged. Working day and night under the supervision of a high member of the Communist Party with ministerial rank, these personnel had quickly restored the bridge to temporary operability.

Thus, the destruction of bridges did not represent a decisive factor for the German side as the war continued. The unsuccessful efforts of the German Command in 1945 to destroy the Vistula River bridges by air attacks, in which even the most modern means were employed, was nothing short of tragic.

Since the Western Allies in 1944 did succeed through the destruction of bridges in France--and this applies particularly to the bridges across the Seine River--in preventing the timely forward movement of German reinforcements against the invading Allied

forces, it must be assumed that the failure of the Luftwaffe to accomplish similar missions must have been due to inadequate technological developments on the German side, quite apart from the general inferiority of German airpower at the time.

The possibility of using paratrooper sabotage teams for bridge demolition is mentioned in paragraph 172 of Air Field Manual No. 16. And during the war the Luftwaffe occasionally applied this method. When forces of the Western Allies in November 1942 occupied French North Africa, for example, the Commander in Chief, Southern Theater of Operations, ordered that paratroopers were to be dropped with the mission of destroying the bridges on the rail and road routes along the Mediterranean coast, on which routes the Western Allies had based their whole supply system.* In the extremely mountainous terrain of the region numerous large man-made structures were to be found along these traffic routes.

To direct the airborne operations involved, the Commander in Chief, Southern Theater of Operations, assigned to the Panzer Army of Tunisia an officer with exceptional experience in this field. A number of missions of this type were carried out. In view of the fact that the enemy succeeded in repairing the damaged bridges within a very short time, however, the Panzer Army discontinued the operations without informing theater headquarters.

Post-war publications, however, present an entirely different picture of the results achieved. Thus, it can be gathered from Eisenhower's Crusade in Europe[19] that the entire 34th US Infantry Division had to be withdrawn from line in mid-February 1943 and employed exclusively to protect the rail and road routes. Furthermore, the Allied Supreme Command in March established that the withdrawal of Free French Forces from the line for large-scale rail and road defense missions was one of the important factors contributing to the serious defeat suffered by the American forces at Kasserine Pass. According to the officer serving as aide to General Eisenhower at the time, the operations of these German demolition teams, which comprised approximately 60 German and 20 Arab personnel, resulted in the withdrawal of more than 100,000 Allied combat personnel from

* See Appendix 11.

the front for guard duties. The Luftwaffe thus achieved a remarkable success in these operations of indirect support for the Army.

By way of conclusion and recapitulation, it might be said that events of the war proved that the principles established in German regulations on the conduct of operations for the commitment of air-power to support the Army by sealing off battle areas were generally sound. In many cases adherence to these principles enabled the air forces to influence the outcome of operations on the ground decisively in favor of the German side.

The Luftwaffe Command had realized even prior to the war that if interdiction operations were to be successful they must produce interruptions of long duration and therefore would require the commitment of considerable forces. On the basis of war games conducted prior to the war it was assumed that one bomber wing of three groups would be required permanently to keep a rail route inoperable. Generally speaking, these computations proved correct so far as the eastern theater was concerned.

If a number of wings were committed to interdict rail routes, it was found advisable to assign each wing one specific route and not to change the assigned route for the duration of the mission. This insured that the aircraft crews would be intimately acquainted with the direction of the route, the man-made structures to be taken under attack, and similar details.

Although the German Command had taken it for granted that the enemy would do everything possible to keep their railway system in operation, it was not thought that the Russians, within a few months after the opening of the campaign, would be able to repair damages in the short time and on the scope which they actually did.

In the matter of rail interdiction operations, the German Command had been mistaken on one point. German air doctrine in general rejected the idea of attacks against large enemy rail depots because, as Field Manual No. 16 puts it, "the large number of tracks at such depots offer adequate detouring possibilities even when a number of tracks are damaged or destroyed . . . ," and because, "Large rail depots as a rule are heavily defended and have adequate personnel and materials available for the quick repair of damages . . . ."

The German Command in prewar days had considered rail interdiction too restrictedly as a means to halt large troop movements. Too little consideration had been given to the fact that the large rail depots of a railroad system are the collecting points of rolling stock, plus the freight on the trucks present, and that they therefore should have been included among the targets of operational air warfare. Concurrently with the general effects of the destruction of rolling stock, attacks against large rail depots would have served to halt the flow of "means of power" to the combat fronts, since no railroad system can perform the functions for which it is designed if its rolling stock and its supply and repair installations are destroyed. Attacks against large targets of this type would also have been more in accordance with the nature of air forces than attacks to destroy specific points of a railroad or locomotives, targets which in exceptional circumstances might also at times be appropriate.

As previously mentioned, the German air forces did not always at the proper time have the appropriate weapons available for the performance of its mission of sealing off a battle area. Thus, at a crucial juncture, it lacked bombs suitable for action against moving troop columns and troop concentrations. Later in the war, for action against man-made structures, such as bridges, the German side lacked appropriately precise bomb aiming devices. Furthermore, the German aircraft crews were inadequately trained for the execution of missions of this type, and during the war there was no time or opportunity to give them such training.

Direct Air Support for the Army

It had become evident even in World War I that situations can develop in ground combat in which the only possible way to support the army forces is by means of direct air combat action against the enemy forces on the field of battle. Even in those early days this realization resulted in the establishment of special air units for such purposes.

On 10 July 1917 infantry forces attacking in the zone of the German Fourth Army in the coastal areas of Flanders were accompanied for the first time by a complete squadron of aircraft, which took the enemy under fire with their mounted weapons and thus prepared the

way for the attacking German infantry. This introduced the new form of close air support for the army on the field of battle. The effects of this action on the enemy, both in the form of actual losses inflicted and in the form of its impact on the enemy morale, were so outstanding that the Commanding General of the Air Forces, at the time the highest authority in command of all army air forces, immediately proceeded to apply the experience gained and to re-form the existing air units accordingly. From then on ground-attack air squadrons (Schlachtstaffeln) supported the army operations through direct action at the front, in the form of strikes against the enemy infantry and artillery concentrations, reserves, and transportation and supply installations.

The German spring offensive in March-April 1918, known as the Great Battle in France (Die Grosse Schlacht in Frankreich) saw a peak in the size and frequency and successful achievements of the new form of air support. A method had been found to employ airpower in operations to open up the way for the infantry through the enemy trench systems of World War I, and in operations supporting the ground forces directly on the field of battle during periods of crisis. For the command the ground-attack squadrons represented a highly effective reserve force which could be brought to bear without delay at any point of the front currently under threat.[20]

It was to be expected that in any future war situations would also develop on the ground which could only be mastered by aircraft with their great speed and flexibility in combat. The need for such air action could develop: 1) During army operations on the ground to enable friendly ground forces to reach their objectives or, conversely, to prevent the achievement of decisive successes by enemy forces; 2) at the beginning of a friendly offensive to support the ground forces in operations to breach the enemy fortification system (to break the outer crust of resistance); 3) during the initial stages of an airborne or amphibious operation to take the place of the heavy weapons which would not be immediately available after the initial landing; 4) in cases where the friendly ground forces were pronouncedly inferior in heavy or special type weapons, such as antitank weapons; and 5) the appearance of enemy weapons, such as tanks or rocket projectors, in terrain closed against friendly artillery observation, or which because of their small size and/or high mobility could only be destroyed by means of precisely aimed direct fire.

Although German air doctrine showed marked preference for the employment of airpower in attacks against massed targets in the far enemy rear because of the better prospects of profitable results to be achieved in such action, it did not reject the idea of the employment of airpower on the field of battle under certain conditions. Thus, the later (1940) edition of Air Field Manual No. 16 contained the following passages on the subject:*

> Strong forces of the Luftwaffe can be committed to participate in critically important battles on the ground.
>
> The methods of cooperation with army forces will vary in accordance with the current situation, the time factor, the nature of the mission, the objectives aimed at, terrain conditions, and the strength and nature of the forces available. No fixed pattern exists. The ruling requirement is that the mission must produce results of decisive importance for the Army.
>
> For the bomber forces it is thus important to strike those targets the neutralization of which will best serve the interests of the army forces or give them the best support in executing their missions, or which will do most to thwart the plans of the enemy.
>
> The more closely the opposing armies are locked in battle, and the closer the decisive battle approaches, the greater will be the effectiveness of action by bomber forces in near front areas.

However, the above is qualified by the statement that an air attack against enemy forces with a good tactical position in the line "as a rule is unlikely to produce results commensurate with the effort expended, although such action might be required in special circumstances."

It should be noted that the implied restrictions here to not apply to air attacks at the beginning of an offensive on the ground. In

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* Editor's Note: Paragraphs 125, 126, 129, 130.

such cases the enemy ground forces as a rule are badly shaken by the preceding or at least simultaneous concentrations of artillery fire delivered in preparation for the attack. Furthermore, the enemy forces in such cases can be considered as restricted in their movements by the effects of the attack staged on the ground, and are therefore not in a good tactical position.

In general terms, however, paragraph 132 of the manual places definite limitations on direct participation by air forces in action on the field of battle. "Air action within the range of friendly artillery fire is only justifiable," observes the manual, "in cases where the artillery is unable fully to accomplish its mission."

An examination of the regulations contained in Air Manual No. 16 is likely to create the impression that, although the possible necessity for air action on the field of battle is admitted, such action is nevertheless considered as the exception rather than the rule. However, it was fully realized in the Operations Branch of the Luftwaffe High Command prior to the war that, in the event of war, it would be necessary to hold available a number of single-engine ground-attack air units for the execution of unavoidable special missions on the field of battle. In order not to jeopardize the build-up of the operational air forces, to which end all efforts had to be directed, the development of ground attack air forces was restricted to the establishment of an experimental ground-attack group as part of the Air Training Wing, which at least made it possible to gather the necessary experience in this field.[21]

After events in the Spanish Civil War had again demonstrated the value of ground-attack air forces to support the army forces on the ground, the decision was taken at the time when war against Czechoslovakia seemed imminent to expedite the activation of a small number of ground-attack air groups. The units thus activated were retained and reorganized prior to the beginning of the campaign in Poland. At the time of their initial activation, however, they were only organized on a limited basis and considered as an auxiliary arm. The idea was to concentrate them at only one single point of the entire front, namely in the area of main effort in army operations, where they were to support the advance of the spearhead units on the ground. The soundness of these views was fully vindicated in the campaigns in Poland and France. Under command of General Freiherr von

Richthofen the existing ground-attack units opened the way for the armored units spearheading the German advance on the ground, first in Poland and later in the drive to the Channel Coast in the west. Action by these forces thus became an integral part of the pattern for the conduct of blitz warfare. This arrangement left the aggressive or so-called operational air forces free for commitment in missions more in keeping with their nature, to attack large targets, such as enemy rear communications, in the far enemy rear.

This clear-cut division of responsibilities was changed at the beginning of the Russian campaign. Because of the wide frontage in the eastern theater, and because of the usually simultaneous existence of a number of points of main effort in army attack operations on the ground and the frequent shifts of main emphasis, the forces under General von Richthofen, which had in the meanwhile expanded to an air corps,* were no longer strong enough to assume responsibility alone for the mission of providing close air support to the army forces on the field of battle.

As soon as temporary German air superiority had been established in the theater, the other air corps were also assigned tactical air support missions. They developed steadily into tactical air corps. Consequently, the air fleet headquarters controlling these corps also assumed the role of tactical headquarters, instead of serving their intended purpose as operational or strategic headquarters, and thus were exposed to continuous pressure by army commands.

The relative weakness of the German Army, its lack of certain weapons, such as antitank weapons, coupled with the organizational features of the German military establishment, produced conditions in which the Luftwaffe was called upon with increasing frequency to provide direct support for the Army and thus it departed more and more from the principles previously observed in the employment of air-power.

Another factor which also contributed towards this development must not be lost sight of. This was the fact that the war had

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* General von Richthofen commanded VIII Air Corps, under Second Air Fleet.

meanwhile developed into a conflict on three fronts, requiring the commitment of air forces in the continuing operations against Britain, and in the Mediterranean theater, circumstances which seriously weakened the overall number of air units available in the eastern theater.

Concerning the changed mission of the Luftwaffe, General Plocher observed that,[22]

> The campaign in the west, in 1940, had brought about another shift of emphasis in the mission. Direct air support for the Army on the field of battle had become just as important as indirect support . . ., which in the past had been considered as the primary mission of the Luftwaffe.

Another study voiced the opinion that it was soon discovered that the Army, confronted by stronger forces, only made good progress when it had effective airpower in active support. Soon after the opening of the Russian campaign, it became habitual for the armored forces to depend in forward movement on heavy support by the Luftwaffe.[23] And the commander of an infantry regiment placed a high value indeed on direct support. "Tanks in the lead," he wrote, "artillery in the rear, and aircraft overhead--only then will the infantry advance to the attack."[24] In consequence of all these circumstances Hitler, as the Commander in Chief of the Wehrmacht, in the autumn of 1941 ruled "that large-scale offensive operations by the Army will only be allowed to commence after the possibility has been insured for extensive support by the Luftwaffe."

Higher levels of command regarded with mixed feelings this change in the employment of airpower from indirect army support in a steadily increasing measure to missions of direct support. An officer who served as Chief of the Operations Section in the Luftwaffe Operations Staff observed that the general tendency of thinking in the Luftwaffe leaned decidedly toward giving the Army indirect rather than direct support. In actual fact, however, air operations were usually direct support, and this was the result of direct cooperation between Luftwaffe and Army commands within the zones of operations, rather than of "the basic intentions of the highest levels of the Luftwaffe command."[25]

If this employment of airpower on the field of battle had been restricted to periods during which the army forces were engaged in battles of decisive importance, it could at least in part have been considered justifiable. However, even during quiet spells the army commands insisted on the constant commitment of airpower against enemy targets within the battle areas in order to conceal their own weaknesses in point of numbers and of weapons. Operations of the Luftwaffe thus became increasingly dependent on the Army.

The extent to which the Luftwaffe High Command accepted this circumstance as inevitable is evident from the following passage by Field Marshal Kesselring:[26]

> I instructed my air force and flak generals to consider the wishes of the Army as my orders, without prejudice to their subordination to me, unless serious air interests made compliance seem impracticable or detrimental. All my commanding officers and I prided ourselves on anticipating the wishes of the Army and on carrying out any reasonable requests as quickly and as completely as we could.

Targets for air attack which were of particular importance in their bearing on the conduct of army operations were moving and fleeting targets, such as advancing enemy infantry units, moving guns of all types, tanks, ammunition transport columns, and enemy reserves. In addition, it was important in special circumstances to take stationary and fortified targets under attack, e. g., fortification works, infantry and artillery positions, and bunkers. Other categories of targets for air attack included bridges, command posts, and signal communication centers. A characteristic feature of all of these types of targets is their small size, which makes it particularly difficult to attack them by air.

In the first years of the war it was a general rule to commit only single-engine bomber units, such as dive-bomber and ground-attack units, to missions within the battle area. Owing to the small size of the targets to be taken under attack, it was necessary to carry out such missions at low altitudes in order to be able to recognize the assigned targets. The dense concentration of weapons in the areas involved represented a very strong air defense, since these weapons could also be brought to bear against aircraft, and for this reason

multi-engine aircraft presented too large a target for defensive fire from the ground, and the losses incurred were too heavy. Even in the most favorable circumstances, multi-engine aircraft were put out of action for a considerable time for repairs, owing to the numerous hits they received. Multi-engine (bomber) units were therefore employed within the battle area only in exceptional circumstances, when it was important at the beginning of an offensive on the ground to support the infantry in the initial attacks to break through the enemy system of positions. Another exceptional case in which it was necessary to commit bomber forces in action over the battle area was when a cloud ceiling below 2,600 feet prevented the commitment of dive-bomber units during a particularly critical situation in ground combat.

Apart from the use of multi-engine units during large-scale Russian offensives, it was only later in the war that the increasing frequency of critical situations on the ground in the eastern theater resulted in the frequent commitment of such units over the battle area, although the number of ground-attack units had increased considerably by then.*

Air-Army cooperation on the field of battle created the necessity for special liaison and control measures to cope with quickly changing situations and to avoid bombing friendly troops. The best contact was maintained when the tactical echelons of the two cooperating headquarters (Army and Luftwaffe) were located in the same place or in an advanced command post. General von Richthofen, who commanded the only really large close support force available to the Luftwaffe, often applied this method during particularly critical situations.

At the beginning of the Russian campaign the other German air corps were required to accomplish large-scale close support missions in addition to their primary mission of conducting the operations of bomber forces. It was found during the rapid German advance in 1941 that these headquarters were not able to handle both responsibilities simultaneously without one of the two missions suffering considerably. On the ground the armored units, which had to rely on air support by the tactical air support units of the various

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* See section on ground-attack forces in Part I of the present study.

air corps, had broken through the Russian main lines of defense and were carrying their attack forward into enemy territory in wedge-shaped movements. Operating from provisionally constructed field type airfields, the tactical air support units had to follow closely in their rear for reasons of contact, operating ranges, and safe operation. The non-motorized army divisions following up the armored forces on a wide front were often as much as 48 miles farther in the rear on an average. Enemy forces time and again penetrated from the flanks into these gaps, so that it was not possible to establish secure signal communications. Being responsible for the direction of operations by their bomber units, which had to rely on the availability of large airfields and rail carried supplies, the air corps headquarters found themselves compelled to establish special tactical air support sections to direct the operations of their tactical air support units. A Tactical Bulletin from Luftwaffe headquarters of 2 May 1941 required the tactical air support commander and his staff to be "located in the immediate vicinity of the headquarters or command post of the army command to be supported," for only close physical contact would enable the air support commander to acquire the necessary current data for the effective operation of his units. This method produced good results during the large-scale German offensives of 1941-42 in the eastern theater.

By 1943 the tactical air support commands were deactivated, since no offensive operations on an appropriate scale were staged from then on. Since fierce fighting had developed all along the line, and since each air corps had to support between two and three armies, the points of main effort shifted so frequently on such wide frontages, that it was possible only in exceptional cases to have the tactical air support command located together with the tactical echelon of the army corps currently being supported. Instead, these responsibilities had to be assumed by liaison detachments or teams. In order to arrange the appropriate agreements between the air fleet headquarters and the army headquarters concerning the allocation of air units to support army operations, the air fleet headquarters had to be fully informed on the current situation and the plans and desires of the army commands concerned. The wide distances separating air fleet from army headquarters (and in spite of the frequent visits made by the air fleet commanders and chiefs of staff to the various army headquarters) made it necessary that close contact be established and maintained by these liaison teams.

Owing to the scarcity of adequate housing space, particularly in the eastern theater, it was not always possible for the air fleet and army group headquarters to be located close enough together, thus necessitating liaison teams even at this level. A basic directive from the Wehrmacht High Command established that it was a responsibility of the Luftwaffe to maintain contact with the Army, so that the Luftwaffe was required to furnish the necessary facilities for such purposes. To secure this necessary contact, the air fleet headquarters assigned liaison teams, whenever possible under a General Staff Corps officer, to the appropriate tactical air support commands attached to the various army group and army headquarters. After deactivation of the tactical air support commands attached to army groups and armies in 1942, the liaison teams were expanded and assumed some of the former responsibilities of the tactical air support commands.

During the war air corps also frequently found it impossible, for various reasons, to have their tactical staff echelons located together with the tactical staff echelons of the army commands they were currently to support. As a rule each air corps had to furnish support to between two and three field armies controlling up to as many as twenty army corps operating on frontages as wide as 240 miles with frequently changing areas of main effort. Since it was essential for each air corps to have direct communication lines (if at all possible, wire communications) with all airfields on which air units were based, it was rarely possible to establish direct communication lines with an army corps committed in an area of main effort. In fact, this was only possible in the exceptional case of attack operations planned well beforehand in otherwise quiet segments of the front. The introduction of wireless telephony towards the end of the war, however, also gave the air corps tactical staff echelons greater opportunities for flexibility in their operations. The difficulties which existed prior to the introduction of wireless telephony also necessitated the use of liaison teams at this level of command, although these teams differed from the liaison teams at higher levels of command in respect to their composition and their technical equipment.

As early as World War I it had been customary for the air forces to attach air liaison officers to the army divisions operating in areas of main effort. The missions of these liaison officers had been to keep the officer directing the operations of the air units

informed currently on developments in the ground situation, particularly on the location of the forward lines--which were difficult to detect from the air, on the intentions and plans of the army command concerned, on important targets within the battle area, and on the current air situation. In order to make them independent of insecure wire communications, such liaison officers at times were given wireless stations, plus the necessary operating personnel, so that the function of liaison in such cases was taken care of by liaison teams instead of by a single liaison officer.

During the Spanish Civil War when the German Command in Spain decided to commit its He-51 aircraft in ground support action because they were no longer suitable for air-to-air combat, it also made use of liaison teams, which were assigned to accompany the army commands or the units spearheading an attack on the ground. General von Richthofen, at that time a colonel in command of the German Condor Legion operating in Spain, used personnel from the 88th Air Signal Battalion to organize a small number of radio teams with specially trained signal communication officers for the purpose.

During preparations for the campaign against Poland, von Richthofen was assigned in command of Special Purposes Air Command (Fliegerfuehrer zur besonderen Verwendung) and was assigned the mission of directing the operations of a number of air units intended for tactical action supporting the army in areas of main effort. He immediately took measures to organize four teams of the type described above, which were designated Air Signal Detachments (Luftnachrichtenverbindungstrupps). The mission of these detachments was to insure the close contact with the Army essential for the execution of air combat missions on the field of battle. Of these four detachments, two for the first time on record were equipped with one armored reconnaissance car each, complete with radio equipment, in order to be able to accompany the commanders of armored divisions when the commanders proceeded to a battle area to lead their troops. The radio messages were transmitted in code according to a locally established code chart.

Greater use was made of these detachments in the French campaign, in which they proved indispensable. Consequently the number of such units was increased prior to the Russian campaign, during which such detachments were assigned also to the other air

corps, which, as previously mentioned, were called upon on an increasing scale to accomplish tactical air support missions. The newly established Air Signal Liaison Detachments, as they were now designated, consisted of an air signal officer with special training to qualify him for his tactical missions, a motor vehicle driver, and four radio operators. Each detachment had a two-set radio station, which was to be maintained in operation day and night without interruption. At the beginning of the Russian campaign the detachments assigned to armored units had armor-plated vehicles, and in some cases tanks, with the appropriate radio equipment, so as to be able to accompany the army staff section to which they were assigned when the unit commander proceeded to the battlefield in his armored command car.

Administratively, and for supplies, the detachments were assigned to a Special Purposes Air Signal Company stationed at the next appropriate air unit headquarters, usually at corps level. The air corps, air division, or other air command responsible for the direction of air combat within an area, controlled the operations of the air signal-liaison detachments assigned to army commands within that area. At the opening of the Russian campaign each army corps, and in exceptional cases army divisions, operating in areas of main effort or in areas which it was presumed would become critical, had one air signal-liaison detachment. As the tactical situation became increasingly critical, with rapidly changing areas of main effort, the majority of the army corps committed in the eastern theater received one such detachment each.

The mission of an air signal-liaison detachment was to report currently to its air corps all special events which occurred in the front area, whether in the air or on the ground. In addition it was required to report at set intervals to its air corps concerning the location of the forward defense lines within the zone of the army corps it was servicing. This meant that the ground situation map at air corps headquarters had to be posted currently at all times, so that all necessary data would be available whenever the point of main effort shifted, even if this shift was to an entirely new area. Other information reported included items on the air and ground situation.

However, army corps were not authorized to forward requests for air strikes through the air-signal-liaison detachments to the air

corps unless main emphasis in air operations happened to be within the army corps' zone. In other cases each army corps forwarded its requests to its superior army headquarters, where the decision was taken, after a proper examination of the circumstances, whether the request was to be fulfilled.

During the Spanish Civil War and the first years of World War II air signal-liaison detachments were occasionally also assigned the mission of directing approaching air units to specific targets difficult to detect from the air, using radio instruments in forward observer posts for the purpose. However, the most suitable points for such observation posts were usually located at points distant from those at which the army corps (to which the detachment was assigned) had its headquarters or command post. Consequently, contact between the army command post and the supporting air command was subject to frequent disruption during critical situations, and it was during such situations that air support was required. Another weak point was that the officers from the Air Signal Corps who commanded the air signal-liaison detachments did not have adequate tactical knowledge to direct an air strike properly.

For the above reasons the Luftwaffe High Command decided to establish special forward air control detachments to direct air strikes from the ground in critical areas of operations. From then on air corps headquarters, by radio, instructed dive-bomber forward air control detachments (and later ground-attack forward air control detachments) to proceed to the point from which they were to direct a planned air strike. There the detachment would take up its position at an observation point from which it could observe the field of battle. From this point the detachment established radio contact with the approaching air unit (for which purpose each individual detachment had a code designation) and directed it to the most important targets. These targets were specified to the detachment by the locally responsible infantry battalion or regimental commander or by the senior artillery commander.

Later, when the air situation became increasingly critical in the eastern theater because of the recovery made by the Russian air forces, forward air control detachments were also established for fighter forces. These detachments were employed in current areas of main emphasis in friendly or hostile air operations, and were

assigned under the locally responsible fighter commands at the front. If the general commanding an air corps proceeded to the front areas in order to direct an operation personally, he was able to transmit his orders through these control detachments to his airborne units.

Other means used to identify targets included the use of marking shells producing colored smoke and fired by artillery guns or of directional signals placed on the ground.

The danger of striking friendly troops with bombs was particularly acute during rapid advances on the ground or when bomber units were committed in high altitude bombing missions over the battle area. For this reason the use of bomber forces in missions over the actual field of battle was authorized only if easily recognizable terrain features existed by which it was possible to find the target. During massed air attacks designed to create a breach in the enemy defenses for the attacking ground forces, it was also essential to designate particularly salient terrain features as boundaries in order to avoid wrong bomb releases. It was not a German practice to withdraw troops from the line as a protective measure during air strikes.

A particularly difficult matter was that of preventing wrongly placed bombings when the situation on the ground became fluid. An attempt to solve this problem by establishing rigidly fixed safety lines for air action (also called rear boundaries for bomb releases) during forward movements on the ground failed. As early as the campaign in France the practice of establishing a daily rearward bombing line a day in advance proved a serious disadvantage in rapidly changing situations, and particularly when motorized surface units were involved. Very often the bombing boundaries established by the command were passed within a very short while by the troops on the ground who then had to halt their successfully proceeding operations or risk coming under attack by their own air forces. On the other hand, if German forces were held up by enemy resistance or even when they themselves came under attack, their air forces were unable to support them because the enemy forces were on the friendly side of the bombing line.

With the beginning of the Russian campaign the rapid advance of armored forces promptly illustrated again the impracticability of establishing bombing lines. Consequently, the system was discontinued

in the late summer of 1941 and replaced by a system of identification markings. In cases of uncertainty air units approaching their assigned target area were required to signify their intention to attack. This was done by means of preestablished light signals, and if German troops were within the area they were required to disclose their presence, also by means of preestablished light signals. In addition, air forces were required to employ every means possible to identify troops on the ground if any doubt existed about their identity. If there was no possibility of clarifying the situation even by means of low altitude air reconnaissance, the air unit in question was required to attack an alternate target.

Friendly troops, on the other hand, were required to identify themselves by means of light or smoke signals when called upon to do so. Rear elements placed cloth signals on their vehicles to identify themselves. Armored units were also required to place cloth signals on the tanks and also to identify themselves by means of smoke signals. The fact that these arrangements also benefited any enemy air force which might approach to attack was unimportant in 1941 because at that time the Germans had clear air superiority. The color of the light signals used changed every few days in order to prevent misuse by the enemy. The use of light and smoke signals proved highly satisfactory and such signals could be recognized even at great altitudes. In particularly difficult situations, however, it proved just as impossible to completely prevent erroneous bombings of friendly troops as it did to prevent friendly troops sometimes coming under fire from friendly artillery.*

As mentioned previously in this study, directives from the Wehrmacht High Command ordering air support for army operations did not (down to the level of air fleet-army group) prescribe whether such support was to take the form of air action to seal off the battle area, of air action directly over the battle, or a combination of these two types of action. Agreements on this subject were usually worked out at the air fleet-army group or air fleet-army level. The latter case applied when the army group had specified which of its armies

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* Appendix 20 in unpublished appendices of USAF Historical Study No. 163, Karlsruhe Document Collection, consists of a letter from VIII Air Corps to Army Group Center dealing with this subject.

was to receive air support.

The basic principle here was that airpower was to be employed in only one area of main effort at any one time within the zone of operations of any one army group. This implied that out of the two or three armies controlled by an army group headquarters only one army at a time could receive air support. The only exception here was the rare case of an air fleet having available two high level commands (air corps, air division, or other air commands) each controlling an appropriate number of air units.

In many cases agreement as to what type of air support was required was reached at an even lower level, namely between the supporting air corps and the army to be supported. If direct air support was required in the form of action over the battle area itself, the appropriate army would inform the air corps which of its corps was to be supported, a matter which naturally depended entirely on the current situation. However, the corps headquarters thus designated had authority to delegate its powers to one of the divisions under its control. The air combat missions themselves then were executed in accordance with the principles laid down in paragraph 125 of Air Field Manual No. 16, which stated that, "the commanding officer directing ground operations will define the purpose to be achieved by the air action while the air corps will direct the execution of the air mission."

Once all the preliminary arrangements were made, all requests for air strikes went from the army corps involved (or, if a division was designated to receive the air support, from this division) to the air corps. It was left to the discretion of the army command thus involved either to formulate the requests itself or merely to pass on the requests as formulated by the units it controlled, such as its regimental or battalion or artillery commanders.*

* The sketches included in the Appendix as Appendix 14: Graphic Presentation of Air Support Action (Schematische Darstellung der Luftwaffenunterstuetzung) and Appendix 15: Example of Direct Army Support (Beispiel einer unmittelbaren Heeresunterstuetzung), are offered as examples of the types of action just discussed.

Since the targets to be taken under attack on the field of battle were usually mobile and remained in evidence for only a short while, the time between detection of the target and the actual strike against it had to be kept as short as possible. In critical situations the method had to be adopted frequently of holding air units constantly ready for immediate action. In order to insure that flying personnel would have their necessary rest, however, acute alerts and alerts under which units had to be able to take off at very short notice were only to be ordered if it was actually to be assumed that they would have to go into action soon. Units which were too often held under false alerts, usually did not take an alert very seriously after a while. The result was that when they were actually needed in a hurry, preparations for takeoff took an exceptionally long time. In order to be ready for all contingencies during critical periods it was often sufficient to hold only elements of a unit under immediate alert.

When it became necessary occasionally to dispatch bomber units on missions directly over the field of battle, these units usually required twice as long as single-engine ground-attack and dive-bomber units to prepare for takeoff.

The timely issue of orders was a matter of prime importance. Warning orders served the primary purpose of allowing the unit time to take care of preparations which required the most time, such as tanking, and the loading of bombs, and at the same time informed the unit when it would probably have to take off.

The operational order itself contained a number of items, the first of which were information on the tactical situation on the ground in the prospective area of operations, and on the air situation and weather conditions, together with a weather forecast. The targets to be taken under attack had to be designated with particular care and precision. It was essential to use large-scale maps, if possible 1:25,000 or 1:100,000 for this purpose. It was found advisable to state the purpose of the mission against the eventuality that the unit might have to divert its action to alternate targets. Details concerning the execution of the mission were to be left as far as possible to the unit commander, with due regard to the abilities and experience of the specific officer concerned.

Critical situations frequently created the necessity for missions

to be flown immediately after daybreak, and thus at a time when adequate target data was not yet available from the army command concerned (through the air signal-liaison detachment), and when it was not yet possible to surmise weather developments in the front areas. In such cases it was found advisable to instruct the unit intended for commitment to carry out target and weather reconnaissance in the target area. The unit thereupon dispatched an advance force of two or three planes on an armed reconnaissance mission in the front area, during which the force could attack small targets and radio the necessary tactical data to its parent unit, which was ready to take off.

If fighter escorts were to be provided, the precise point, time, and altitude at which the attacking unit would meet its escorting fighters had to be stated. In most situations only dive-bomber units needed fighter escorts; personnel in the ground-attack arm had limited fighter training and were able to protect themselves, one squadron attacking the assigned target while another stood by to protect the attacking unit. If heavy ground fire was encountered it was sometimes necessary to detach elements of the attacking force to take first the firing antiaircraft gun batteries under attack. In many cases it was possible to arrange with friendly artillery batteries to fire on the enemy antiaircraft batteries while the air strike was being executed.

In cases where individual air groups, which were part of a single air wing, were committed, it was sometimes found advisable for corps headquarters, in order to avoid misunderstandings, to issue orders directly to each group participating in the attack, informing air wing headquarters accordingly. Orders from corps headquarters stated either that the units participating in the air strike were to take off on their mission "as soon as possible" or that they were to take off at a specified time.

While on the approach flight to the front the unit had to rely exclusively on radio communications for contact with its base on the ground. The Luftwaffe did not employ a system such as that applied by the Western Allies, in which the parent headquarters directed the operation through control points at the front. Any changes which occurred in the air or ground tactical situation, or modifications of the mission order, had to be transmitted to the unit in flight by radio

messages from its control station on the ground.

If a strike was to be directed by a ground control point in the front area, the unit in flight established contact with the appropriate control detachment which directed it to the assigned target or targets. As a rule the ground forces received no notification concerning the type and timing of the mission, since the relaying of such information to troops in position in the foremost line was usually a problematical matter. Agreements as to the precise timing of an air strike were arranged well beforehand only if the plan provided that the ground forces were to exploit the effects of the air strike. In special circumstances a bomb release schedule was established for the attacking air units and coordinated with the fire plan of the ground artillery.

After the air unit had returned to base, the locally responsible operations officer reported the results of the strike to air corps headquarters. If further missions were waiting for execution, the report included information on when units would be ready to take off again and the presumed number of aircraft which would be available.

A few examples selected from the voluminous records available on the subject will serve to illustrate what has been said in the above discussion.

On 13 May 1940, the fourth day of the campaign against France,* the German Army High Command decided to dispatch forces across the Meuse River in a surprise movement at Sedan in order to create conditions which would enable the armored units to breach the French main line of resistance. Air support was a decisively important requirement in this operation.

Orders to the 1st Panzer Division to cross the Meuse contained the following information on the plans for air operations in support of the action:[27]

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* Editor's Note: The campaign in the West has been covered in the unpublished manuscript by General der Flieger (Lieutenant General) Wilhelm Speidel on the German Air Force in France and the Low Countries, 1939-40, in Karlsruhe Document Collection.

> On the 13th of May the point of main effort of our Western Offensive lies in the sector of Group von Kleist. Almost the whole of the German air force will support this operation. By means of uninterrupted attacks lasting for eight hours the French defenses along the Meuse will be smashed. This will be followed by an assault across the river by Group von Kleist at 16.00 hrs. and the establishment of bridgeheads.

The army support mission included direct air support in the form of close support of army forces on the field of battle and indirect support in the form of action to seal off the battle area.

Concerning the indirect support for the Army at Sedan, the Intelligence Reports by the Office of the Commander in Chief of the Luftwaffe contained the following passages:

> Continuous attacks by strong forces within a confined space neutralized the enemy defenses, prevented the forward movement of enemy forces for a counterattack, and thereby made it possible for the spearhead units of two armored divisions and of one infantry brigade to cross the Meuse River at two different points between Charleville and Sedan.
>
> The drive through permanent fortification systems of the enemy at Mezieres and Sedan was carried forward to a depth of 12 miles in a southward direction and our forces crossed the Ardennes Canal westward. Under the pressure of the German drive, which is supported by strong air forces, the enemy forces are retreating in disorder . . . .

Of the numerous occasions on which airpower was employed against permanent type fortifications, the air operations against the Fortress of Sevastopol, on the Crimea Peninsula, in June 1942 merit special mention. The fortress had been developed in accordance with the most up-to-date experience and with the use of the most modern means available at the time, and action to reduce it presented entirely new and difficult problems for the attacking air forces. Action had to be taken to destroy the heaviest types of armor-protected gun batteries, battle positions, and other fortification works, including innumerable bunkers and field defenses in the midst of a maze of trenches, and battle positions built into the rock walls of canyons.

The whole operation was based on carefully planned preparations by the Luftwaffe and the Army. From November 1941 on the fortress had been enveloped on the land side. Air reconnaissance, by means of normal and stereo photography, had recorded all permanent and field type fortification works, artillery and mortar positions, alternate positions, antitank ditches, assembly areas for reserves, and command posts.* In the planning of air attacks this provided the best data conceivable for the VIII Air Corps, which had been moved into the Crimea from the central sector of the eastern front specifically because of the wide experience this corps had in the type of action required. In the execution of its missions against Sevastopol, the air corps was responsible directly to the Commander in Chief of the Luftwaffe.

The air forces available for the operation comprised 390 bomber, dive-bomber, and fighter aircraft, which corresponded to a daily operable strength of approxima ely 250-300 aircraft.

Supported in its views by General von Richthofen, in command of the VIII Air Corps, Eleventh Army Headquarters expected that, in addition to the actual destruction achieved, the air attacks would wear down the morale of the enemy troops. For this purpose, plans provided for four days of uninterrupted air attacks and artillery fire against the Russian fortifications to precede the infantry attack. The fire plan provided in detail for the following action: 1) Simultaneously with the first artillery concentration, air forces each day were to attack enemy reserves outside of artillery range; 2) twin-engine units were to maintain continuous day and night attacks against supply installations in the far enemy rear, and against airfields and shipping; 3) in systematic action coordinated with the artillery, air forces were to neutralize the enemy artillery and mortar batteries; 4) air forces were to destroy targets, such as coastal artillery batteries, which the ground forces could neither attack nor take under observation; and 5) artillery reconnaissance aircraft were to keep the enemy artillery under constant observation. On the first day of the infantry attack, main emphasis in air operations was to be on support for the LIV Corps. Then emphasis was to shift to the XXX Corps or to the VI (Rumanian) Mountain Corps in accordance with developments in

* See Appendix 16.

the tactical situation.

Favored by good weather, the first air mission was flown on 2 June 1942 and the air attacks then continued according to plan until 6 June.*

On 7 June, when the infantry jumped off to the attack on the north flank, dive-bomber units from the early morning on maintained continuous attacks against the enemy defense positions in the line of advance of the attacking infantry. It was found during this action that the preceding fire action had by no means destroyed the enemy combat morale. Hopes failed to materialize that the attack on the ground would carry through to the shores of Servernaya Bay, and most of the heavily armored fortification works in the outpost area were found to be undamaged.

The outcome was that the infantry attack in this sector alone continued up to 20 June. Inch by inch the infantry had to battle its way forward. Committed as ground-attack aircraft and using bombs and weapons fire, dive-bomber aircraft prepared the way for the infantry. Fighter aircraft maintained continuous patrols over the area and attacked fortified field and artillery positions and troop columns with bombs and weapons fire. Some of the air units engaged flew as many as eight combat missions daily.

The severe nature of the infantry fighting influenced the army command to request that the Luftwaffe should cease action against the enemy artillery and concentrate exclusively on bombing attacks in direct support of the infantry attack. The results achieved in certain specific actions decisively influenced the outcome of the whole operation, as was the case with a mission flown by 1st Lieutenant Maus, who scored two full hits on armored turret "Maxim Gorki," putting it completely out of action./ This single incident considerably

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* See Appendix 17.

/ Editor's Note: This battery was located directly south across the narrow peninsula from Sevastopol itself. It formed the extreme right wing of the inner ring of defenses around Sevastopol, as well as commanding the sea approaches to the city from the south and east.

accelerated the advance on the right flank.

On 11 June the south flank forces joined in the attack. Here again, main emphasis in air operations was on strikes at targets immediately ahead of the foremost infantry units.

On 29 June came the final drive at the hard core of the whole fortification system. To divert the attention of the defenders and at the same time to break their resistance, all air units available, including reconnaissance aircraft, combined in two hours of concentrated bombing against the Sapun Hills immediately preceding the infantry drive on the ground. These final attacks were successful and the infantry gained a foothold on the summit in the first attack and then speedily gained ground westwards and southwestwards. Completely worn down by the incessant air attacks, the enemy forces were able to continue resistance at only a few points and for only a short while. In spite of bitterly tenacious resistance, the fortress finally succumbed under the combined effect of massed air attacks and heavy artillery fire.

Flying a total of 23,751 sorties, the air units delivered 20,000 tons of bombs on targets. Being based so close to their targets, units in some cases were able to complete their missions within the short space of twenty minutes. The decisive factor in the whole operation was the contribution made by the participating air forces, which prepared the way for the infantry advance on the ground by placing bombs on the enemy immediately in front of the foremost German forces.

The airborne operation to seize the island of Crete, which was carried out by the XI (Airborne) Air Corps, consisting of two divisions (one paratrooper and one air-carried), constitutes an excellent example of air support of an airborne operation. For the transportation movement the XI Air Corps was assigned a special air command with a large number of air transport groups totalling approximately 500 Ju-52 transport planes, plus tow planes with freight gliders.

The operation commenced on the morning of 20 May 1941. Landings were effected at three points: at the Maleme airfield, close to the city and port of Khania and Rethymnon, and, in the afternoon,

at the Iraklion (Candia) airfield.

The mission of neutralizing the ground defenses during the parachute jump and of providing close air defense was assigned to the VIII Air Corps, which had for the purpose three bomber wings, one dive-bomber wing, one single-engine fighter wing, one twin-engine fighter wing (with two-seater planes), and two reconnaissance squadrons. The bulk of the air units operated from airfields in the Athens area and on the Peloponnesus; some elements came from Italian airfields in the Dodecanese, from Rhodes, and the Scarpanto islands.

The first paratroopers made their jump so as to reach the ground almost simultaneously with the delivery of the first concentration of bombs by the bomber aircraft, taking advantage of the newly created bomb craters for cover. Other air units were detailed to neutralize the enemy antiaircraft artillery in the vicinity of the air-drop area, and to attack barracks and tent camps in order to prevent interference by the enemy reserves with the landing of the transport planes. Single- and twin-engine fighter units provided cover for the troops during the landing. Since the transport planes available at the time could not carry heavy weapons, the VIII Air Corps had to provide fire support in the fighting which then followed on the ground until the first naval units could arrive.

The air combat action in support of the airdrop was so effective that only seven of the 500 Ju-52 planes used in the first landing were lost.*

Air support of an amphibious operation is best illustrated by the seizure of the Baltic Islands in September 1941.†

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* Editor's Note: Considerable material is available in the Karlsruhe Document Collection (G VII 8, G VII 8a) on the operation in Crete; also, the unpublished manuscript by Major Pissin in the German Historical Monograph series on the conquest of Crete.

† See Appendix 18.

Responsibility for operations was assigned to the Commanding General, XXXXII Army Corps, who was given command authority for the purpose over air and naval elements. The air forces thus assigned comprised three bomber groups, one twin-engine fighter group, one single-engine fighter squadron, and three naval reconnaissance squadrons, controlled by a special air command.

At the request of the Army and contrary to the desires of the Luftwaffe, plans provided for the first attacks, against the east coast of Muhu Island, to be launched during hours of darkness on 14 September. In this case the attack had to take place without direct air support until daylight.

Landing operations having been delayed by bad weather, a critical situation resulted. Enemy artillery and antiaircraft inflicted heavy losses by flanking fire on the assault boats and on the infantry crossing the beach. Unfortunately, German supporting fire had little effect, since the guns positioned on the mainland were handicapped by poor weather for observation. It was only after air units had neutralized the enemy batteries that the infantry, with direct air support, succeeded in establishing a beachhead during the morning. Indeed, it was only with continued effective air support that the island was captured, and that measures by the enemy to reinforce the island's forces, and later to withdraw, were thwarted.*

The Russian counteroffensive beginning 8 July 1943 offers a good example of air support of army defense operations.

This counteroffensive was launched against the German Second Panzer Army and Ninth Army (the forces of the former were holding the Orel River bulge while those of the Ninth Army were still engaged in a southeastward drive) and developed into a situation which gave cause for grave concern.† When a Russian armored brigade participating in the counterattack broke through the German defenses and succeeded in establishing itself athwart the only rail and the only

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* Unpublished manuscript in the German Historical Monograph series by General Hermann Plocher on the Luftwaffe in the campaign in the East.

† See Appendix 19.

road route on which the two German armies relied for their supplies and replacements, the threat of a catastrophe even greater than that of Stalingrad appeared imminent.

Plans for the German Zitadelle* offensive had provided for the Ninth Army, serving as the northern prong in a double envelopment of the Russian forces at Kursk, to stage an all-out drive towards the southeast from the Orel River bulge area. Prior to the offensive, the German Command had foreseen the possibility of a Russian counterattack and had realized the serious danger inherent in such a Russian move. Two days before the German offensive began Hitler addressed the commanding generals of the armies and corps which were to participate. In his address, which was held in a hall on the Jaegerhoehe hill near his headquarters in Loetzen, Eastern Prussia, he spoke in great detail about this latent threat. He declared that if the Russians did launch a counterattack he would throw the last available aircraft into action to ban the threat.[28]

In actual fact the First Air Division, committed in the Orel River bend area, did receive large reinforcements after the Russian counteroffensive began, and reinforcements continued to arrive until the Sixth Air Fleet declared that it was unable to support more units with supplies. In very heavy air attacks the Luftwaffe actually succeeded time and again in preventing a Russian breakthrough, a contingency which threatened once or twice each day. This enabled the command on the ground gradually to withdraw all forces in some semblance of order from the bulge, and to straighten out the front lines.

The final report on the Battle of the Orel River Bend Area, in characteristically sober language, pointed up the achievement of 1st Air Division:[29]

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* Editor's Note: Operation Citadel was conceived by the Wehrmacht, not as a major offensive looking toward complete victory but as a means of further wearing down the Soviet Union to the point where, as Field Marshal von Manstein put it, the Soviet Union "would tire of its already excessive sacrifices and be ready to accept a stalemate" (Manstein, Lost Victories, p. 443).

Particularly impressive in these actions are the figures showing the results achieved by the 1st Air Division, which tirelessly continued its support mission, alternating between support for the Ninth Army and for the Second Panzer Army, in the form of air combat missions and strikes in direct support of current operations on the ground.

The air division, which through its action decided the issue in many highly critical situations,* dispatched its units in the execution of a total of 37,421 sorties, shooting down 1,735 enemy aircraft--1,671 of them by fighter units alone--against a loss of only 64 of its own planes. In addition, the air units put out of action 1,100 tanks, 1,300 wheeled and tracked motor trucks and other vehicles, and numerous artillery batteries.

Delivering more than 20,000 tons of bombs on targets, the air forces also inflicted heavy losses on the enemy in personnel, railway rolling stock, and supplies. During the Battle of the Orel River Bend Area units of the air division at times flew as many as five or six missions on a single day.

Events in the past years of warfare had revealed clearly the importance of the development of power concentrations in offensives. In a proper appraisal of these past events, the German supreme command should have realized by then how immeasurably important the development of airpower concentrations was in operations to repel enemy offensives. Besides concentrating all tactical support units available, it would have been necessary in the first place to break with the old system of distributing the multi-engine bomber forces among the various air fleets. Through firm and direct control over these forces, the supreme command would have had available a really effective instrument of power with which to exercise a decisive influence in the needed areas. This admittedly would have necessitated a change in the existing command organization, a change which was in any event long overdue.

The preceding passages are not intended to support any idea

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* Underscored by author.

of increased emphasis on army support air activities. What is meant here is that concentrated air attacks of the type referred to should have been launched only during limited periods when the tactical situation on the ground made them appear necessary, as was the case at the opening of large-scale Russian operations. However, the German Command failed to learn the obvious lessons of Orel. Instead it continued the system in which the flying forces remained too widely distributed. *

Under conditions as they existed towards the end of 1944, however, with steadily expanding frontages and with Russian armored forces frequently breaking through the lines in a number of wedges, the only thing which could have relieved the situation would have been the employment of air forces concentrated firmly in sharply defined areas of main effort.

That enemy armor was time and again successfully neutralized by German airpower is undeniable. The 1940 campaign in the west proved that the airplane was a most effective weapon against tanks. Indeed, it was shown that a well prepared operation by armor could be made to fail primarily through airpower. For example, during the drive of General Guderian's XIX Panzer Corps towards the Channel Coast, General de Gaulle's armored force, in the plains of Laon, struck in the flank and penetrated to a considerable depth. That de Gaulle had achieved an initial success is undeniable, but this threat was averted largely by German dive-bombers which put most of the French tanks out of action. [30]

In 1943 the introduction of specially equipped aircraft carrying guns for antitank action again produced very favorable results. Thus, the Luftwaffe's IV Antitank Group at Belgorod on 8 July 1943, during the Zitadelle Offensive, completely repelled a Russian surprise attack in the strength of an armored brigade. The Russian attack was directed against the rear flank of the I SS Panzer Corps, under General Hausser, in other words against the rear flank of the Fourth Panzer Army. Under the command of Captain Meyer, the IV Antitank Group of the 9th Antitank Fighter Wing, comprising four squadrons, each with 16 Hs-129 aircraft armed with M. K. -101 30-mm guns, for roughly an

* See Appendix 21.

hour maintained squadron-size attacks which halted the Russian force and compelled it to withdraw to its jump-off positions. The attacking German aircraft set most of the Russian tanks and other vehicles on fire, and the German Fourth Army was able to continue its drive without interference. [31]

As the numbers of Russian tanks committed in the eastern theater continued to mount, successful action against them became a problem of life and death for the Army (handicapped in manpower and by a dearth of antitank weapons), and a mission the Luftwaffe was not able to avoid. [32]

However, in spite of all the success achieved in this field (for example, Colonel Rudel destroyed 519 Russian tanks), the number of Russian tanks destroyed remained too small, particularly in view of the fact that Russia's output in tanks was mounting steadily after the Luftwaffe had done nothing, or practically nothing, to interfere with manufacturing operations. This resulted in the impressive contrast of 150,000 tanks produced by Russia during the war to the German production of 25,000. [33] In addition, the Western Allies delivered large numbers of tanks to Russia.

The German bombs initially available for antitank action were hardly suitable for the purpose. Near hits, within only a few yards of a tank, usually did no damage at all. The situation only improved after development of the S. D. 4 antitank (hollow-charge) bomb. However, these bombs, as well as the newly developed antitank rocket weapons, reached the field at such a late stage as to preclude decisive effects.

In the circumstances obtaining in World War II, it must be admitted that the support of ground forces on the battlefield was a valid mission of airpower. This being the case, an appropriate command organization and appropriate special type combat units were necessary for such purposes. In order to produce really telling results, it was essential to commit airpower against tanks in concentration. What would have made this all the more feasible was the fact that, as a rule, larg-scale ground operations within a specific theater usually remain restricted to one or two segments of the front at a time. Main effort in air operations had to be adapted to the current main effort in operations on the ground. Very frequently

this was not done on the German side, since the high level army command concerned in each case did its utmost to prevent the withdrawal of air forces from its command zone when any such withdrawal was intended. This fact was admitted by Colonel Kusserow* in a postwar report of 2 September 1954. In the beginning of the Russian campaign, Colonel Kusserow wrote, the area of main effort on the ground was also the area of airpower concentration. Later, there was a departure from this principle, with a consequent parceling out of airpower to the detriment of efficiency and effectiveness. Usually this was caused by the requests and demands of the army commands on a scale impossible to justify from the standpoint of sound tactics and strategy. Nor could the measures taken in this respect be judged commensurate with the results achieved. [34]

In discussing the basic requirement that airpower must be employed only in concentration it must be admitted that in the far-flung areas involved it was always possible for a serious crisis to develop in a hitherto quiet segment of the front. In view of the general shortage of reserves on the German side such a crisis could produce disastrous results. Under such circumstances it would probably have been justifiable to leave a tactical air support force--possibly in the strength of approximately a group--stationed within the command zone of an army group as what might be called a local emergency reserve. However, all other air forces available within each theater of operations should have been concentrated for action at one decisive point.

Contrary to this basic principle, the available tactical air support units were distributed among the various front sectors in accordance with a more or less stereotype pattern. The outcome was that, purely from the urge to keep them busy, the units were committed continuously even when there was no possibility that their action could produce important results. In part, this tendency stemmed from the army commands concerned, in the belief that such action would weaken the enemy. From personal experience gained through five years spent in command positions at the front, however, the present author is aware that most of the air fleet headquarters also pursued this policy. At the close of each day air fleet headquarters

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* Editor's Note: See pp. 95-96.

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would examine critically whether all aircraft available had been committed often enough "in order to avoid the Commander in Chief of the Luftwaffe's taking away units." The examination rarely went into the question of whether circumstances justified the attacks carried out, or whether the results achieved were commensurate with the effort expended. For example, in a currently quiet segment of a front, the defense forces available to the enemy in that segment were not engaged in ground combat action, so that defensive fire from all weapons on the ground could be concentrated against the attacking aircraft. This resulted in excessive losses.

As a result of this urge to keep their forces occupied, the commands did not allow their units adequate time for rest and for training activities. Except when reequipping with a new type of aircraft, the units were constantly in action. And all this time no really decisive results were achieved in the actual areas of main effort in combat on the ground.

What the German side lacked was a system under which each theater of operations would have been under a joint command with detailed insight into the situation all along the line and having the necessary authority over both the army forces and the tactical air support forces to conduct operations commensurate with the situation. Instead, the air fleets committed in all theaters were under the Commander in Chief of the Luftwaffe, who had his headquarters far removed from the fighting fronts, while the various army groups were either under the Army High Command, also not within any one of the theaters but inside Germany, or directly under the Wehrmacht High Command. These top level commands were too far distant to have a precise knowledge of the real situation on the various fronts, and also were too heavily burdened with other responsibilities to give adequate time and attention to the situation.

The commitment of bomber forces in action over the actual field of battle on the ground was authorized theoretically only in exceptional circumstances--to create a breach in the enemy defenses for forces attacking on the ground, or in the case of an exceptionally critical situation. What actually happened becomes evident from a report by the last commander of the 1st Fighter Wing, Lieutenant Colonel von Riesen. He contended that, in reality, the Luftwaffe came to be "a means of combat of the army groups and armies."

Thus, the ground forces came to look on the use of all types of units of the Luftwaffe as the final solution to problems which were "strictly the field of ground-attack forces." The extreme was reached when units were required to commit four-engine bombers singly in low-level attacks on tanks, while fighter forces not dissipated in ground attack missions were compelled to contend with enemy forces greatly superior in numbers. "This outcome," observed Colonel Riesen, "was brought about by a command which had failed to grasp the extreme value of airpower in this war." Such wasteful and erroneous utilization of airpower led first to the loss of the war in the air, which in turn led inevitably to the ultimate fate of ground operations.[35]

The problem of what measures could have been taken to prevent this misuse of the bomber forces will be dealt with in the closing chapter of this study.*

The errors of organization and employment were intensified by errors and shortages in materiel. For the Luftwaffe did not always have available the proper weapons for direct air support on the battlefield. For example, the command failed to provide, prior to the beginning of the Russian campaign, for adequate supplies of fragmentation bombs.

The lack of suitable weapons for antitank combat action has been mentioned previously, and this lack was accentuated by the fact that the ground forces also were inadequately equipped with antitank weapons.

At all events, it may well be that in future war rocket development will reduce or entirely do away with the necessity to commit air forces in action over the actual field of battle, which as a rule is an uneconomical use of airpower.

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* This problem is dealt with in a report in Appendix 33, in unpublished appendices of USAF Historical Study No. 163, Karlsruhe Document Collection.

Chapter 5

THE RATIO OF ARMY SUPPORT TO OVERALL AIR OPERATIONS

In order to arrive at a just appraisal, it is necessary to determine what share of the overall air effort was expended in action supporting the operations of the Army on the ground, whether such action was to seal off battle areas or was in the form of direct support over the field of battle. Although available sources[1] do not provide an exhaustive presentation of the subject, they do provide certain indications. They reveal to what extent operations in support of the Army resulted increasingly in a neglect of the other missions of airpower, which were usually just as important, if not more important, than direct support.

The Polish Campaign, 1939

The 8th (Military History) Division of the Luftwaffe, in a study entitled "Survey of German Conduct of Air Warfare" (Ueberblick ueber die deutsche Luftkriegfuehrung), stated that,

> In the battles in Poland the independent (operational) air force made its first appearance as a weapon which could decide the outcome of a campaign. Its missions in this role necessitated a clearly defined concentration of effort to secure the quick defeat of the enemy and in detail prescribed the following tasks:
>
> a. Destruction of the Polish air forces, their ground service organization, and the Polish air armament industries.
>
> b. Support of army operations on the ground in order to insure a quick breakthrough on the ground and a speedy advance by the ground forces.
>
> c. Attacks against Polish military installations and armament industries in Warsaw.

For the performance of these tasks two air fleet headquarters, with

an operable strength of 1,558 first line aircraft, were available.*

In the first few days of September 1939 483 aircraft were committed in combat missions against the enemy air forces. Units flew 4,806 sorties of indirect army support during the drive across the Vistula-San line, and 3,740 sorties of direct support during the border battles and the fighting which then followed. The ratio of aircraft employed in strategic missions to those employed in missions of direct support for the Army was thus 5:4.

The Polish side had available 400 operable first line aircraft. Within two days the German air forces established air supremacy over all Polish territories. The attacks against the Polish air forces compelled them to displace to alternate airfields and rendered them ineffective. The Polish command was no longer able to employ the air forces still available in uniformly directed operations.

These circumstances made it possible for the German command to operate in support of army operations on a larger scale and at an earlier stage than had been anticipated. From the first day of the campaign all Polish concentration movements came under systematically planned attack directed at rail depots, loading operations, and points of interdiction along traffic routes. In some cases the movements of Polish troops were rendered completely impossible.

Destruction of the Vistula River bridges and other crossing facilities prevented the withdrawal of the Polish forces and made a large battle of envelopment possible. Continuous combat action by tactical air support units against the retreating Polish forces facilitated and accelerated the German advance on the ground. The air units thus committed supported the ground forces in their drive through fortified lines, broke up enemy troop concentrations, and

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* This number includes only the strengths available in units under command by the Commander in Chief of the Luftwaffe, not the reconnaissance and liaison units allocated to the Army. The forces under the CINC, Luftwaffe, were organized under the two air fleets: 8 strategic reconnaissance squadrons, and 21 bomber, 8.5 dive-bomber, 5 twin-engine, and 5 single-engine fighter groups.

destroyed pockets of resistance and Polish units spearheading attacks. All of these operations were carried out in close coordination with action by the ground forces.

The large-scale attack by the combined forces of the First and Fourth Air Fleets against the fortress of Warsaw on 15 September 1939 broke the will of the defenders to resist and brought the "Battle for Poland" to a quick end.

Operations by the Luftwaffe thus contributed in a decisive measure towards the successful conclusion of the war against Poland. Success was due to the following factors: 1) The surprise effect achieved in the attack; 2) properly planned mass attacks and developments of power concentration; 3) the lack of proper planning in the Polish direction of air operations; and, 4) German superiority in manpower and materiel.

The Campaign in the West, 1940

The study by the Military History Division of the Luftwaffe quoted above reported on the 1940 campaign in the west:

> With the opening of the campaign against Holland, Belgium, and France on 10 May 1940, our air forces in the west . . . /were/ committed in new offensive operations. Consonant with past experience their assigned missions required execution of the following tasks:
>
> a. Destruction of the enemy air forces and their resources.
>
> b. Indirect and direct support of army operations on the ground.
>
> c. Combat action against enemy ports and enemy ship movements.

The Second and Third Air Fleets were given the responsibility of the accomplishment of these missions. Actual Luftwaffe strength was 5,142 aircraft, with 3,824 of these in combat-ready condition, and consisting of 1,120 bomber, 1,665 fighter, 501 reconnaissance,

342 dive-bomber, 42 ground-attack, and 154 seaplane aircraft. *

Opposing German airpower were the Allied (including Belgian and Dutch) air forces, with a total strength of approximately 6,000 aircraft, roughly 3,000 of them based on continental airfields. [2]

The principal emphasis at the beginning of the campaign was against the air forces ground service organizations in Belgium, Holland, and northern France. These attacks destroyed the Belgian and Dutch air forces and seriously weakened the Franco-British air forces. The result was the rapid establishment of German air supremacy, permitting the Luftwaffe to give increased air support to the ground forces. Airborne operations in Holland and Belgium, marking a new departure in warfare, made possible a rapid advance by German ground forces. Following the defeat of enemy air forces, the demoralizing dive-bomber attacks had a decisive influence on the rapid and successful operations. Indeed, the drive to the Channel Coast was made possible by the protection of both flanks of the drive by air reconnaissance and heavy commitments of combat airpower. The impression of irreversible German air superiority must be considered as an important psychological factor contributing to the vitiation of the French will to continue the struggle. /

Nor did the Luftwaffe neglect the sea. Operations of bomber forces reached a high point during the enveloping maneuvers in the Dunkirk area. Enemy naval and merchant ships were taken under continuous attack with bombs and mines.

Once again the system of concentrated and logically directed operations in air warfare had been vindicated. In independent action to establish air supremacy, in operations to destroy large enemy

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* These figures are taken from a compilation prepared by the Supply Branch from the operable strengths given in unit strength reports.

/ See Appendix 23. This sketch shows how a combination of action in direct support of the army and of action to seal off the battle area made the drive by armored forces to the Channel coast possible in the west. In direct support missions dive-bombers crushed enemy resistance in the line of advance on the ground, while bomber forces took action to prevent the movement of enemy forces against the flanks of the German armored force.

industrial areas, and in missions of indirect and direct support for the Army and the Navy the Luftwaffe achieved decisive results.

The Balkan Campaign

With the opening of the Balkan campaign on 6 April 1941 main emphasis in the German conduct of air warfare shifted from the western to the southeastern areas of Europe. The mission directive of the Luftwaffe in this campaign called for, a) effective support for the ground forces through air combat action on the field of battle and through action to neutralize enemy resistance in the rearward areas; and b) execution of an airborne operation aiming at the capture of the island of Crete.

On 15 February 1941 Yugoslavia had available a total of 357 aircraft suitable for military purpose. Of this number 32 were reconnaissance, 177 bomber, and 154 fighter aircraft.[3] In contrast, the German Fourth Air Fleet was assigned one strategic reconnaissance squadron, one bomber wing, seven dive-bomber groups, two twin-engine fighter groups, seven single-engine fighter groups, plus three single-engine fighter squadrons.[4]

Against the numerically weak air forces available to the enemy, the Fourth Air Fleet, assigned responsibility for the conduct of air operations in the campaign, had uncontested air supremacy from the very outset. Thus, quick and decisive results were achieved in both Greece and Yugoslavia.

Neither tactical nor operational surprise was achieved in the operation to seize Crete. Here again, the success of the airborne operation was predicated upon clear air superiority over the enemy. The success of the whole operation was made possible through the commitment of paratrooper forces and of mountain infantry units, whose victory on the ground was largely due to support from air transport groups and from the tactical units of the VIII Air Corps in the form of continuous air combat action.

The Russian Campaign

The Eastern Theater in 1941. Consonant with past experience, operational plans for the Luftwaffe established the following air missions: a) Destruction of the enemy air forces; b) support for the Army by means of combat action against enemy movements on road and rail routes, and by direct support on the battle field.

The Fourth, Second, and First Air Fleets, and elements of the Fifth Air Fleet were assigned to accomplish these missions. Out of a total actual strength of 5,892 aircraft available to the Luftwaffe, of which 3,701 were operable,* the air units committed in the eastern theater had a total strength of 2,150 first line aircraft. These were organized in 21 strategic reconnaissance and 51 tactical reconnaissance squadrons, and 31 bomber, 8 dive-bomber, 1 1/3 ground-attack, 2 twin-engine, and 19 single-engine fighter groups.[5]

On the basis of radio intercept reports the Soviets were assumed to have twice this strength in aircraft, but their recorded losses revealed in a very short while that they must have had a much larger numerical strength. For the first time the German air units thus entered a campaign with a numerical strength inferior to that of their opponent.

Throwing everything available into the action, the Luftwaffe struck its first surprise blows at the Russian air forces and by evening of the second day the Soviets had lost 2,582 aircraft.[/] It was

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* This average operable strength of 3,701 aircraft comprised 593 reconnaissance, 1,030 bomber, 302 dive-bomber, 130 twin-engine fighter, 1,271 single-engine fighter, 231 transport, and 144 seaplane aircraft.

/ Editor's Note: "We succeeded in gaining air supremacy in the first two days, helped by excellent air photography. Reports of enemy aircraft destroyed in the air or on the ground totalled 2,500; a figure which the Reichsmarschall at first refused to believe. But when he checked up after our advance he told us our claim was 200 or 300 more than the actual figure" (Field Marshal Albert Kesselring, Kesselring: A Soldier's Record [New York, 1954], p. 98).

thought on the German side that this would create a parity in airpower. Thereupon the heavy bomber units were committed in support of the ground forces and contributed largely towards the successes achieved on the ground. Air strikes were directed primarily at all traffic installations and highways in the enemy rear. The purpose of this action was to prevent withdrawal of the enemy forces into the deep rear to establish themselves behind the Dnepr and Dvina Rivers. During the battles of envelopment the objective was to prevent the approach of enemy forces aiming at relieving the enveloped Soviet armies through an attack from the outside, and at the same time to frustrate attempts of the pocketed armies to break out.

However, even in the June-December 1941 period the German air forces were unable to establish continuous air supremacy, and the frequent displacements combined with resupply difficulties resulted in serious attrition. Soviet losses were heavy, but not heavy enough to bring the campaign to a close. Although the Luftwaffe had destroyed 20,392 Soviet aircraft, it was unable completely to neutralize Soviet airpower. The number of aircraft available was simply too small to enable the Luftwaffe to furnish support at all points where support was required. Effective counterair action concurrently with air action in support of the ground forces was impossible.

Indeed, developments in 1941 took a course which was to prove fateful for the Luftwaffe. The large size of the theater of operations in the east, and the crushing superiority of the enemy ground forces over the German side made it imperative to employ German airpower almost exclusively from then on in missions of direct support for the Army. If Army demands for air support were to be met, adequate air forces were not available for action against targets of a type the destruction of which might have served to balance Russian numerical superiority in favor of the German Army, as, for example large Soviet tank factories. Practically speaking, the Luftwaffe now had to restrict itself almost exclusively to only one mission, that of supporting the Army.

In a study prepared during the war, the Military History Division of the Luftwaffe General Staff discussed this subject in some detail. Even in 1941, as the study pointed out, the outstanding feature of air warfare in the East was the preponderance of Luftwaffe operations in support of the Army. Indeed, it soon became patent that the

ground forces, confronted with forces superior in numbers, could make good progress only when attacks were supported by the Luftwaffe. In recognition of this, Hitler issued a directive to the effect that large-scale operations by the Army were only to be initiated when full support by the Luftwaffe was ensured. This general condition, coupled with the mobile warfare which prevailed up to November 1941, required the commitment of almost all air units for close support, leaving only weak elements for "missions of a strictly strategical nature." The study concluded that if the number of aircraft and missions flown against Moscow be compared with the magnitude of the Anglo-American bombing effort against Germany, it must be concluded "that our strategic attacks cannot have been expected to produce decisive results."[6]

Circumstances were similar in the field of rail interdiction operations, from which the German Command had expected results on a strategic scale in view of the widely meshed Soviet railroad system and its low capabilities. Here again, however, the forces available for the purpose proved far too small for the size of the mission in the wide expanses of Russia. In the first few weeks of the campaign German rail interdiction attacks admittedly had an exceedingly hampering effect on the enemy, particularly during the large battles of envelopment. But the hoped for lasting results failed to materialize. The effects of Luftwaffe rail interdiction attacks remained locally restricted and, what is more important, only temporary. This was so because the Soviets developed completely unexpected and astonishing capabilities in the repair of damaged rail routes within inconceivably short spaces of time. Realizing the immense importance of an intact rail network for their conduct of operations, they furthermore soon commenced defending all of their rail depots, including those of small size, with antiaircraft artillery, mounted light antiaircraft guns on all railway trains, and with fighter units stationed along the routes, so that German units committed in rail interdiction missions soon began to encounter strong defenses.

The operations of Luftwaffe fighter forces also soon showed that the units available were far from adequate to secure air superiority--not to mention air supremacy--in all parts of the enormous expanses of the eastern theater. This obtained in spite of the fact that German fighter forces were far superior to the Soviet units in training, combat morale, and the quality of their equipment. It was

only through a firm concentration of fighter forces over the areas of main effort in ground operations that it was possible to achieve locally restricted and temporary air supremacy. In other areas of the theater, which at such times had to be stripped of fighter forces, German ground forces, who naturally could only judge the situation from their own limited viewpoint, found cause to complain about Soviet air superiority, because the resounding success achieved in annihilating attacks at the beginning of the campaign had secured for the Luftwaffe air supremacy for a few weeks all along the line.

Combined with aircraft deliveries from the Anglo-Americans, the large manufacturing capabilities of their aircraft industry had enabled the Soviets to replace within an astonishingly short time the losses they had suffered at the beginning of the campaign. This enabled the Soviets to maintain lively air activities, restricted almost entirely to action at the front in support of their ground forces. Soviet air attacks against targets far in the German rear were a rare occurrence, and the Soviet Command desisted entirely from operations of a strictly strategic nature.

German reconnaissance activities suffered under the same handicap of inadequate forces for the various areas, and this applied particularly to strategic air reconnaissance, in which field main emphasis was on rail reconnaissance. It would have been necessary to patrol the main rail routes in their entire length at least twice daily, and to ascertain the amount of traffic in large rail depots by means of air photo reconnaissance at least once daily. The lack of an adequate number of units made this impossible. A reconnaissance service of this type would have furnished data from which the higher level commands would have been able to determine with considerable reliability whether the traffic detected at any given time represented normal military and civilian transportation movements or whether large troop movements were taking place. In view of the inadequate number of reconnaissance units available, however, it was possible to keep under observation only a relatively small segment of the extensive enemy rail system.

Antiaircraft artillery operations also were rendered difficult by the wide extent of the zones of operations and of the rearward occupied enemy territories, and it was possible to provide concentrated antiaircraft defense for only a few target areas at any given

time. As a rule the pattern of antiaircraft artillery operations was as follows: The antiaircraft artillery units of the antiaircraft artillery corps under the air fleets, and the antiaircraft artillery units assigned under army commands were committed in defense of the routes of advance, near front targets--such as troop assemblies, artillery concentration areas, and bridges--and on a large scale in ground combat missions against bunkers, strongpoints, and attacking Soviet tanks. In addition, air fleet headquarters allocated antiaircraft artillery units to defend airfields, and the various air district commands committed such units to defend traffic centers, supply bases at which particularly important items of supply were stored, and important bridges on major supply routes.

The Air Signal Corps had exceptional difficulties to contend with in establishing signal communications covering the great distances involved in the eastern theater. Radio communications naturally played an all-important role in the eastern theater. Owing to the vulnerability of radio communications to intercept operations and to interferences of all types, however, it was not possible to rely alone on radio in the conduct of operations. Thus it was essential to be able to reach all higher level headquarters by teletype and telephone. The distances which had to be covered for such purposes is illustrated by the fact that the line connecting the command train of the Second Air Fleet with the VIII Air Corps alone was 780 miles long.

The development of an aircraft reporting network of sufficient density, that is, covering the whole vast area of the eastern theater, was impossible. All that could be done in this field was to commit aircraft reporting units in areas of main pressure. Close cooperation between these units and fighter groups proved highly profitable in combat action against Soviet air units penetrating the German lines.

Air signal-liaison detachments with the army forces in the front lines proved to be most valuable. The reports received from these detachments enabled the tactical air support commands to maintain a precise interpretation of the rapidly changing situation on the ground, thus furnishing them the data required for the effective use of their combat units.

The field which presented the greatest difficulties was that of supply operations, which had to function in the immense distances in

the eastern theater and on substandard roads, many of which could not be traveled at all during the mud seasons. This situation resulted in problems which in many cases could only be remedied by an increased use of transport aircraft, the continued development of which was promoted systematically for this reason. In August 1941 a large Type Gigant freight glider landed for the first time on an airfield in the zone of the Second Air Fleet, bringing 11 tons of bombs. These gliders were later powered by six engines.* Air transportation was naturally used not only for the movement of Luftwaffe supplies but also to meet the requirements of the Army, an activity which was of particular consequence, for example, for the supply of fuel and ammunition to armored units far ahead of the general advance on the ground.

Thus as the war continued, the Luftwaffe's position became increasingly difficult. Beginning in 1941 it had been compelled to forfeit any possibility of conducting strategic operations in order to be able to furnish adequate air support for the Army.

The Eastern Theater in 1942-44. German air operations in the eastern theater from 1942 on again clearly revealed that it was not possible to conduct counterair warfare simultaneously with air operations in support of the ground forces. The close interrelation between air operations and developments in the military situation on the ground became the salient feature in further developments. Generally speaking, the mission directive for each air fleet required operations in support of the army in cooperation with a specific army group.

With an overall average strength of 6,821 and an operable strength of 4,262 aircraft available to the Luftwaffe, the combined combat strength of all units committed in the eastern theater fluctuated between 2,000 and 3,000 aircraft. The operable strength of 4,264 aircraft in June 1942 comprised 486 reconnaissance, 1,237 bomber, 369 dive-bomber, and 278 twin-engine and 1,253 single-engine fighter aircraft, plus 529 transport planes and 112 seaplanes.[7]

The Soviet Air Force had recovered from the defeats it had suffered in 1941. It was now stronger and more up-to-date than before, and its officer and enlisted personnel had been trained in accordance with German standards. Even as early as 1942 the Soviets

* Editor's Note: The Me-323.

again had roughly 5,000 aircraft on line. Out of this number approximately 15 percent were type U-2 planes,* used as improvised bomber or courier units.

German air operations in 1942 were determined largely by the offensives on the ground directed at the Volga River and the Caucasus in the southern part of the eastern theater. The vast majority of all air missions executed were missions of army support in action directly in front of the German ground forces. Eighty percent of all bomber forces available were employed in missions of direct support for operations on the ground, with only a small number committed against targets in the far enemy rear, in action commensurate with the actual mission assignment. Sizable strategic air missions were executed only in the central and northern areas of the eastern theater, where the ground situation permitted such action./ These attacks struck industrial installations of military importance in the areas of Gorki, Rybinsk, Moscow, and Leningrad, the ports of Murmansk and Arkhangel'sk, and the railway system, which was of extreme importance to the enemy.

The Luftwaffe Command realized the harmful results of a system in which air operations were too strictly contingent upon army operations, and the characteristic feature of 1943 in command circles was the struggle for authorization to employ the bomber forces in strategic missions. The outcome of this struggle was the dispatch of large air forces against the Gorki tank factory and installations of the Jaroslavl rubber industry during the months of quiet between battles.

Under pressure of the ground situation as it developed with the opening of the Soviet summer offensive, however, all available units again had to be thrown into action in direct support of the Army. Here, the units were split up, their operations intermeshed with operations on the ground, and consequently could not be brought to bear against concentrations far in the enemy rear.

It is true that the IV Air Corps in 1944 received the mission

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* Editor's Note: A single-engine training and ambulance biplane.

/ In actual fact only a few attacks were carried out.

of renewing strategic combat operations against traffic targets in the far enemy rear. Good results were achieved in this field as a result of the application of methods employed in the west in a form adapted to the requirements of the eastern theater. Generally speaking, however, air operations still remained tied to the operations of the ground forces for the purposes of direct support. In 1943 80 percent of all air activities were dictated by the mission of tactical support for the Army, and military events in 1944 produced no changes of any consequence in this situation.

A study prepared in 1944 by the Military History Division of the Luftwaffe General Staff[8] furnished a further development of the problem:

> The further course of the war in the air, after 1941, was characterized by the fact that the Luftwaffe was no longer as in the past employed in concentration on only one front against only one enemy within the overall pattern of the whole war. Through its employment in a number of theaters simultaneously, it was compelled to dispatch its forces against the enemy in widely separated areas. This necessarily resulted in a reduction of the operable strengths available in the individual segments of the fronts. This made the departure from the past principles of operational warfare in favor of direct support for the Army and the Navy an accomplished fact. The conditions for an employment of air power consonant with the principles of Douhet were thus removed.

The situation in the eastern theater created what must be considered as a classic example. Because of its inferior strength, the strategic Luftwaffe was forced out of its real role in spite of a clear realization of the adverse results which would follow. Neither in Russia, nor in the Mediterranean and western theaters did German air superiority continue. As a result the initiative passed more and more to the enemy. Our own air forces, however, found themselves implicated in air defense under the pressure of events of the war. Thus the thing had happened which Douhet had desired to avoid. For in his opinion the strategic offensive was always to be considered as the most effective form of operations. He desired its application even if the friendly air forces were weaker than those of the enemy.

The attempt to achieve lasting results by means of strategic

air operations was nevertheless repeated frequently. Attacks were directed occasionally at militarily important factories in Gorki, Jaroslavl, Rybinsk, Moscow, and Leningrad. However, no telling results were achieved because the forces dispatched were too small and because the attacks took place at too long intervals. Therefore, the objectives propounded by Douhet for such attacks could not be achieved.

The fact was that in view of the difficult situation on the ground, all available air forces were thrown in a steadily increasing measure into combat action in direct support of the Army. In such action their units were necessarily split up and were tied down to action contingent upon events on the ground, and in consequence could not be brought into action against such paying targets as troop concentrations in the enemy rear.

On the enemy side the flow of men and materiel to the battlefields continued almost without interference, where they created the necessary conditions for the commencement of enemy military successes. This again showed, by negative proof, how right Douhet's overall concept was of the all-important significance of airpower in modern warfare.

Chapter 6

SUMMARY

It was an inescapable necessity for the Luftwaffe to provide support for the Army within a certain scope. In ground-to-ground combat operations certain missions developed which could actually only be executed satisfactorily by air forces. In battles of decisive importance on the ground it was undoubtedly also sound practice to employ the bulk of available air forces to support the Army in missions of direct or indirect support appropriate to the nature of airpower. It was such use of airpower which had provided the pattern for victory in the blitz campaigns against Poland in 1939, France in 1940, and the Balkan countries in 1941.

Generally speaking, the same held true for the first few months of warfare in the eastern theater. In the periods of quiet which then followed between the great battles on the ground, however, the continued employment of airpower primarily in support of the Army cannot be considered as having been a sound policy. The operational and tactical doctrines established in Air Field Manual No. 16 quite rightly provided that, with the exception of times when very large army forces were locked in battles of decisive importance, action against the military resources of the enemy--concurrently with action to establish and maintain air supremacy--was the decisively important mission of airpower.

However, the German overall military command, and the Luftwaffe Command, almost completely neglected air combat operations of this type, particularly in the eastern theater. Precisely at the time when Russian superiorty in tanks and ground-attack aircraft was making itself increasingly felt, strategic targets existed against which attacks certainly would have produced results with a greater impact on ground operations than could ever be produced by continuous missions of direct army support, frequently carried out with inappropriate means.

Obviously, the Luftwaffe realized the disadvantages of the system it was following during the war. Thus a letter by the Luftwaffe

Operations Staff in November 1943 observed:*

> 1. In the Russian campaign German airpower was employed soundly until the German advance reached the Dnepr River line in the autumn of 1941. It was the destruction of the Russian air forces, plus the direct air support given to the /German/ ground forces, which made the rapid advance possible at all. From that moment on, at least elements of the Luftwaffe should have been committed in action
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> a. Against Russian rail routes deep in the Russian interior, but particularly to prevent or to hamper the evacuation of large installations of the armament industry to the Russian rear.
>
> b. Against armament factories still operating within striking range.

After enumerating the reasons why the great weakness of the German ground forces made air operations of this type impossible, the letter concluded that "we have missed the time of most favorable opportunities, and that the difficulties have become very great."

In spite of these difficulties, the decision was taken at the end of 1943 to withdraw a number of bomber units from line and train them for strategic operations against the enemy resources of military power. Suitable targets in sufficient numbers existed, and, in cooperation with the Minister for Armament and Ammunition, a bombing program against Soviet industry and supply depots was worked out. The plan assumed that by careful selection of targets it would be possible to reduce the monthly Russian deliveries to the front by 3,500 tanks and 3,000 aircraft. With this purpose in view IV Air Corps headquarters, with three bomber and several twin-engine fighter wings, were withdrawn from action and given training for strategic long-range operations. But the time was past: what would have been entirely practicable in 1941 was no longer so. By the time the Corps

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* The complete text is in Appendix 36 in unpublished appendices of USAF Historical Study No. 163. Karlsruhe Document Collection.

completed its training in the middle of 1944, the German lines had been pushed back so far as to place the major portion of the targets out of range. The lack of long-range bombers was acutely felt at that time. Furthermore, considering the unfavorable German military situation in 1944, the withdrawal of these wings from combat only served to accelerate the loss of ground on the eastern front. Here it became evident that the problem could hardly be solved by the Luftwaffe alone. Stringent measures by the Wehrmacht High Command would have been necessary to so increase the strength of the ground forces that the Army would not have been compelled to rely constantly on support from the Luftwaffe. It was esssential to restore freedom of action to the Luftwaffe, but exactly the opposite happened.

The weakness of the Army in the winter of 1941-42, given by the Luftwaffe High Command in its letter as the reason for the fact that no air forces could be made available for operational air warfare, was to be found in Hitler's refusal, in spite of the advice of experienced Army commanders, to withdraw the front in the east to a shorter and more easily defensible line. Even later, after cessation of the German offensive operations in the eastern theater from the autumn of 1943 on, measures to straighten out the front line would have been the most effective way to economize in forces.

Writing on this subject Captain Harry Butcher, General Eisenhower's aide, observed on 29 January 1944:[1]

> The length of the front line in Russia as measured on the map is slightly more than 1900 miles, an increase of 500 miles over the front line as it existed when the Russians started their big offensive in July, 1943. If the Germans retreat to the shortest line from the Baltic to the Black Sea, it is presumed German divisions may be released and the same strength of opposition continued against the Russians.

However, Hitler refused to sacrifice even a square yard of ground voluntarily in the eastern theater, and insisted on holding frontages far in excess of the capabilities of the German forces available. In the case of forced retreats he time and again ordered the troops to hold fortified points as islands of resistance surrounded by enemy occupied territory, allegedly in order to contain enemy forces and thereby slow down the general enemy advance. German strengths

were further depleted by the hundreds of thousands of troops lost in this way. What is completely incomprehensible here is that Hitler even refused to give any consideration to plans for German offensive operations involving an initial voluntary tactical withdrawal. In a conference at Feltre, Northern Italy, on 19 July 1943, for example, he stated to Mussolini:[2]

> His generals frequently recommended the sacrifice of one area or another in order to improve opportunities for operations. This was completely false; one must not cede the enemy an inch of captured terrain and must conduct the war as far as possible from the homeland.

It was such a policy which rendered it completely impossible to operate against the Soviet forces from the summer of 1943 on, since the overextended frontages in the eastern theater alone made it impossible to make forces available for offensive operations.

A study of German operations in World War I against the Russian forces, which at that time were heavily superior in numbers, shows that the German Command achieved a number of decisively important victories over the Russians in operations staged from withdrawal movements. In contrast, by prohibiting withdrawals in combination with attacks from the withdrawal movement, Hitler robbed the German field commands of the possibility decisively to weaken the Russian forces while at the same time he exposed his own forces, numerically far weaker than the Russians, to certain annihilation.

The German command organization was another factor partly responsible for the fact that German airpower was no longer employed in a logically proper manner, thus preventing the achievement of decisive results through a real power concentration. The Luftwaffe command was so organized at the highest levels that, under the Commander in Chief of the Luftwaffe, the air fleet headquarters each controlled simultaneously and through lower level commands their strategic forces, their tactical forces, their air defense forces, and their own ground service organization.* In times of war each air fleet was assigned to support one army group. This organization had

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* See Appendix 25.

proved sound while Germany was fighting a war on one front only, as long as the air fleets were operating from bases in Germany, and as long as the Luftwaffe remained completely superior in the air. After the conflict had developed into a multi-front war, with the air fleets committed far inside enemy territory, and when the original German superiority in the air had deteriorated into a pronounced inferiority, the organizational setup was no longer sound.

It need be mentioned only incidentally that the problem of a practicable air defense system also called for a different solution. The matter of a practicable command organization for the tactical air forces has been discussed previously in this study. The intention at this point is to deal only with the problem of a practicable command organization for the heavy air units of the Luftwaffe.

During the 1939 campaign in Poland and that of 1940 in western Europe, the bomber forces had been concentrated under only two air fleet headquarters; now they were distributed among six air fleets. Such an arrangement made a proper concentration of power unthinkable. As previously mentioned, the fact that these air fleets were each harnessed to one army group produced the unavoidable result that the bomber units were often committed in continuous missions of army support, and were frequently employed unwisely even in action over the field of battle. By thus distributing and splitting up its bomber forces the Wehrmacht High Command, as the highest level of German military command, had deprived itself of an immensely powerful means of combat. In comparison, it is interesting to note the manner in which the German Army High Command in World War I had kept its bomber forces firmly consolidated for employment consonant with their capabilities against sizable targets in the enemy rear areas.

After 1941 it would have been wise to withdraw the bomber wings from control by the individual air fleet headquarters and place them under suitable command staffs under a centralized bomber command. This was the only possible way to secure their commitment in concentration at decisively important points when necessary in support of the Army. Only if this had been done would the Luftwaffe have been in a position to exercise a decisive influence on military events.

It should be noted, however, that what has been said in this

study has not been said with any intention to gloss over the fact that, owing to the circumstances of the multi-front war and to the air armament effort of the Western Allies, the Luftwaffe, in any case, was no longer in a position to perform its missions because of strength and supply considerations.

NOTES

Chapter 1

1. Material for this chapter has been taken largely from Handbuch der neuzeitlichen Wehrwissenschaften (Manual of Modern Military Science), 1939. Karlsruhe Document Collection, G X 1.

Chapter 2

1. "Selection of Tactical Reconnaissance Aircraft," from a lecture by Captain Pohle, General Staff, during a General Staff Tactical Tour in June 1939. Karlsruhe Document Collection, C IV 2a.

2. Ernst Heinkel, Stuermisches Leben (Stormy Life) (Stuttgart, 1953), pp. 331-333. English edition ed. by Jurgen Thorwald (New York, 1956).

3. Hans-Ulrich Rudel, Trotzdem (In Spite of Everything) (Waiblingen/Wittenberg, 1950 /?/), p. 82.

4. Ltr, Generalluftzeugmeister (Chief of Special Supplies and Procurement Services), Document No. 3800/41. Karlsruhe Document Collection, F V laa.

5. Generalluftzeugmeisterbesprechung (Chief of Special Supplies and Procurement Services Conference). Karlsruhe Document Collection, F V laa.

6. "Die deutsche Luftwaffe an der Ostfront" (The German Air Force on the Eastern Front), vol. 4, 122. Karlsruhe Document Collection.

7. Report, Generalluftzeugmeister (Chief of Special Supplies and Procurement Services), Document No. 18/42, 8 January 1942. Karlsruhe Document Collection, C VI 2.

8. Ltr, Generalluftzeugmeister (Chief of Special Supplies and Procurement Services) to Commander in Chief, Luftwaffe, 29 Oct. 1941. Karlsruhe Document Collection, F V laa.

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9. From the War Journal of the High Command, Luftwaffe, 1945. Karlsruhe Document Collection, C VI 2. The Mistel plane was a twin-engine bomber loaded with explosives. A fighter plane clipped to its wing steered it into the target, releasing it shortly before the target.

10. Karlsruhe Document Collection, F III 1.

Chapter 3

1. This chapter is taken largely from General der Flieger (Lieutenant General) a. D. Karl Drum, "Der Einsatz der dem Heer Taktisch Unterstellten Verbände der Luftwaffe" (Operations of the Luftwaffe Army Support Units). Karlsruhe Document Collection, F III 1a.

2. Dr. Elze, "Der Koluft 14 im Polnischen Feldzug, 1939" (The 14th Air Support Command in the Polish Campaign, 1939). Karlsruhe Document Collection.

3. "Luftwaffeneinsatz in Africa" (Luftwaffe Operations in Africa), an extract from "Der Feldzug in Nordafrica" (The Campaign in North Africa). Karlsruhe Document Collection, G VII 10.

4. As quoted in the manuscript by Generalleutnant (Major General) Hermann Plocher, "The German Air Force Versus Russia on the Eastern Front," vol. II, to be published in the German Historical Monograph series.

5. Dr. Theodor Stocke, "Die kartographische Vorbereitung des Dnepr Uebergangs 1941 beim LII Korps" (The Cartographic Preparation for the Crossing of the Dnieper in 1941 by the LII Corps), Wehrwissenschaftliche Rundschau, vol. VI (1956), 202-203.

6. Report to General der Flieger (Lieutenant General) Karl Drum by Colonel Nagel, wartime squadron leader, 4th (Tactical) Squadron, 31st Air Reconnaissance Group.

7. "Richtlinien fur das Gewinnen von Luftaufklaerungsmeldungen durch die Verbaende des Ob. d. L. und des Ob. d. H., ihren Austausch, und ihre Verwertung fur die Zwecke der Luftwaffe und des Heeres" (Directives for the Processing of Air Reconnaissance Reports Through the Units of the Luftwaffe High Command and the Army High Command, Their Exchange and Their Utilization for the Objectives of the Luftwaffe and the Army). Luftwaffe High Command, Operations Staff Ia/II, 20 April 1941. Karlsruhe Document Collection.

8. "Zusammenarbeit mit dem Heer, 1944," (Coordinated Action with the Army, 1944), Luftwaffe High Command, Operations Staff (Ia), Document No. 4100/44, 24 July 1944. Karlsruhe Document Collection, F III 1a.

Chapter 4

1. Colonel Hans Jeschonnek, Chief of the Luftwaffe General Staff, "General Observations on Tactical Operations," from a General Staff Tour Critique, June 1939. Karlsruhe Document Collection, F III 1. Editor's note: In February 1939 Colonel Jeschonnek had become Chief of the Luftwaffe General Staff, succeeding General Hans Stumpff in that post. Jeschonnek took his own life on 19 August 1943.

2. Colonel Ernst Kusserow, "Unterstuetzung des Heeres durch die Luftwaffe im Feldzug gegen Russland" (Luftwaffe Support of the Army in the Campaign Against Russia) (hereinafter cited as "Unterstuetzung . . . ."), 2 Sept. 1954. Karlsruhe Document Collection, F III 1.

3. John R. Deane, The Strange Alliance (New York, 1947), p. 93.

4. "Der Einsatz der deutschen Luftwaffe waehrend der ersten 11 Tage der Frankreichfeldzuges" (Operations of the Luftwaffe During the First Eleven Days of the Campaign in France), taken from the daily situation reports of the Air Operations Section (Ic), Luftwaffe High Command. Karlsruhe Document Collection, G V 2c.

5. Ibid.

6. Ibid.

7. Cf. General der Flieger (Lieutenant General) Paul Deichmann, "Balkan-Feldzug des VIII Fliegerkorps" (The VIII Air Corps in the Balkan Campaign). Karlsruhe Document Collection, G VII 6.

8. Karlsruhe Document Collection, G VII 6.

9. An unpublished German Monograph study, in Karlsruhe Document Collection. See also, Generalmajor (Brigadier General) Hitschhold, "Die Entwicklung der Schlacht-und Sturzkampfliegerei waehrend des Kampfes in Russland" (Development of Attack and Dive Bombing Aviation During the Battles in Russia), Karlsruhe Document Collection; "Der Luftkrieg im Osten 1941" (The Air War in the East, 1941), Karlsruhe Document Collection.

10. "Abschnuerung des Schlachtfeldes waehrend der Schlacht um Kiew" (Isolation of the Battlefield During the Battle of Kiev), taken from situation reports, Operations Staff, Luftwaffe High Command. Karlsruhe Document Collection, G VI 3b.

11. "Der Luftkrieg im Osten gegen Russland 1941," (Air Warfare Against Russia in the Eastern Theater in 1941), Report, Military History Division (8th), Luftwaffe General Staff. Karlsruhe Document Collection, G VI 3a.

12. Generalleutnant (Major General) Hermann Plocher, "Unterstuetzung des Heeres durch die deutsche Luftwaffe im Osten 1941/42" (Support of the Army by the German Air Force in the East, 1941-1942) (hereinafter cited as "Unterstuetzung des Heeres . . . ."). Karlsruhe Document Collection, G VI 3a.

13. "Das II Fliegerkorps im Einsatz gegen Russland vom 22. 6. 41 - 15. 11. 41" (The II Air Corps in Operations Against Russia from 22 June to 15 November 1941). Karlsruhe Document Collection, G VI 3b.

14. Zantke, "Eisenbahnjagdeinsatz schwerer Kampfverbaende im Operationsprogramm der deutschen Luftkriegsfuehrung, 1941" (Heavy Bomber Formation Attacks on Railroads in the Operational Program of German Air Warfare, 1941). Karlsruhe Document Collection, G VI 3d.

15. Deane, The Strange Alliance, pp. 94-95.

16. Plocher, "Unterstuetzung des Heeres . . . ." Karlsruhe Document Collection, G VI 3a.

17. More details on these operations are contained in the sources available in the Karlsruhe Document Collection, among them a report by the Luftwaffe Operations Staff, Intelligence Section/East (D), entitled "Grossangriffe des IV Fliegerkorps auf S. U. Eisenbahn System in der Zeit von 27. 3 bis 5. 5. 1944" (Major Offensive of IV Air Corps Against the Soviet Railroad System from 27 March to 5 May 1944). Karlsruhe Document Collection, G VI 6b.

18. The details given here are taken from situation reports of the Luftwaffe Intelligence Division and from Plocher, "Unterstuetzung des Heeres . . . ." Karlsruhe Document Collection, G VI 3a.

19. Dwight D. Eisenhower, Crusade in Europe (New York, 1948), p. 122.

20. Details given here taken from Lieutenant General von Hoeppner, Aus Deutschlands Krieg in der Luft (The German War in the Air) (Leipzig, 1921). General Hoeppner was General Commanding German Air Forces.

21. Personal experience of the author during an assignment in the Operations Branch of the Luftwaffe High Command, 1935-37.

22. Plocher, "Die Unterstuetzung des Heeres . . . ." Karlsruhe Document Collection, G VI 3a.

23. "Die Unterstuetzung des Heeres im Osten 1941 durch die deutsche Luftwaffe," (Luftwaffe Support of the Army in the East, 1941), Historical Division (8th), Luftwaffe General Staff. Karlsruhe Document Collection, G VI 3d.

24. Plocher, "Unterstuetzung des Heeres . . . ." Karlsruhe Document Collection, G VI 3a.

25. Kusserow, "Unterstuetzung . . . ." Karlsruhe Document Collection, F III 1.

26. Field Marshal Albert Kesselring, Kesselring, A Soldier's Record. Tr. by L. Hudson (New York, 1954), pp. 96-97.

27. General Heinz Guderian, Panzer Leader (New York, 1952), Appendix VI (XIX Army Corps Order No. 3, 13 May 1940), p. 478.

28. Personal experience of the author, who was present as CG, 1st Air Division.

29. "Gefechtsbericht der 9 Armee und der 2 Panzerarmee uber die Schlacht im Orelbogen, 5 July-18 August 1943" (Combat Report of Ninth Army and Second Panzer Army on the Battle of the Orel Bend, 5 July-18 August 1943), Ninth Army High Command. Karlsruhe Document Collection, G VI 5a.

30. G. W. Feuchter, "Entwicklung und Kriegsentscheidende Bedeutung der Luftkriegfuehrung im 2 Weltkrieg" (Development and Decisive Significance in War of the Air Warfare Leadership in World War II), Flugabwehr und Technik, vol. II (Feb. 1949), 30.

31. Report by General der Flieger (Lieutenant General) Hans Seidemann, "Das VIII Fliegerkorps im Osteinsatz, 1943" (The VIII Air Corps in Operations in the East, 1943), 1943. Karlsruhe Document Collection, G VI 5a. Editor's note: General Seidemann was commanding general of VIII Air Corps at the time, with the rank of Generalmajor (Brigadier General).

32. "Panzer-Bekämpfung im Osten, 1943/1944" (Combat Against Tanks in the East, 1943/1944). Karlsruhe Document Collection, G VI 5a.

33. Eike Middeldorf, Taktik im Russland Feldzug (Tactics in the Russian Campaign) (Frankfort/Main, Mittler und Sohn, [?]).

34. Kusserow, "Unterstuetzung . . . ." Karlsruhe Document Collection, F III 1.

35. Horst von Riesen, "Die Luftwaffe -- der hervorragende Faktor eines Krieges" (The Air Force -- The Dominant Factor of War), Flugwelt, vol. II (1955).

Chapter 5

1. Information for this chapter is taken largely from studies prepared during World War II by the Military History Division (8th) of the Luftwaffe General Staff.

2. "Air Power in the West" (1940), article in Russian newpaper Krasnaya Swesia (Zvezda?), 14 August 1940. Source No. 206, Division VIa (Foreign Press), Luftwaffe General Staff.

3. "Umfang und Auswirkung der Unterstuetzung des Heeres durch die deutsche Luftwaffe auf den Ablauf der verschiedensten Feldzuege" (Size and Effect of Ground Support by the Luftwaffe in the Launching of the Various Campaigns), from a study of the 8th Division of the Luftwaffe General Staff. Karlsruhe Document Collection, F III 1.

4. Ibid.

5. Ibid.

6. "Die wichtigsten allgemeinen Einsatzerfahrungen des Jahres 1941" (The Most Important Operational Experience of 1941), prepared by the Military History Division (8th), Luftwaffe General Staff. Karlsruhe Document Collection, G VI 3a.

7. Compiled by the Supply Division (6th), Luftwaffe General Staff, from operable strength reports submitted by units.

8. "Einsatz zur Unterstuetzung des Heeres an der Ostfront" (Operations in Support of the Army in the Eastern Theater). Karlsruhe Document Collection.

Chapter 6

1. Captain Harry C. Butcher, My Three Years With Eisenhower (New York, 1946), p. 483.

2. Enno von Rintelen, Mussolini als Bundesgenosse (Mussolini As Ally) (Stuttgart, 1951).

APPENDICES

Anlage 1

(POINT MAP)

ZIELPUNKTKARTE

Meldeverfahren bei Karten ohne Gitternetz

(Message Procedure with Maps without Military Grid)

Maßstab = 1 : 25 000

0 250 500 750 1000m = 1 km

(Das in obiger Karte vorhandene Gitternetz ist fortzudenken)

Anlage 2

Die Luftverteidigungskraefte an der Ostfront am 26. 3. 44
(The Air Defense Strength on the Eastern Front, 26 March 1944)

(Stand der Einsatzbereitschaft: 25. 3. 44)
(Combat-Ready Status: 25 March 1944)

(Unit) Verband:	(Airfield) Flugplatz	(Combat Ready Aircraft) Einsatzbereite Flugzeuge
II. /J. G. 52	Gramatikowo (Krim)	38
Rum. 49. J. St.	Saki (Krim)	5
15. /(kroat.)52	Karankut	0
Rum. IX. J. Gr.	Odessa	15
I. /J. G. 52 (ohne 1. u. 2. Staffel)	Kantakusenka	10
1. /J. G. 52	Jassy	10
III. /J. G. 52 (ohne 7.)	Kolomea	16
7. J. G. 52	Lemberg	6
Ung. J. St.	Lemberg	4
Stabs-Staffel/J. G. 51	Terespol	13
1/2 J. G. III. /51	Lublin (in Umruestung)	-
1/2 J. G. III. /51	Baranowitschi	10
St. J. G. 51	Bobruisk	4
I. /J. G. 51	Bobruisk	44
IV. /J. G. 51	Orscha	30
II. /J. G. 54 (ohne 4.)	Petseri	12
12. /J. G. 54	Petseri	8
Stab J. G. 54	Dorpat	3
IV. /J. G. 54 (ohne 12)	Dorpat	15
4. J. G. 54	Dorpat	6
I. /J. G. 54 (ohne Einsatz-Kdo.)	Wesenberg	18
Einsatz-Kdo. I. /J. G. 54	Lattsberg	8
Finnland, Norwegen (Stand: 10. 4. 1944)		
Stab J. G. 5		2
II. /J. G. 5		24
III. /J. G. 5		25
		326

Anlage 3

Anlage 4

RUSSIAN TANK FACTORY AT GORKI

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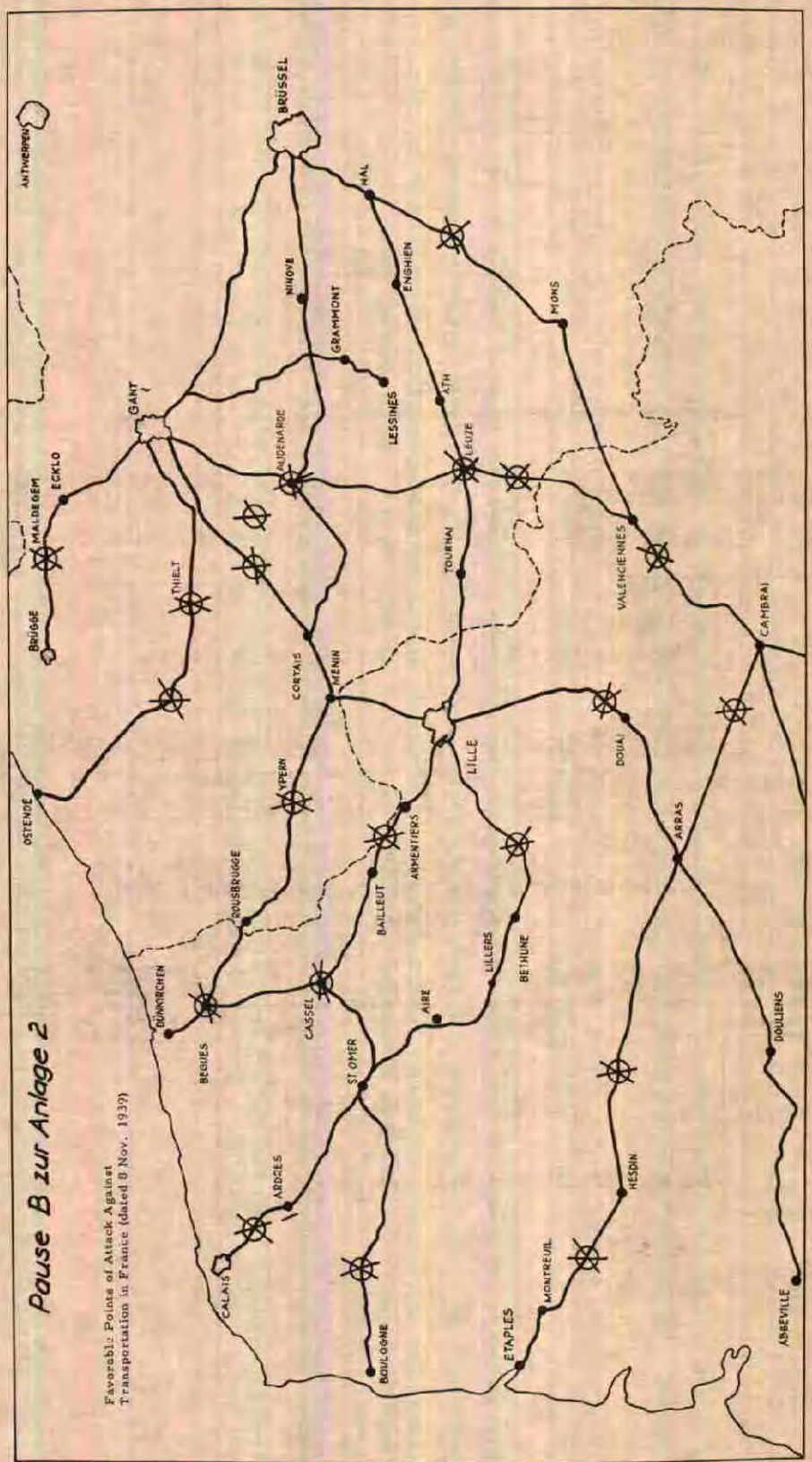
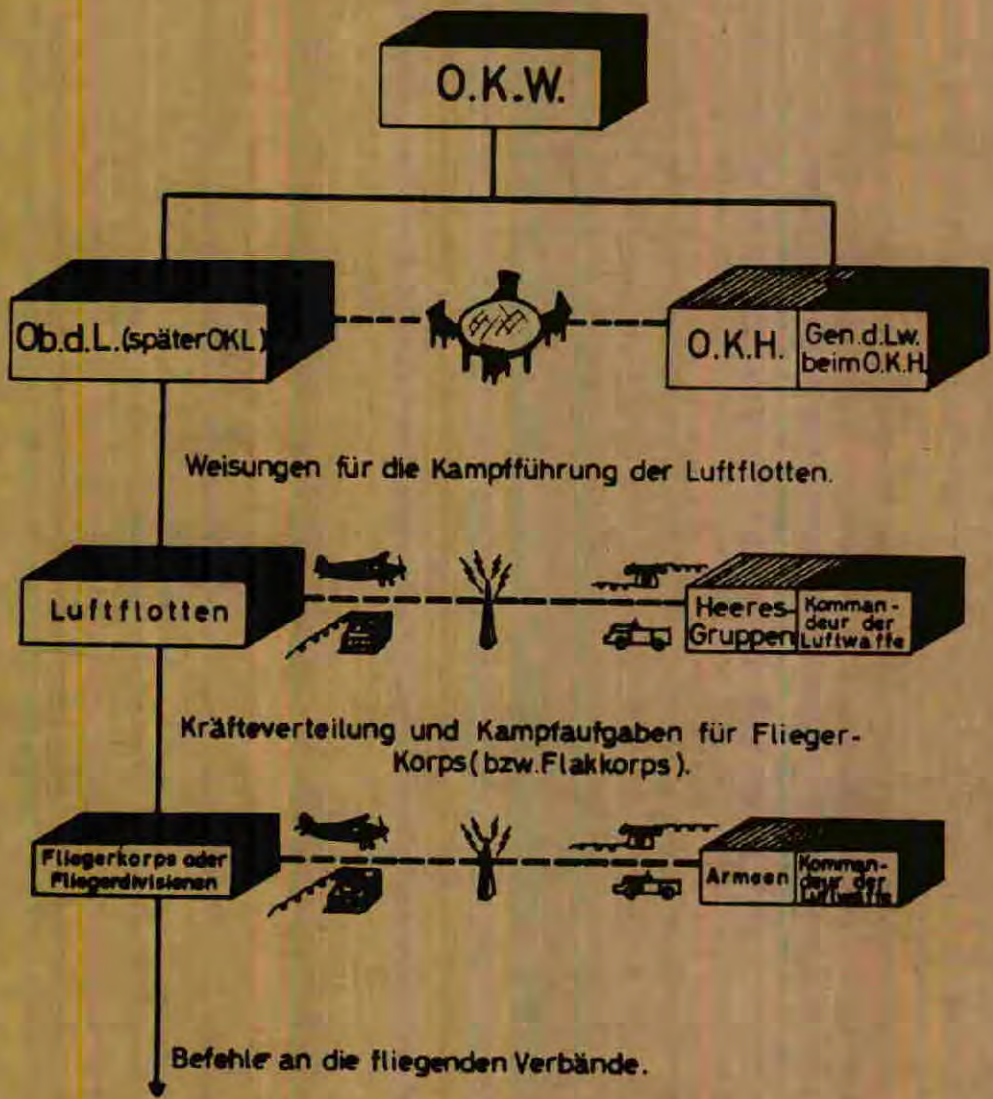
Anlage 5



Anlage 6

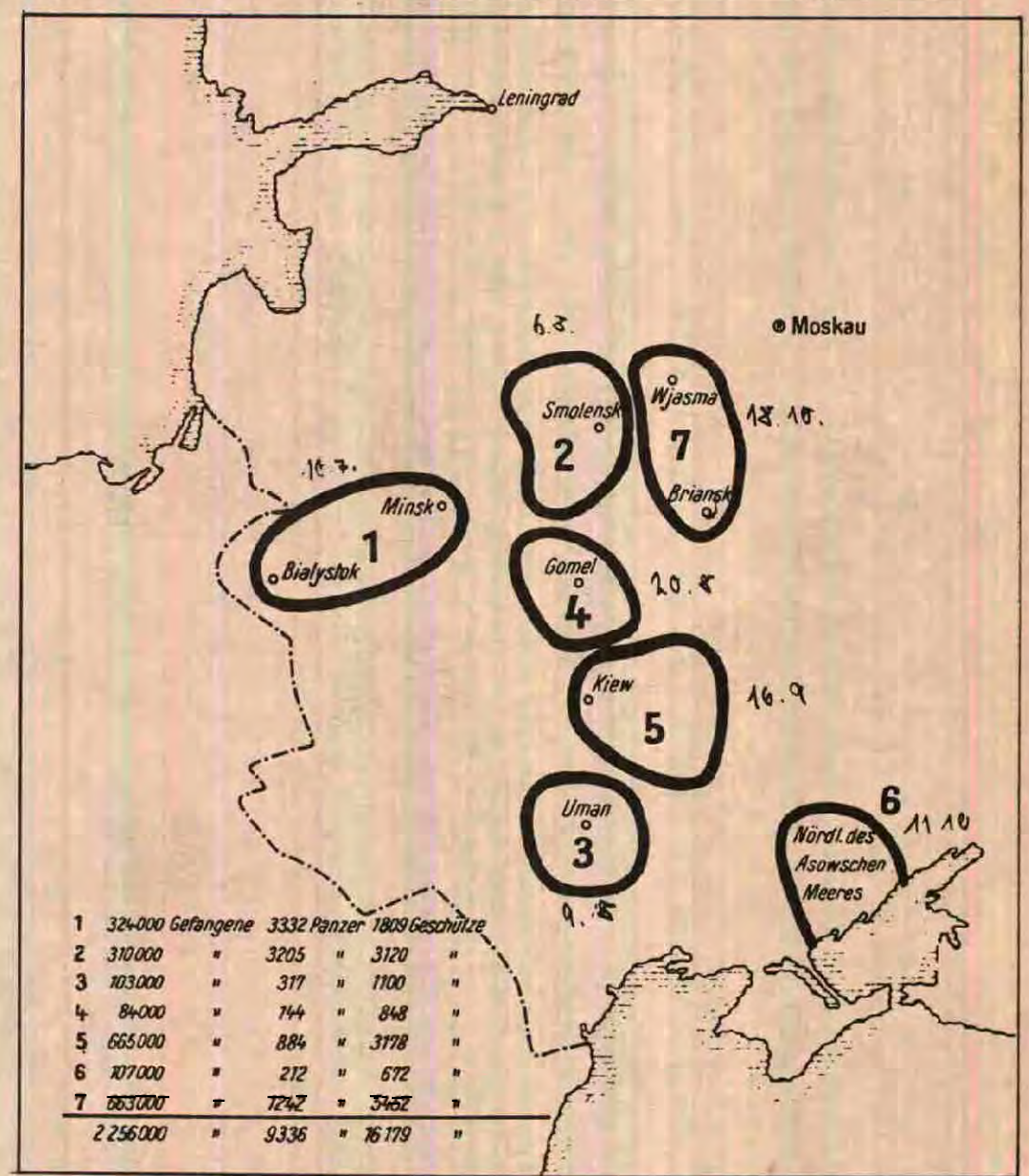
(Command Organization and Chain of Command for Operations of
~~Befehlsgliederung u. Befehlsgang fuer den Einsatz der fliegerverbaende~~
Flying Units in Support of the Army by Interdiction
zur Unterstuetzung des Heeres durch
of the Battlefield)
~~Abriegelung des Schlachtfeldes~~



Anlage 7

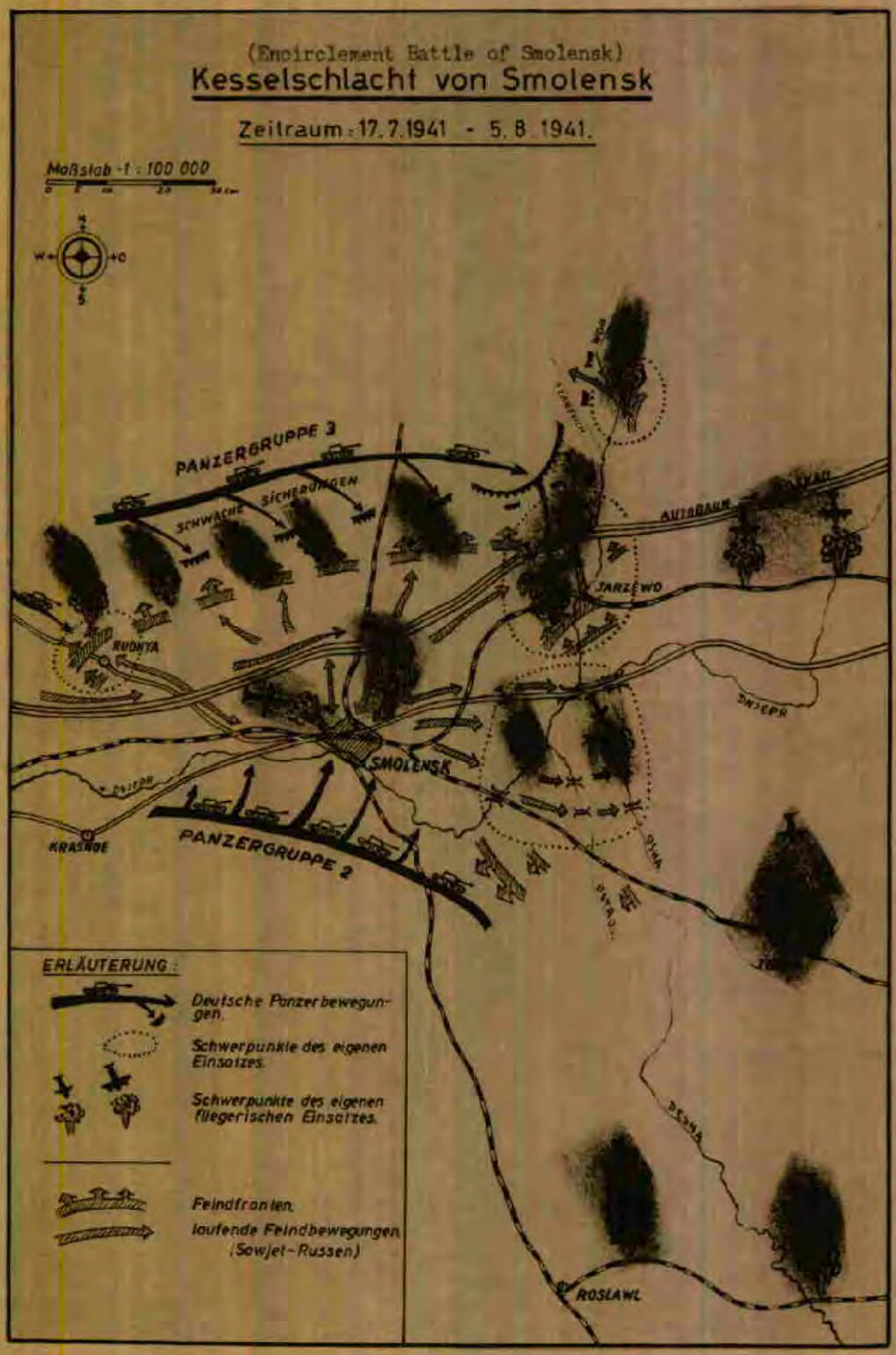
(The Seven Great Battles of Encirclement of the Eastern Campaign, 1941)

Die 7 großen Kesselschlachten des Ostfeldzuges 1941



1	324000	Gefangene	3332	Panzer	1809	Geschütze	
2	310000	"	3205	"	3120	"	
3	103000	"	317	"	1100	"	
4	84000	"	144	"	848	"	
5	665000	"	884	"	3178	"	
6	107000	"	212	"	672	"	
7	663000	"	1242	"	3452	"	
	2256000	"	9336	"	16179	"	

Anlage 8

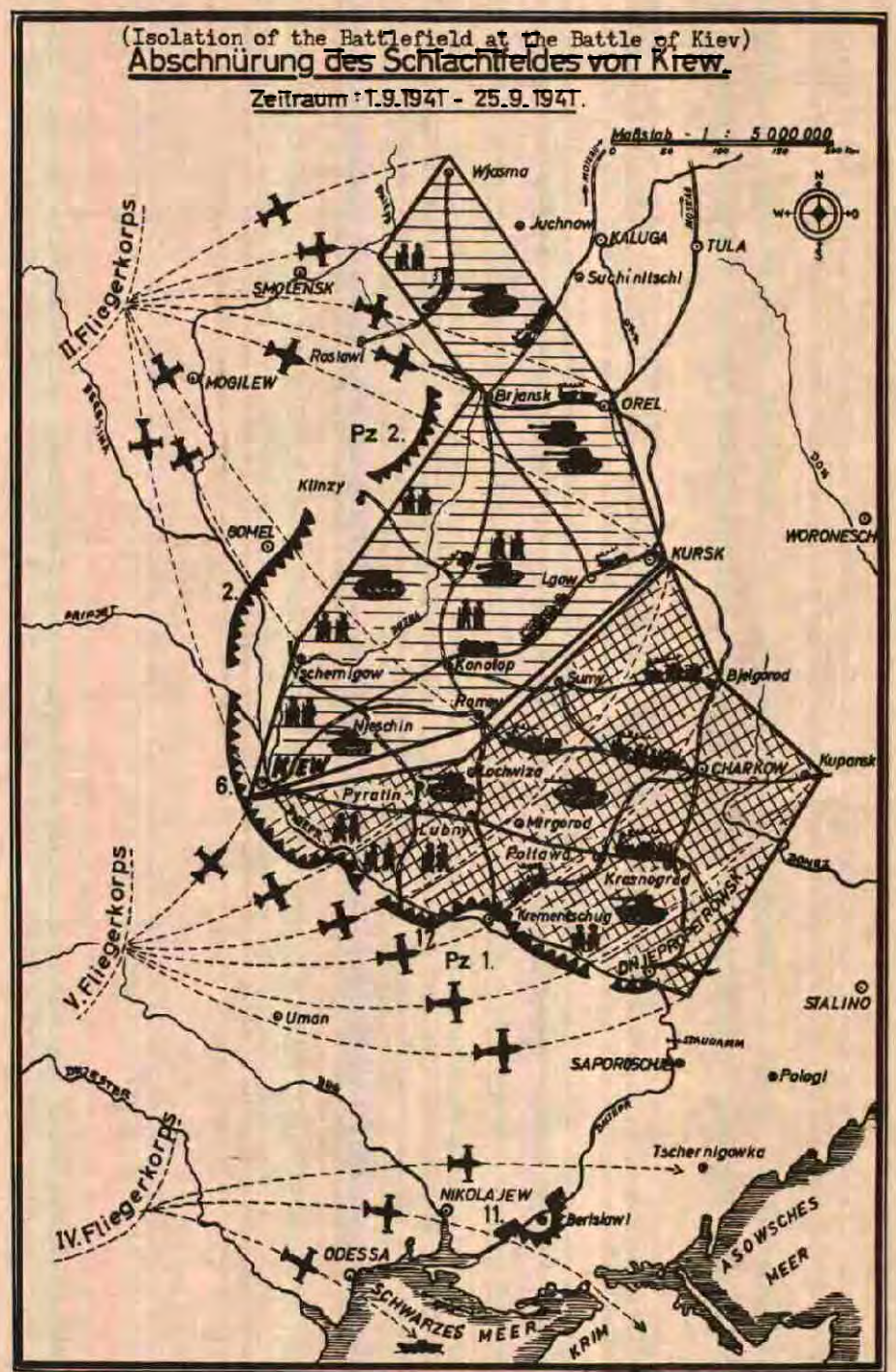


Anlage 9

(Isolation of the Battlefield at the Battle of Kiev)

Abschnürung des Schlachtfeldes von Krew.

Zeitraum: 1.9.1941 - 25.9.1941.



Anlage 10

(Campaign Against the Railroads During the Encirclement Battle of Kiev)

Eisenbahnbekämpfung

während der Abschnürung des Schlachtfeldes von Kiew.

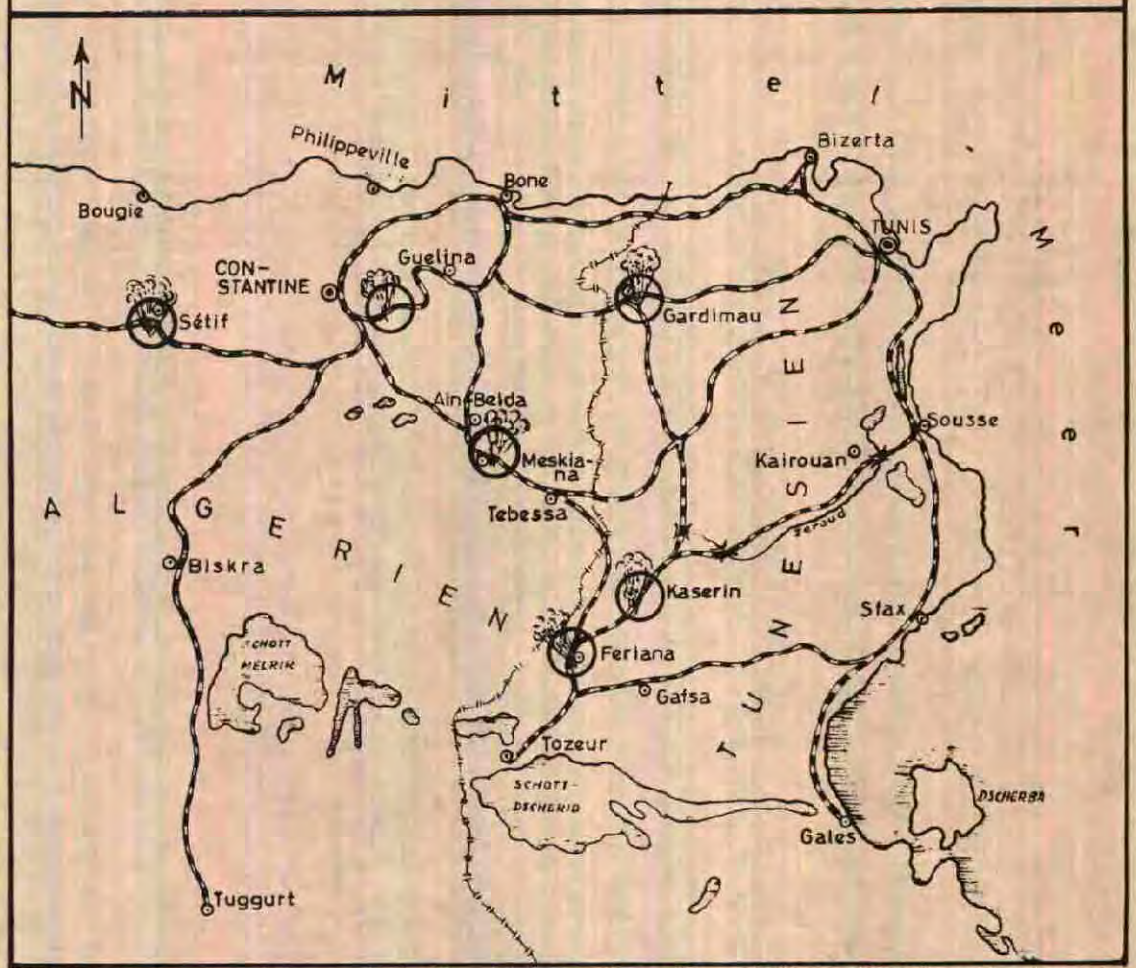
Zeitraum : 1.Sept.1941 - 25.Sept.1941

Anlage 11

Übersichtsskizze

über den Einsatz deutscher Sprengkommandos im Feldzug in Tunis

Ende Januar und Ende Februar 1943



(Survey Sketch of Operations of German Demolition Teams in the Tunisian Campaign)

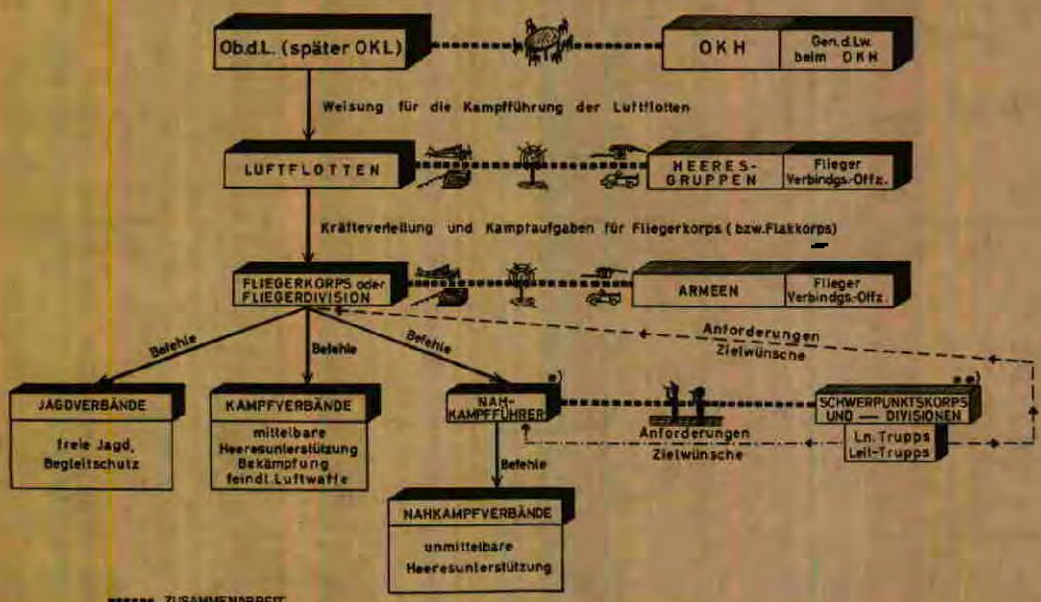
Maßstab - 1 : 4 000 000

0 20 40 100 Km

Anlage 12

1941/42 Command Organization and Chain of Command for Operations of the Luftwaffe on the Battlefield

1941/42 Befehlsgliederung und Befehlsgang für den Einsatz der LUFTWAFFE auf dem Schlachtfeld des HEERES



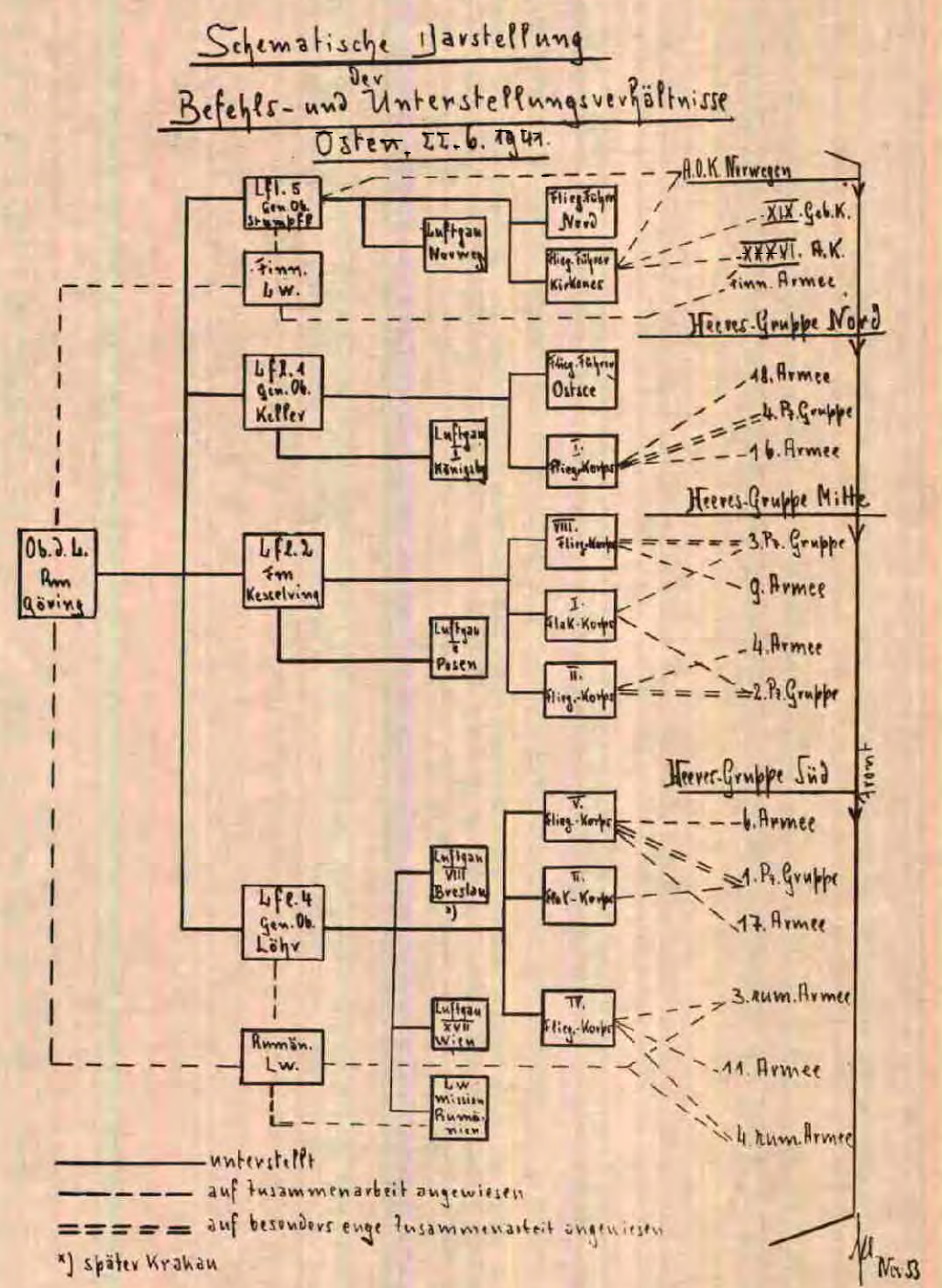
====== ZUSAMMENARBEIT

Bemerkung: *) Ist kein Nahkampfführer vorhanden, gibt das FLIEGERKORPS die Einsatzbefehle unmittelbar an die NAHKAMPF-VERBÄNDE.

**) HEERESVERBÄNDE, die zur Zeit nicht von der LUFTWAFFE unterstützt werden, geben Wünsche zur Unterstützung durch die LUFTWAFFE an ihre vorgesetzten HEERESFÜHRUNGSSTÄBE.

Anlage 13

(Schematic Presentation of Command and Subordinate Unit Relationship, East, 22 June 1941)



Anlage 14

Schematic Presentation of Luftwaffe Ground Support

Schematische Darstellung der Lw-Unterstützung

Angriff: D-Tag, X-Uhr

X-25 bis X-20 Massierter Hochangriff gegen Gesamtziel-Bombenteppich

X-20 bis X Sturzangriffe gegen Punktziele im Angriffsraum gemäß Feuerplan

X Angriff der Erdtruppe

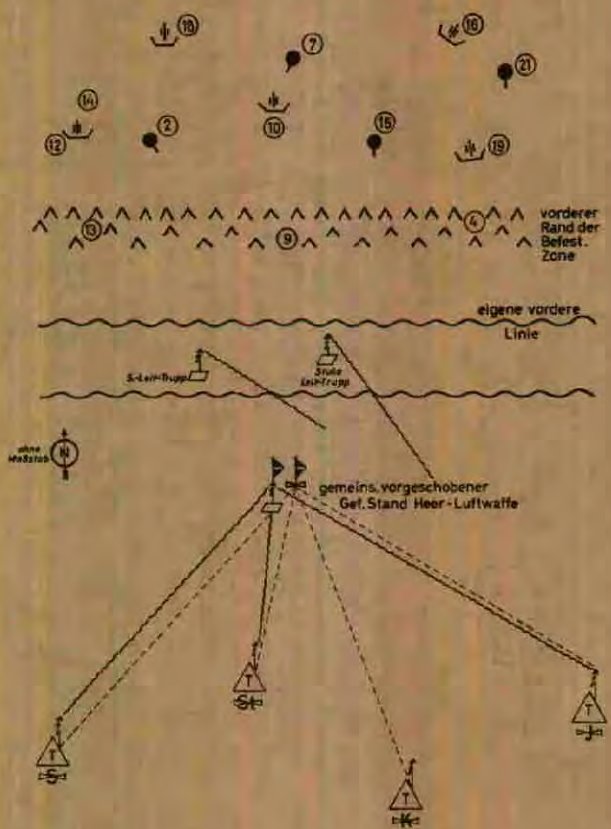
ab X Bekämpfung von Zielen in der Tiefe der Befestigungszone

Niederhalten der Feindflanken

Beweglicher Einsatz vom vorgeschobenen Gefechtsstand aus, je nach Erdlage

Zeichenerklärung:

- Artillerie-Stellung
- Panzerbatterie
- Schlachtflieger-, Stuka-, Luftnachrichten- } Leit-Trupp
- Flugplatz
- Draht- } Verbindung
- Funk- }
- (13) (2) Ziel-Bezugs-Punkte für Kampf- bzw. Feuerplan Heer-Luftwaffe
- Kampfflieger - Bomber
- Jagdflieger - Fighter
- Schlachtflieger - Attack
- Stukaflieger - Dive-Bomber

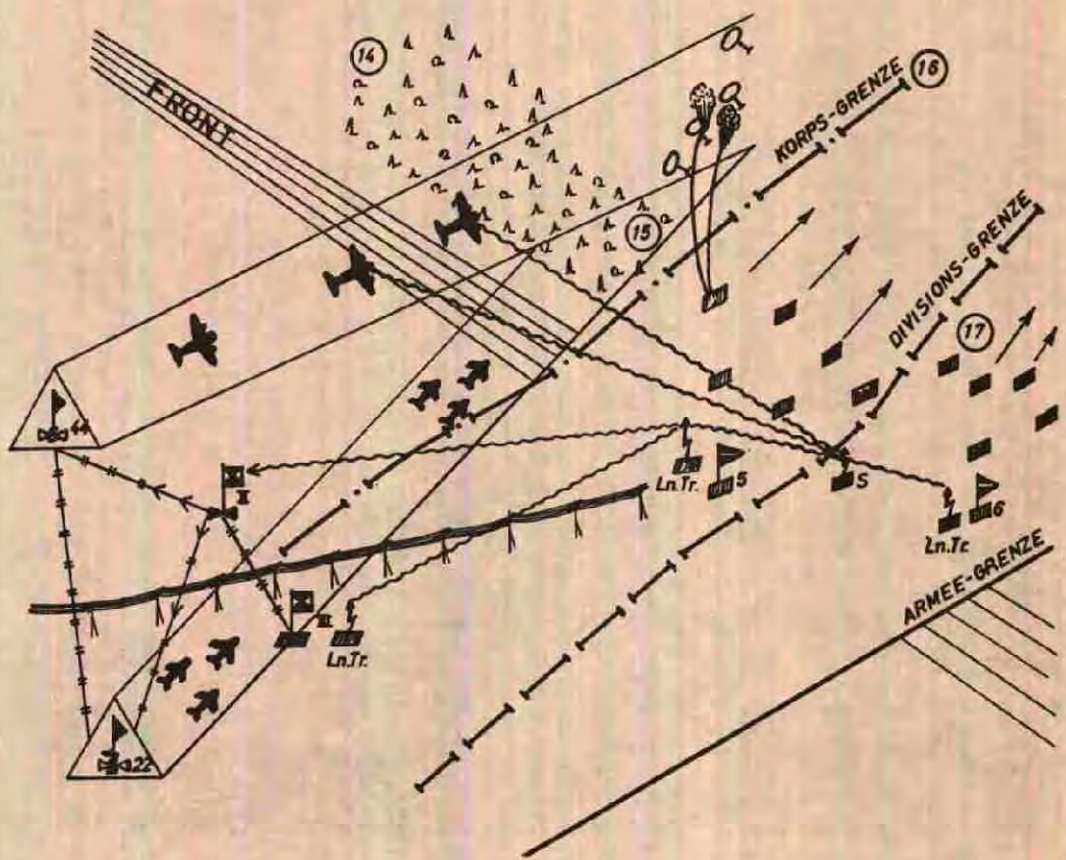


Anlage 15

Illustration of a Direct Support Action

Beispiel einer unmittelbaren Heeresunterstützung

(Anforderungs-und Befehlswege)



Zeichenerklärung:

- 14 17 — Bezugspunkte
- Flugplatz
- Ln. Trupps
- S — Schlachtflieger-Leit-Trupp
- Schwere Pak (Feind)
- Pz-Einheiten
- Funkverbindung
- Feldkabel (Doppel) Leitung
- Stammleitung

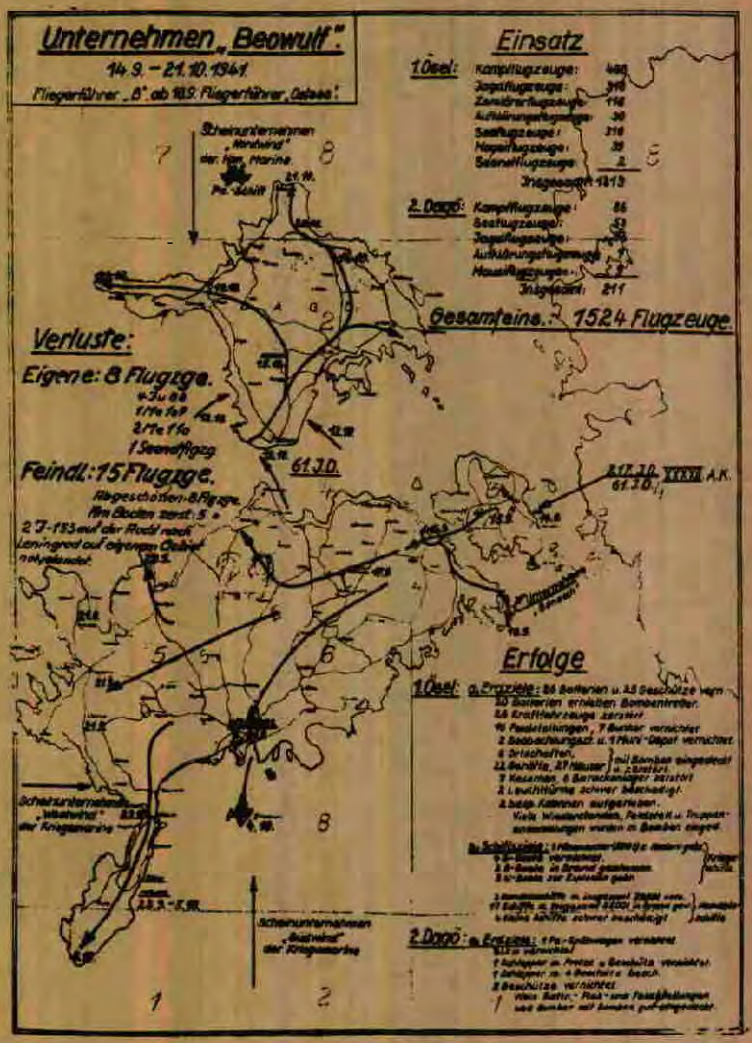
Anlage 16

Anlage 17

The Conquest of Sevastopol

Anlage 18

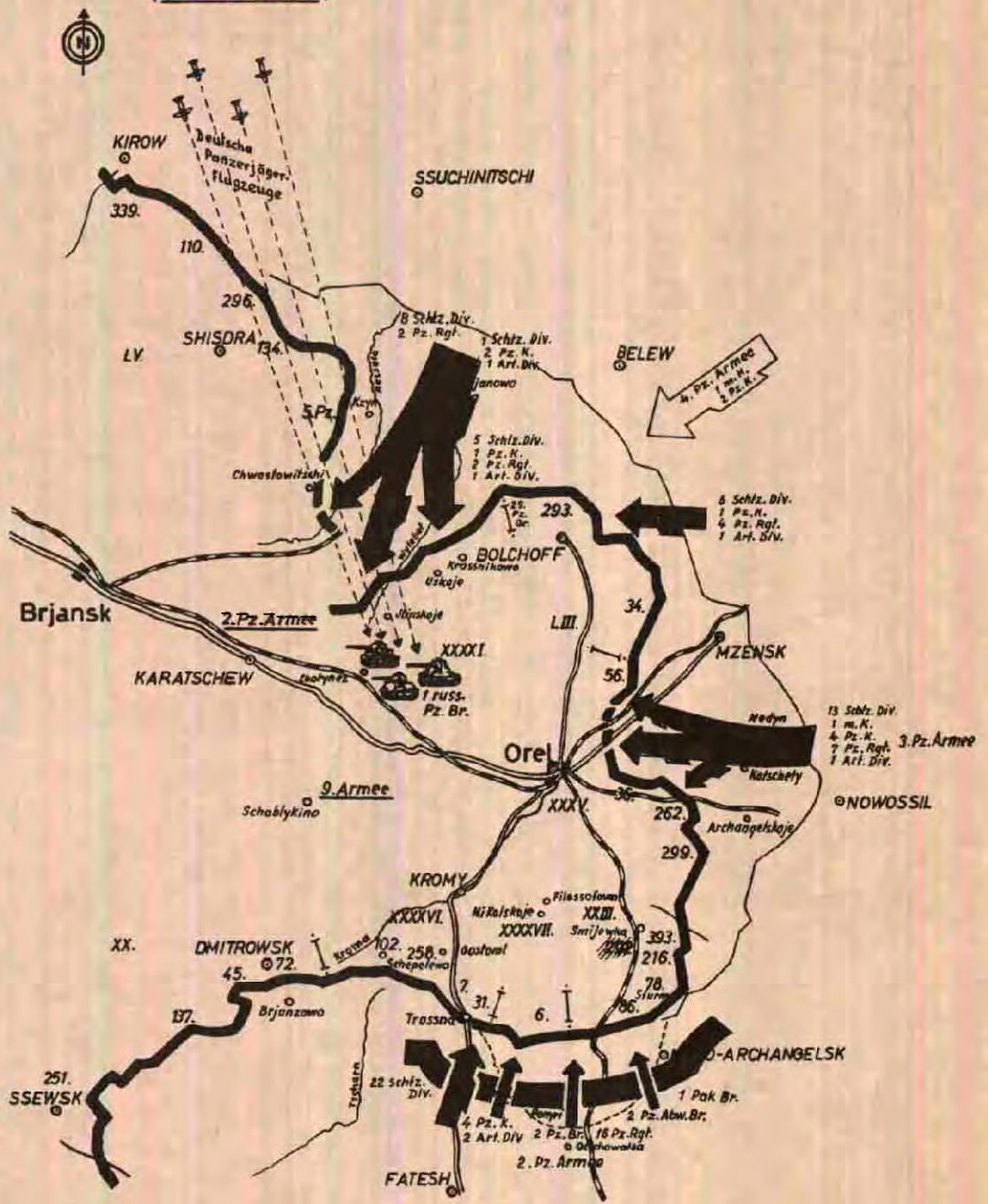
(Operation Beowulf)



Anlage 19

(Luftwaffe Prevents Union of Two Armies, Battle of Orel Bend)

Luftwaffe verhindert während der Schlacht im Orelbogen die Einschließung von zwei Armeen.
(19.-21. Juli 1943)

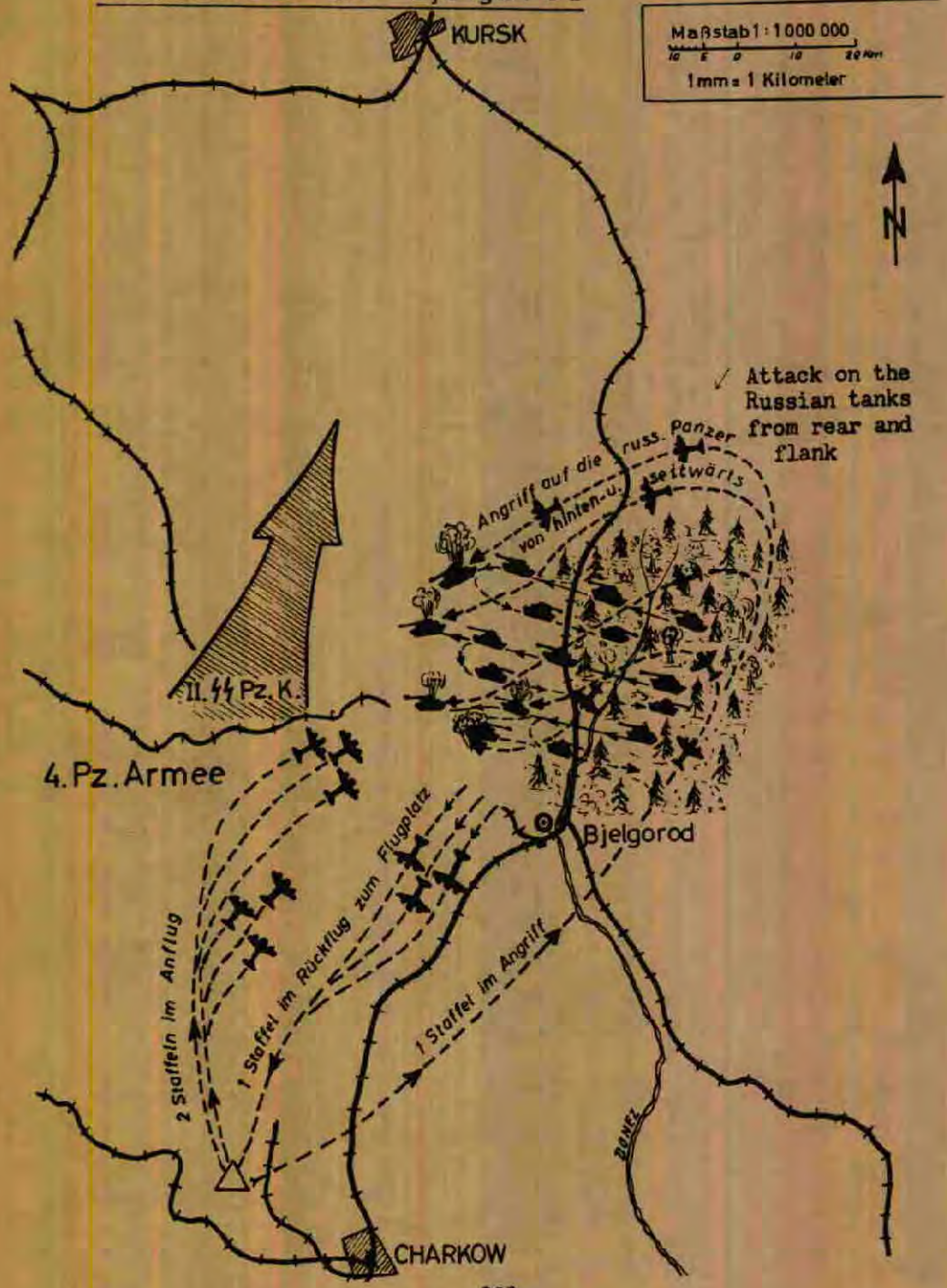


Anlage 20

(Operation IV Panzer Army and 9th Ground Attack Wing)

Einsatz der IV. Pz./S.G.9

am 8. Juli 1943 bei Bjelgorod



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Anlage 21

Distribution of the Existing Operational Bomber Units

Aufteilung der im Einsatz befindlichen Kampffliegerverbaende

(Einsatzbereite Flugzeuge)

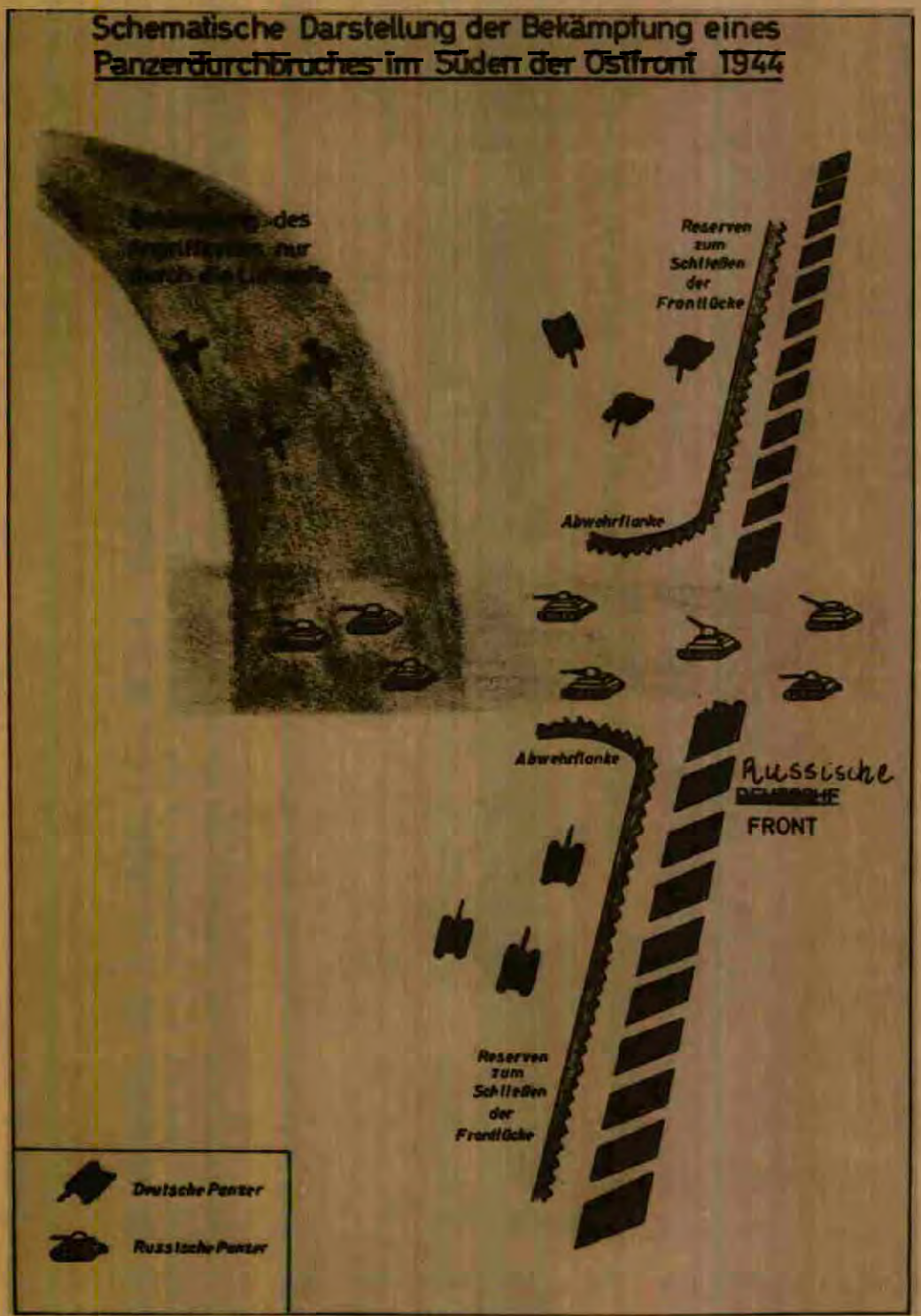
Zeitpunkt	Okt. 1943	Nov. 1943	Dez. 1943	Jan. 1944	Febr. 1944	März 1944	April 1944	Mai 1944	Juni 1944	Juli 1944	Aug. 1944	Sept. 1944	Okt. 1944	Nov. 1944	Dez. 1944	Jan. 1945
In Norwegen	16	17	15	-	15		16	17	17	17	-	-	-	-	73	115
An der Ostfront																
Nordabschnitt	Nicht	-	-		8	5e	7	3	4	6	12	6	5	5	-	-
Mitte	auf-	96	47		5	163	225	177	248	233	259	215	3e	-	11	11
Suedabschnitt	gegliedert	245	191		125	54	61	43	74	25	51	4	62	45	68	87
Insgesamt:	358	341	238		138	167	293	223	326	264	322	225	97	5e	79	98
Im Westen																
Nordfront								54	1e3	15e		88	123	61	?/	258
Westkueste (Atlantik)	459	3e2	695	456	429		125	19	22	28	246	-	-	-	-	-
Sueden (Mittelmeer)							62	71	59	28						
Im Sueden																
Italien	285	263	?	?	169	1e2	57	5e	keine	keine	64(?)	32	-			
Im Suedosten																
Balkan	5e	84	43	-	-	-	-	-	-	-				Einige Flugzeuge zur Versorgung		

Quellen: Lagekarten Ob.d.L.
Quartiermeistermeldungen

Bemerkung: Nicht aufgefuehrt sind die jeweils im Heimatgebiet zur Wiederaufruestung bzw. Umruestung befindlichen Bombergruppen.

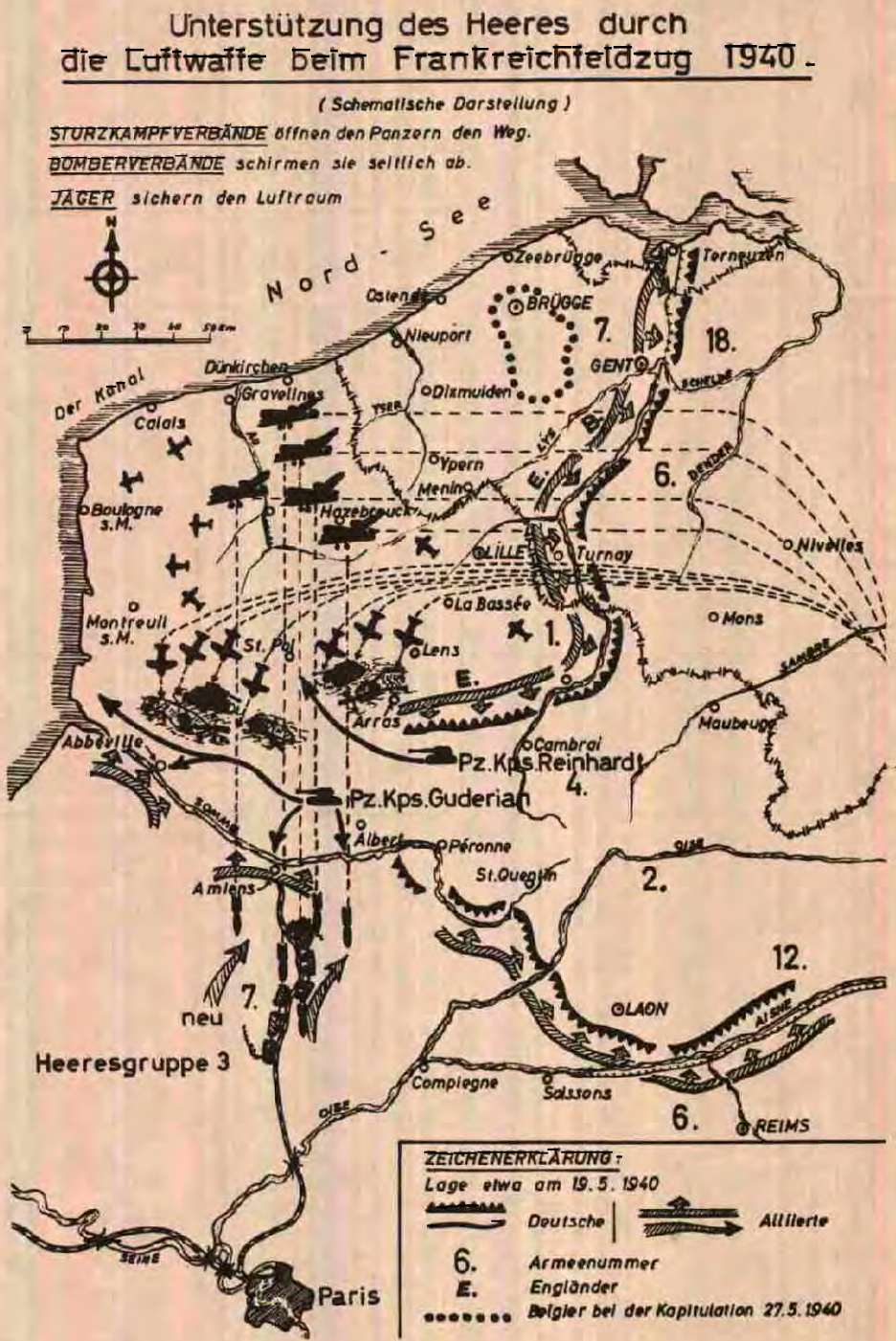
Anlage 22

(Schematic Presentation of Control of an Armored Breakthrough on the Eastern Front, South, 1944)



Anlage 23

(Ground Support by Luftwaffe in the Campaign in France, 1940)



Anlage 24

Comparative Survey of Flying Units and Antiaircraft Units Allocated to the Army in the East, 1941

Vergleichs-Übersicht über die dem Heer im Osten 1941 zugeteilten Heeresfliegerverbände u. Lw-Flakartillerie.

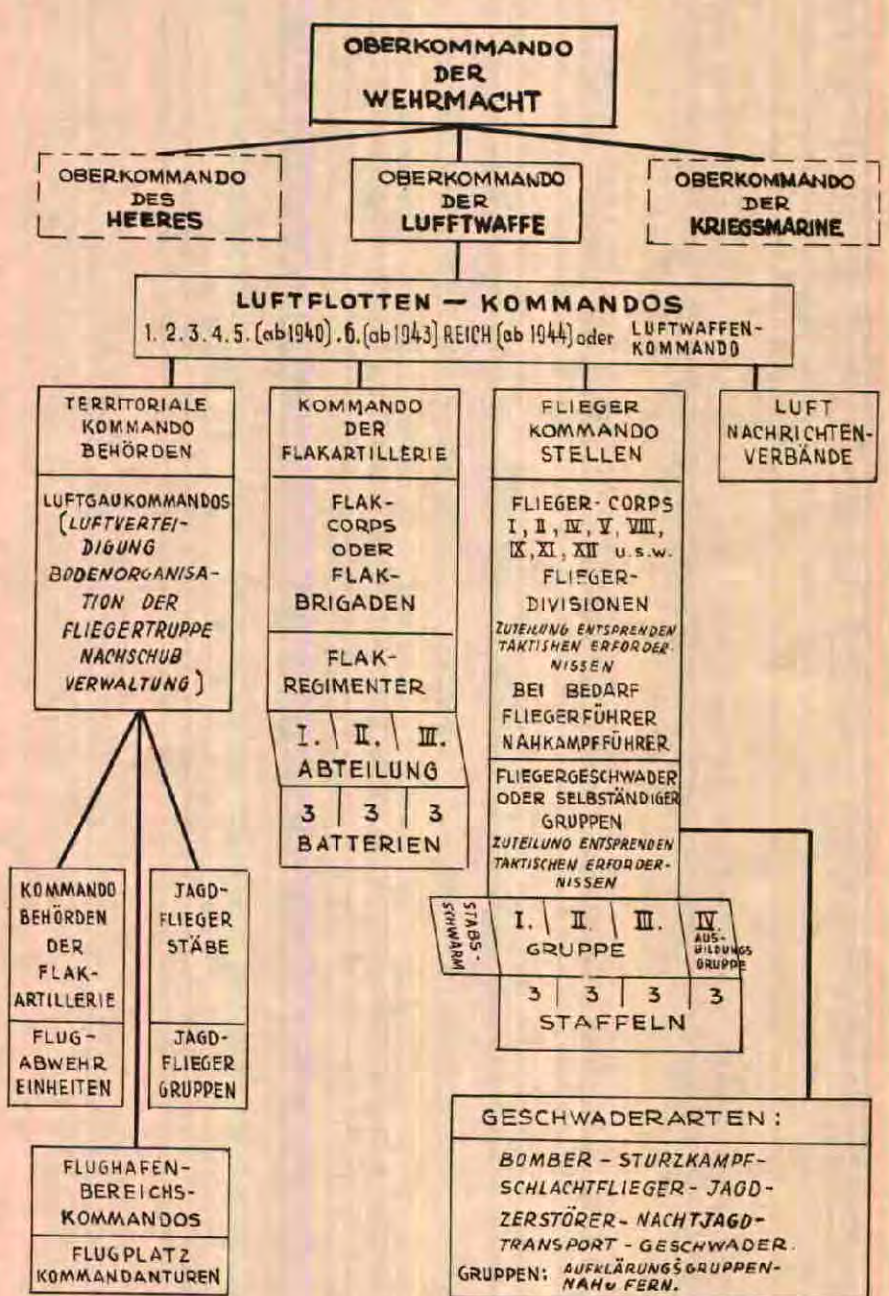
(Stand - 18. Juni 1941)

1	2	3	4	5	6	7	8	9	10
	Kolutt	Fernaufkl.-Staffel	Nachtaufkl.-Staffel	Verbindungs-Staffel	Aufkl. Gr. Stabe	Aufkl Staffel H	L u f t w ä f f e n Flk.Rgts.Stä	Flak-Abt	Bemerkungen
Gen.der Lw.beim Ob.d.H.	-	2	-	1 (Heer)	-	-	-	-	
Finnland	1	1	-	-	-	-	-	1	
Heeresgruppe Nord	1	1	1	-					
18.Armee	1	1	-	1	-	3	1	3	
16.Armee	1	-	-	1	-	3	1	3	
4.Panzergruppe	1	1	-	-	2	5	1	5 davon 3 lei. Abt.	
Heeresgruppe Mitte	1	2	1	1					
3.Panzergruppe	1	1	-	-	2	6	1	6 davon 4 lei.Abt.	
9.Armee	1	-	-	1	-	4	1	5	
4.Armee	1	-	-	1	-	5	1	5	
2.Panzergruppe	1	1	-	-	3	8	-	1 lei. Abt.	unterstützt durch 4 gem. und 2 lei. Abt des I.Flakkorps
Heeresgruppe Süd	1	2	1	1					
6.Armee	1	-	-	1	-	4	1	3	
1.Panzergruppe	1	1	-	1	3	8	-	1 lei.Abt.	unterstützt durch 4 gem. und 2 lei.Abt des II. Flakkorps
17. Armee	1	-	-	1	-	3	1	3	
11. Armee	1	1	-	1	-	3	1	3	
Summe:	15	14	3	11	10	52	9	39 davon 9 leicht	

Anlage 25

(Tactical Subordinate Relationships in the German Air Force)

TAKTISCHE UNTERSTELLUNGSVERHÄLTNISSE IN DER DEUTSCHEN LUFTWAFFE



APPENDIX NO. 26

LIST OF GAF MONOGRAPH PROJECT STUDIES

I. Published

Study No.	Title
163	German Air Force Operations in Support of the Army
167	German Air Force Airlift Operations
173	The German Air Force General Staff
175	The Russian Air Force in the Eyes of German Commanders
177	Airpower and Russian Partisan Forces
189	Historical Turning Points in the German Air Force War Effort

II. To Be Published

150	The German Air Force in the Spanish War
151	The German Air Force in Poland
152	The German Air Force in France and the Low Countries
153-55	The German Air Force versus Russia
156	The Battle of Britain
157	Operation Sea Lion
158-60	The German Air Force versus the Allies in the West
161	The German Air Force versus the Allies in the Mediterranean

Study No.	Title
162	The Battle of Crete
164	German Air Force Air Defense Operations
166	German Air Force Counter Air Operations
168	German Air Force Air-Sea Rescue Operations
169	Training in the German Air Force
170	Procurement in the German Air Force
171	Intelligence in the German Air Force
172	German Air Force Medicine
174	Command and Leadership in the German Air Force (Goering, Milch, Jeschonnek, Udet, Wever)
176	Russian Patterns of Reaction to the German Air Force
178	Problems of Fighting a Three-Front Air War
179	Problems of Waging a Day and Night Defensive Air War
180	The Problem of the Long-Range Night Intruder Bomber
181	The Problem of Air Superiority in the Battle with Allied Strategic Air Forces
182	Fighter-Bomber Operations in Situations of Air Inferiority
183	Analysis of Specialized Anglo-American Techniques
184	Effects of Allied Air Attacks on German Divisional and Army Organizations on the Battle Fronts
185	Effects of Allied Air Attacks on German Air Force Bases and Installations

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Appendix No. 26 (Cont'd)

Study No.	Title
186	The German Air Force System of Target Analysis
187	The German Air Force System of Weapons Selection
188	German Civil Air Defense
190	The Organization of the German Air Force High Command and Higher Echelon Headquarters within the German Air Force
194	Development of German Antiaircraft Weapons and Equipment up to 1945
Extra Study	The Radio Intercept Service of the German Air Force