

81

The command reorganization had become necessary for practical reasons and reasons of personality. From the outset the tactical support units of the Special Purposes Air Command had separated from their initial ground service area and followed closely the rapid advance by the German ground forces. As the advance progressed the influence of the 2d Air Division on these units became steadily less, in addition to which the division itself had entirely different missions. For technical reasons, the transmittal of messages and orders also became more and more difficult by the hour. Furthermore, coordination between the tactical air support units and the appropriate army commands had become so closely integrated in the meanwhile that control by rearward headquarters had become increasingly superfluous and, in fact, could only be harmful. For these reasons the Commanding General, Special Purposes Air Command, on 3 September had requested the commanding general of the Fourth Air Fleet, General Loehr to place him under direct command by the air fleet, and this request had been granted. The new chain of command became effective at midnight of the 3-4 September. The practical results of this change will be discussed later. <sup>76</sup> One result of the change was that now each air fleet had two intermediate commands under its direct control, which hitherto had

76. pp. 147-8.



82

been true only of the First Air Fleet. It is hard to understand why this arrangement had not been made in the case of both air fleets from the outset. The last paragraph of the order referring to the missions of Air Administrative Area Command VIII also is closely connected with this changed chain of command.<sup>77</sup>

By midnight of 3-4 September the situation on the ground changed considerably.<sup>78</sup> The new boundary line between the two army groups mentioned in the annex extended the responsibilities of Army Group South considerably farther north in the Posen area, a change which seems to have been made exclusively for reasons of the conduct of army operations. The boundary line between the two air fleets, in contrast, was not changed. The weather continued to improve on 4 September and the situation on the whole was more quiet. It was still cloudy in the Carpathian and foothill areas, but the weather was clear in the rest of Poland, apart from a few patches of morning fog. Presumably the tactical airfields of the First Air Fleet were fog-bound in the morning, since the units stationed in Pomerania only commenced operating in the late forenoon; in the command zone of the Fourth Air Fleet air operations commenced early in the morning, so that weather conditions



82a

here apparently were favorable both in the take-off and target areas.

For a proper understanding of the execution of offensive missions by the two air fleets on 4 September, both in respect to their development and their objectives, it is not sufficient to view them in the light of the directives and orders issued on the previous day. Both the combat missions assigned and the reconnaissance results of 3 September, and in particular the orientation received from the Wehrmacht High Command at midnight, revealed that an entirely new phase was approaching in the conduct of operations on the ground. On the whole a situation appeared to be developing in which the Polish Army High Command was preparing to regroup its forces on a very large scale, possibly with the intention of planning a new major operation designed to gain the initiative. In view of this overall situation the decisive

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78. Appendix 40.



83

was factor/what results reconnaissance would produce as data for the coming operations. Actually, the Luftwaffe command received a veritable flood of reconnaissance reports on the fourth day of combat from all areas of the front as well as from the far Polish interior.

The operational reconnaissance units of the Luftwaffe High Command and of the two air fleets as well as the tactical reconnaissance units operating under the Luftwaffe General with the Commander in Chief of the Army shared equally in producing the highly detailed coverage made possible by their intensive activities and the favorable weather. The integrated efforts of these three reconnaissance elements became increasingly important in the growingly critical situation. It is therefore all the more surprising to find that--and this applies specifically to 4 September--that a satisfactory stage of cooperation had not been achieved as yet between strategic or operational and tactical reconnaissance, that is, between the Commander in Chief of the Luftwaffe and the Luftwaffe General with the Commander in Chief of the Army. It remains inexplicable that the daily report of the Luftwaffe General with the

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84

Commander in Chief of the Army concerning the reconnaissance activities of Army air units on the previous day could only reach the Luftwaffe Operations Staff at 1340, on 4 September.<sup>79</sup> More time necessarily passed before these reports could be processed and the results transmitted to the two air fleets. It can be assumed, however, that the air fleets were informed directly and sooner because of their lateral contacts with the army groups and armies.

The results produced by air reconnaissance on 4 September are to a large extent still available.<sup>80</sup> From them the following general picture of the situation can be reconstructed: It was relatively easy to recognize that the Polish command was regrouping its entire forces, primarily by rail movements, into two separate areas of main effort. The first area was in the south, where rail transport operations were in process between Krakau-Tarnov-Sandomierz-Kamienna<sup>and Kielce</sup> moving generally from north to east. These movements could indicate either a regrouping of forces in the southern area of the front or the first beginnings of a large-scale new strategic concentration pointing northwest from these areas. However, they could also be considered as preparations for the retirement of the entire southern part of the Polish front to behind the Vistula River. In the center, on the other hand, in the



84a

Lodz-Skierniewice-Kutno-Gnesen-Kalish area, rail and road movements revealed a new build up with main effort around Lodz. Completion of this concentration could produce a serious threat to the north flank of the German Tenth Army and to the Eighth Army, adjacent on the left. Finally, a third railway movement was clearly recognizable east of the northern reaches of the Vistula River, but there was no evidence here of the development of a third area of main effort.

The picture thus pieced together was well rounded out by reports from air reconnaissance against troop movements on secondary roads and bridges. Thus, large columns were observed moving northeastward along the roads, parallel with the reported railway movements in the south. In the northern areas retrograde movements were also observed in a general southerly direction, for example, along a line from Thorn through Ichenialza and Wagrowice. These movements indicated Polish evacuation of the Corridor and of the region along the Lower Vistula River. However, it was also

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79. See p. 77, above.  
80. Appendix 27



85

possible to consider these movements as being connected with the assumed new Polish concentration around Lodz.

Finally, south of the border with Eastern Prussia large-scale Polish retrograde movements in a southerly direction through Mlava had also been observed, and operational reconnaissance had turned in completely new reports that new bridges were being constructed and bridge material being deposited at various points along the Vistula upstream from Warsaw. The overall impression gained from these widely varying reports was definitely that the fronts had become fluid in all sectors.

Examined in the light of this initial situation, the air operations on 4 September can be understood even better than otherwise. <sup>81</sup> Compared with the previous days, the units of the First Air Fleet flew an exceptionally large number of <sup>81</sup> diversified missions, which are best presented in the form of concise statistical statements, as follows:

Total number of squadrons committed	<u>70</u>
Under direct control by air fleet HQ (27th Bomber Wing)	7
Under 1st Air Division	24
Under Luftwaffe Command Eastern Prussia	39

81. Appendix 41



86

Breakdown by target categories:

Number of Missions	Type of target	Squadrons committed	Total
<u>Total</u>		<u>Total</u>	<u>70</u>
17	Rail interdiction		39
9	Troops (tactical)		20
4	Counter-air		11

Concentrations against rail interdiction targets:

Railway system in Hehensalza-Thorn-Wloclawek area  
 " " between Gnesen and Lodz  
 " " " Kutno and Warsaw and in and around  
 Warsaw  
 " " east of Warsaw, with emphasis at Malkinia-  
 Gorna.

Concentrations against troop targets:

In area around Thorn (ahead of German Fourth Army)  
 In area around Mlava (ahead of German Third Army).

Concentrations against counter-air targets:

Dalikov, Brest-Terespol airfields; Warsaw-Okecie aircraft  
 factories; Warsaw Radio station.

An evaluation and examination of these missions in detail reveals as the most striking feature that the main air effort of the day was against rail interdiction targets. This was fully consonant with the orders received and the requirements of the overall situation. A remarkable point here is, however, that no clearly defined power concentration can be discerned corresponding to the Polish main effort in rail transportation as it became evident during the day. This main effort became clearly defined in the Kutno-Lodz-Kalish-Gnesen area and obviously indicated a complete re-orientation in the overall Polish disposition of forces. Nonetheless, the highly important and worthwhile targets



187olved

involved only came under attack in the following cases:

an attack by the 27th Bomber Group against Kutno rail depo

attacks by 1 group of the 26th Bomber Wing against the Gnesen and Mogilno rail depots

attacks by 1 squadron of the 53d Bomber Wing against the Koluszki rail junction

attacks by 1 flight of the 26th Bomber Wing against the Lodz rail depot,

making a total of five-and-one-third squadrons. It must be admitted, however, that the numerous and heavy attacks flown by ten squadrons against the railroad system in the Hohensalza-Wloclawek-Thorn area, and specifically against rail interdiction targets ahead of the German Fourth Army, in direct support of local army operations at the same time affected the Polish concentration area around Lodz. The results achieved in these missions can be stated groupwise. In the western area of main effort, which comprised the two areas mentioned, direct hits cut the Thorn-Wloclawek rail routes at a number of points. The Wreschen-Kutno rail route was also cut in several places by direct hits, the Alexandrov rail depot was well covered with bombs, the Kutno rail depot was set on fire, and direct hits brought railway trains to a standstill on all rail routes. These results were achieved by the 27th Bomber Wing; the 1st Group, 1st Bomber Wing; the 1st Group, 26th Bomber Wing; and the 2d Group, 2d Dive-Bomber Wing. In the general area of Warsaw attacks by the 1st Group, 27th



87a

Bomber Wing, against the freight rail depot of Warsaw-West and by the 3d Group, 27th Bomber Wing against the marshalling yards of Warsaw-East were highly successful. The 1st Group, 1st Dive-Bomber Wing and the 2d Group, 3d Bomber Wing cut the Warsaw-Bialystok rail route, while the 2d Group, 1st Air Wing, bombed the rail intersection at Malkinia-Gorna and the 3d Group, 3d Bomber Wing, bombed the Luckov rail depot at Siedlce. Missions against tactical troop targets were flown as developments in the ground situation required in the areas of Briesen Flonsk, Sierc, and south of Mlava; all of these attacks were in the general areas in front of the German Third and Fourth Armies but farther in the Polish rear than on the previous day. On that day, air operations here had been primarily in



88

the nature of direct support artillery action for the attacking infantry, whereas on the 4 September emphasis was more on action to scatter withdrawing Polish columns and disperse Polish troop concentrations and destroy Polish rear communications. The objectives thus were consonant with the fact that the fronts actually had become fluid. Nevertheless, direct air action against hostile troop targets was less prominent than on the previous day.

So far as the two airfields reported as occupied are concerned, the attacks against counter-air targets were in every respect consonant with the orders received. In these attacks the 1st Group, 53d Bomber Wing, destroyed 3 twin-engine aircraft on the Dalikow airfield,<sup>82</sup> while the 2d Group, 1st Air Wing, set hangars and a number of aircraft <sup>in flames</sup> on the Brest-Terespol airfield. In the attacks by the 4th Group, 1st Dive-Bomber Wing, against Aircraft Factories ## 734 and 743 at Warsaw-Okecie, and by the 1st Group, 1st Dive-Bomber Wing, against the Warsaw radio station, in contrast, two dive-bomber groups were committed against targets against which action was not urgently required in the light of the overall situation.

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82. Not to be found on maps.



89

In the command zone of the First Fleet the situation in the air remained practically unchanged on 4 September. Very few Polish fighters were encountered, and their aggressiveness and combat morale had declined even further. Polish bombers were found only on the ground. German air superiority remained uncontested over Poland. In detail, the following reports were received by evening on 3 September: The 3d Group, 2d Dive-Bomber Wing, while attacking railway trains at midday on the Thorn-Wloclawek route was engaged in combat by 10 Polish fighters, of which 3 were downed, and 2 forced to land; no German planes were lost. The 1st Group, 53d Bomber Wing, detected a total of 11 twin-engine Polish aircraft on the Dalikow airfield, of which it destroyed three. The 1st Group, 1st Twin-Engine Fighter Wing, reported that while escorting the unit which bombed rail depots in Warsaw it shot down 5 Polish aircraft, presumably fighters. Polish anti-aircraft artillery fire increased considerably, particularly around Lodz and Thorn.

The information on missions flown by units of the Fourth Air Fleet on 4 September is not nearly as complete and detailed as in the case of the First Air Fleet. Nevertheless, a fairly accurate picture can be traced in broad outline of the air fleet's plans, the missions executed, and the results



89a

achieved. Compared with the 1 September, the order of battle on 4 September shows that the Fourth Air Fleet had received considerable reinforcements.<sup>83</sup> Without exception all attack units were committed in continuous attacks against Polish troop movements by rail and road. This applies particularly to the bomber units of the 2d Air Division. However, the action of these units was supported by dive-bomber forces of the Special Purposes Air Command in strikes against specifically rail interdiction targets. On the whole, it is seen thus that in the command zone of the Fourth Air Fleet all efforts were concentrated against hostile transportation movements, even to the exclusion of direct support missions for the ground forces employed in areas of main effort.

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83. See separate table and 2 charts in Appendix 42.



90

The chief outcome of the attacks flown by units of the 2d Air Division, of which the 4th, 76th, 77th, and 55th Bomber Wings were dispatched repeatedly, was that the Polish troop en- and detraining operations at numerous points were broken up. Furthermore, the attacks on the whole produced confusion in the Polish regrouping movements, traffic jams and congestion at important traffic centers and routes, and disruption of the entire Polish transportation plan. An evaluation of the attacks flown against Polish rail targets reveals concentrated effects on various rail routes and rail systems. The effects were most marked on the Krakau-Tarnov-Rzeszov route, the rail system around Lublin, the Krakau-Jedrzevo-Kielce-Kamienna-Radom-Warsaw route, and the rail system in the Lodz area. The concentration of target groups in the area east of Lodz reveals that in this actual main area of the new Polish concentration of forces the attacks by the two air fleets supported each other effectively and in parts even overlapped. This concentration of air power was supplemented further by the attacks which dive-bomber units of the Special Purposes Air Command flew against railroad installations of the Koluczki rail junction and the Pabianice rail depot, both in the Lodz area. No Polish airfields were

84. These missions are presented in tabulated form in appendix 43.



91

attacked in the command zone of the Fourth Air Fleet on this day of combat, but the 1st Group, 2d Twin-Engine Fighter Wing, reported the destruction of 15 Polish fighters. In addition, fighters of the Special Purposes Air Command reported 4 Polish planes shot down and 9 destroyed on the ground.

In summarizing it can be said that in the southern areas of the theater also fronts had become fluid on the fourth day of the campaign, particularly in the operational zone of the Fourth Air Fleet and Army Group South. The Polish armies were in full retreat on all rail and road routes, but it was impossible to discern whether this was only a general retirement of the front or a movement to regroup all Polish forces. Apart from elements of the Special Purposes Air Command employed in direct support missions, the Fourth Air Fleet committed its entire force in preplanned and concentrated attacks against rail and road routes in the Polish rear. In contrast with the First Air Fleet, there is no evidence of any dissipation of forces through their commitment against non-priority targets. It is only natural that the effects of all these planned attacks only became fully evident a few days later, but even at this early stage it seemed that advantageous cooperation between the



91a

two air fleets in the boundary areas was secured.

Before closing this account of the fourth day of combat, mention must be made of a new important factor which, although primarily of a political nature nevertheless also produced military effects: At 0910 the Luftwaffe General with the Commander in Chief of the Army reported that the radio intercept service at 0200 had intercepted radio traffic between British aircraft and Polish airfield Lida.

According to a report by the 10th Tactical Air Support Command (Koluft 10) <sup>\*</sup> at 0430 the British aircraft in question were to land at Lida. Shortly after, this military report was supplemented and apparently confirmed by reports from political sources: Information arrived from the German Embassy at Bucharest that the British were preparing to purchase exceptionally large quantities of Rumanian mineral oils for the dual purpose of sealing off Germany's only source of supply and of securing supplies for a British air fleet in Poland. In the course of the day, however,

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\* Luftwaffe staffs attached to armies and army groups to control the air and antiaircraft artillery units allocated to their army or army group.



92

it became clear that the reports concerning a probable landing of British aircraft in Poland were unfounded. It would have been impossible for them to land at Lida anyhow, because German air attacks had destroyed the runways and most of the installations there. The reports nevertheless produced one result: the Luftwaffe High Command found itself compelled to give consideration to the problem of cutting the rail routes between Poland and Rumania as a precautionary measure.

In its daily reports, the Luftwaffe Operation Staff made special mention of the effective results of German air attacks against the entire Polish railroad system and against Polish troop movements and detraining operations. The Commander in Chief of the Luftwaffe in his daily situation report for 4 September, Situation Report-East # 16, again was able to state that German air superiority had again remained unchallenged in the entire Polish theater throughout the day and that, compared with the intensity of the German air operations and the results achieved, German losses were very small. The report enumerated the numerous successful attacks against the entire Polish railroad system, but at the same time emphasized that, although rail traffic in Central Poland was



completely paralyzed, complete interdiction of traffic of any duration had not been achieved on any one of the main routes. According to this report Polish losses totaled approximately 35 aircraft.

85

The Wehrmacht High Command Bulletin for 4 September recapitulated in detail the successes achieved by the Luftwaffe in attacks against railroad targets. In addition to the individual air battles over Poland previously mentioned, however, it also refers to air attacks against Gdynia and Helo, in which Polish Destroyer Wicher was sunk and Polish Mineslayer Gryf was badly damaged.

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85. The complete text of the report will be found in the Karlsruhe Document Collection.



94

## CHAPTER 6

5 September

## Air Reconnaissance and Army Support Operations

As on the previous days, preparations for air operations on the fifth day of combat was in the form of general directives from the Commander in Chief of the Luftwaffe. Reconnaissance reports of the previous evening left two points unclear: (1) It was still impossible to interpret clearly the purpose of the Polish transportation movements in the south, and (2) The meaning of the apparent Polish concentration movements in the general area of Lodz--to which the Wehrmacht High Command had previously directed attention--was still unclear. In spite of these two uncertain factors, the Commander in Chief of the Luftwaffe already at 1350 on 4 September issued a

86

warning order, the full text of which will be quoted later.

87

The order was preceded by a statement already no longer consonant with existing circumstances, namely, that

.....On the afternoon of 4 September the prevailing view at the Luftwaffe Operations Staff was that the Polish command probably would not accept battle on the near side of the Vistula River.

The first orders for operations on 5 September were based



94a

on the above incorrect interpretation of the situation, commencing with the warning order referred to above, which read as follows:

Combat and reconnaissance operations in accordance with Directive # 3 for 4 September. Main emphasis in Army support operations will be in the zones of the Tenth and Fourth Armies. Attacks against industrial targets are prohibited. Up to one-third of all air forces will be placed on rest status for 5 September. Efforts will be made to insure 100 percent operability for 6 September. Preparations will

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86. Ob. d. L. Fuehr. Stab Ia, # 4390/39 geh.

87. Study by the 8th (Military Science) Branch of the Luftwaffe General Staff, p. 104; Karlsruhe Document Collection.



95

be made to transfer units to airfields in occupied Poland. Fourth Air Fleet will hold forces ready for action to destroy railroads in area southeast of Tarnopol-Stanislaw. Details to follow.

This warning order was followed at 1650 on 4 September by Directive # 4 for both air fleets:

1. The main effort in air operations on 5 September will be in support of the Army. For this purpose efforts will be concentrated primarily against Polish rear communications, concentrations, and other movements in the line of advance of the German Tenth Army. Counter-air operations will be restricted to attacks against airfields on which sizable Polish air forces are reported. Attacks against industrial targets are prohibited. Fourth Air Fleet will direct strong attacks to intercept the railroads from Rumania in the area southeast of Tarnopol-Stanislaw. The purpose of these interdiction operations is to prevent transportation from Rumania to Poland. Infringements of the Rumanian border will be avoided.

2. Rail reconnaissance activities.....will continue. In addition, the Vistula River will be kept under observation, particularly in the Sandomierz-



95a

Warsaw section to detect bridge construction operations or preparations for such purposes.

3. On 5 September both air fleets will withhold up to one-third of their aircraft and crews in their various units in order to insure restoration of full operability from 6 September on. Preparations will be made to transfer units to airfields in occupied Polish territories.

Consonant with this directive, main emphasis in air operations on 5 September, similarly to the previous day, was on support for the Army, primarily in the areas ahead of the German Tenth Army. One new mission was that of railroad interdiction in the southern area, namely, in the

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88. Ob. d. L., Fuehr. Stab Ia, # 4329/39 geh.



extreme southeast of the Polish Theater and thus completely out of touch with the missions of direct and indirect support for the Army; another was that of keeping the Vistula River under observation to detect any possible Polish preparations for a river crossing operation and was thus a precautionary measure of the Luftwaffe High Command.

The last mission assignments above reveal that the Commander in Chief of the Luftwaffe at this stage again was beginning to think and plan on the strategic plane. However, he made the mistake of not giving appropriate attention, so far as air tactics were concerned, to the tactical developments ahead of the actual fighting front, as evident from available air reconnaissance reports. The directives show clearly that the threat developing in the Lodz area for continued Army operations was not properly assessed. On the other hand it seems appropriate that air attacks were prohibited against industrial targets at this juncture, and that counter-air operations were restricted to attacks against heavily occupied Polish air fields. Another notable point is the uniform order to all units that, after four days of almost uninterrupted combat activities, certain measures of rehabilitation were to be taken. Although losses in personnel



97

and materiel had been relatively small, capacities had to a certain extent been overstrained, so that it appeared advisable to spare the forces as far as possible in order to have them in good condition for later missions. The overall situation was such that the risk involved in a temporary reduction of all strengths by one-third could be accepted. The decision might have been due in part also to the uncertainty concerning future developments in the west.

From the Evening Report (East) by the Wehrmacht High Command to the Commander in Chief of the Luftwaffe the situation of the Polish forces on the night of 4-5 September was interpreted as follows: The movements from the Krakau area to Kielce to regroup the Polish forces had been brought to a halt by German attacks against troop and rail interdiction targets. The troop transport trains were halted at closely spaced intervals along the routes from Krakau to Kielce, but it was still uncertain which forces the Polish command intended regrouping, and the Wehrmacht High Command doubted that the Polish command could regroup in time. The Wehrmacht High Command further assumed that at least five infantry divisions and one cavalry brigade, the designation numbers of which were known, were involved



97a

in the regrouping movement. Intelligence information also revealed that numerous Polish troop columns had been withdrawing southeast- and southwards from the general line of Bromberg-Mlava since midday on 4 September. Allegedly, elements of the Polish 16th Infantry Division had escaped southward from Graudenz.

Concerning the German situation on the ground it can be said that the German attack on 4 September had gained considerable ground. Strong Polish retrograde movements were noticeable all along the line. <sup>89</sup> Weather continued fair over Poland and Eastern Germany, with only slight cloud formations in the fringe areas of the Carpathians.

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89. The disposition of German Army forces in the night of 4-5 September is shown in Appendix 44.



98

In line with the directives received from the Commander in Chief of the Luftwaffe, the two air fleets issued their orders to their units, as had been done on the previous day.

The First Air Fleet at 2010 on 4 September passed on the contents of the directives to Luftwaffe Command Eastern Prussia and to the independently operating 27th Bomber

90

Wing in the form of orders. From Paragraph 7 of these orders it is safe to assume that the First Air Fleet on its own initiative had, on 4 September, already placed one-third of its effective strength in rest status, so that the initiation of this general order was due probably not so much to an original idea of the Commander in Chief of the Luftwaffe as to the ideas of the Commanding General, First Air Fleet.

The Fourth Air Fleet issued a special operational order to its units, which corresponded in general to the directives received from the Commander in Chief of the

91

Luftwaffe. One significant point in this special operational order was that only two bomber groups were specified for action against the rail routes to Rumania, which can be taken as a certain measure of reluctance to execute the assigned mission. From the last paragraph (Air Defense)



98a

it can be seen that the bulk of the antiaircraft artillery forces allocated for defense were transferred from the southeastern area to the west, since they were no longer required in the German rear after elimination of the Polish air threat.

As on the previous day, air reconnaissance was of decisive importance for the execution of the assigned air missions on 5 September. Owing to the exceptionally

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90. Full text in Appendix 45.

91. See Appendix 46.



favorable weather good results were obtained which provided the basis for the coming action of the operational Luftwaffe. In actual practice the principle long recognized in theory as the only sound one was now applied in a steadily increasing measure. This principle was that air units should be committed only against targets of all types previously established beyond doubt as worth the effort, and during the first few days of the campaign it had happened frequently that bomber forces were dispatched on what might be called roving missions to search out their own targets.

For various reasons it is difficult to evaluate the air reconnaissance results of any specific day, with any degree of accuracy, and the evaluation offered here is subject to reservations. One of the main difficulties is that the actual text of only a few of the reports turned in is available. Other reasons are that it is not possible to determine whether the reports available are merely a selection, that it is rarely possible to establish when the Luftwaffe High Command received them, and when the observations reported were actually made. Furthermore, the reports available are frequently far from precise on decisively important points. Thus, it is not always



100

possible to determine in which reported transportation was moving, and the direction of a movement was the one decisively important factor in evaluation current situations.

Nonetheless, an effort will be made to arrive at an interpretation of the situation on the fifth day of combat as that situation may have appeared to the Commander in Chief of the Luftwaffe at the time. For this purpose the air reconnaissance results in the command zone of the Fourth Air Fleet will first be examined. <sup>92</sup> As on the previous day reconnaissance reports indicated primarily two main areas of Polish rail and road transport movements: In the southern part of the theater the Krakau-Rzeszov-Sandomierz-Radom-Konskie-Kielce-Krakau area; in the northern part the area generally around and north of Lodz, astride the boundary line between the two German air fleets. The picture in the southern area was generally as follows: almost all reconnaissance reports indicated that the attacks by bomber forces of the 2d Air Division had produced important results; large rail sections were filled with halted trains, and on all routes the number of trains observed in movement was considerably smaller than on the previous day; on all routes long lines of trains were seen standing still--some without locomotives--and the overall



100 a

results of the interdiction attacks were clearly evident; in addition, lively troop and vehicular movements were clearly obvious in the areas close and farther around the destroyed rail depots, sections of open way, and the trains halted en route; these movements indicated that the transport movements had been detoured from the blocked rail routes to road routes.

In the general area of Wolbrom<sup>93</sup> and Kielce reconnaissance reports seemed to indicate heavy concentrations of transportation resulting from the destruction of railroads and railroad facilities. However, the decisively important point deduced from an overall evaluation of reconnaissance reports from the entire southern part was as follows: The

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92. Summary of reconnaissance results in Appendix 27.

93. Wolbrom, not shown in the outline maps, is situated on the rail route approximately 12 miles west of Mischov.



101

orientation of all movements, still unclear on the previous day, was established unmistakably as a continuation of the Polish north to east movement. All Polish rail and road movements, particularly those in the direction of Radom, now clearly indicated a planned Polish withdrawal from the southern segment to and beyond the Vistula River up- and downstream from Deblin, which was already taking place. This also explained the construction and preparations for construction of bridges across the Vistula reported by reconnaissance units on the previous day. Another important point was that strategic reconnaissance over the rail routes towards the Rumanian border produced completely negative results: no traffic at all was observed on the rail and road routes in the entire area involved.

In the northern part of the theater air reconnaissance over the main area around Lodz on either side of the boundary between the two air fleets produced very much the same picture as that in the southern part. The same state of rail traffic congestion was observed as had been reported on the previous day, with more trains standing still than moving--a result of past air attacks. In the north, however, the general direction of Polish troop movements was not as pronounced as in the south. However, uncertainty



102

on this point was removed completely in the evening by a report from the First Air Fleet.<sup>94</sup> This evening report revealed clearly that the Polish forces had regrouped or were regrouping in the general area of Lodz. This seemed to indicate a serious threat to the north flank of the German Tenth (main attack) Army and to the Eighth Army, responsible for protection of the main attack. It can be assumed as self-understood that this air fleet report represents the summary finding deduced from reconnaissance reports received during the day. Normally, these reports also were transmitted currently to the Luftwaffe High Command, and it can therefore be assumed with certainty that the Commander in Chief of the Luftwaffe also had a clear picture during the day of the situation in the northern part of the theater. The wording of the air fleet's summary report reveals that the air fleet during the day had based its operational orders on the individual reports thus received.

The operations of the First Air Fleet on the fifth day of combat were spread over three physically separate areas; this applies equally to the air fleet's bomber and dive-bomber forces and the twin-engine fighter forces committed in ground-attack action. These areas were as



102a

follows: (1) an area including the Wreschen-Konin-Kolo-Lowicz-Sochazew rail route and the parallel roads as well as the rail and road routes leading southward to the Lodz area from these two main routes; (2) an area comprising the region northeast of Warsaw with the Ostrolenka-Ostrow rail and road routes, the area generally in the line of advance of the German Third Army; and (3) a less important area in the Wloklawek-Plock-Sierpe region and thus at the Vistula River bridges in front of the right flank of the German Third Army. The particularly successful operations of the air reconnaissance units on this day of combat enabled the air fleet command to recognize clearly the coming importance of the Lodz operational area. For this reason it committed the bomber and dive-bomber forces of the 1st Air Division and of Luftwaffe Command Eastern Prussia in action against all detected targets from dawn to late evening. The targets thus attacked consisted of troops and motor columns moving south, which were subjected primarily to squadron-size attacks. At the same time systematic attacks continued

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<sup>94</sup>. Received at Luftwaffe High Command at 2028 hours; see Appendix 47.



103

against rail targets, particularly against rail depots and moving trains along the Konin-Kutno route towards Warsaw. Among other rail targets, First Air Fleet units attacked the rail depots at Alexandrov and Zgierz immediately north of Lodz and the Kutno, Lowicz, and Skierniewice rail depots, thus overlapping in some parts the areas under attack by the Fourth Air Fleet. Altogether 54 squadrons were committed, of which 16 operated in the general area of Lodz and farther north. The distribution of these air attacks is shown in the appropriate Chart of Daylight Attacks, which also shows how the operations of the two air fleets overlapped: the First Air Fleet did not adhere rigidly to its prescribed boundary line but suited its operations primarily to the existing tactical and operational requirements. Although the air fleet on this day of combat may not have succeeded in breaking up the new Polish concentration, it definitely did succeed in seriously interrupting them and through the action of its units exercised a decisive strategic influence on the coming ground operations in this area. Thereby it also decisively influenced the imminent German defense action to repel the flank threat to the German main army of attack.

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95. Appendix 48.



104

In the second main area, the region northeast of Warsaw the attacks by units operating from Eastern Prussia were spread about evenly between rail and troop targets. Forty squadrons were committed, of which 3 participated in the attacks west of Warsaw. During these operations Luftwaffe Command Eastern Prussia for the first time committed the 1st and 2d Groups of the 27th Air Wing, which had arrived in the command area on the previous evening. Thirtyfour squadrons were thus available to provide direct and indirect air support for the German Third Army. The bulk of these forces were committed in the Ostrolenka-Ostrow-Malkinia-Gorna-Siedlce-Minsk-Mazowiezki-Nowy-Dwor-Wyskow-Ostrolenka area, while the rest attacked the Vistula River crossing points in the Wloklawek-Sierpe-Plock area.

In considering the strengths employed in these combat operations it is noticeable that the 1st Air Division committed only 11 squadrons. This small participation is not easy to explain but may have been due in part to orders that one-third of the bomber units were to be placed on rest status. The heavy commitments by Luftwaffe Command Eastern Prussia on the fifth day of combat are all the more noticeable. Although reinforced by the 27th Bomber Wing, the commitment of 40 bomber squadrons must be con-



104a

considered remarkable. So far as the development of power concentrations is concerned, the difference between the commitments in the two main operational areas is striking: Only 16 squadrons were committed in the endangered area around Lodz against 34 in the area ahead of the German Third Army and these in marked concentration ahead of the army's left flank. Here, thus, are the first indications of the new direction the German drive was to take from Eastern Prussia, with the eastern German flank moving southward east of Warsaw. From the command viewpoint it seems hard to understand why the First Air Fleet withheld one bomber group--the 2d Group, 27th Bomber Wing--instead of assigning it to the 1st Air Division.

For a proper appreciation of the combat operations of the Fourth Air Fleet it is necessary to quote first a directive telephoned directly to the 2nd Air Division on



105

96

this day of combat. This directive was worded as follows:

Main effort for the day remains at Tenth Army, with special emphasis on interdiction of rail routes from Lodz to Warsaw and from Kielce to Dablin. These missions take precedence over operations against rail routes south of Lvov.

This was the first instance of interference by the Commander in Chief of the Luftwaffe in the control of lower level units which later was to complicate the conduct of operations. The directive contains nothing new but permits the assumption that, at least around midday on 5 September, the Commander in Chief of the Luftwaffe still counted on a uniform Polish withdrawal all along the line to behind the Vistula River.

The Fourth Air Fleet committed its forces in accordance with the original directive, # 4, and with the new directive to the 2d Air Division. Insofar as the air fleet's operations can be reconstructed they are summarized in a separate

97

table. An evaluation of these operations produces the following picture: Main emphasis obviously still was on interdiction of rail and road routes in the southern areas with

96. Unfortunately, no detail information is available concerning this directive by the Commander in Chief of the Luftwaffe.

97. Appendix 49.



106

the object of preventing a Polish withdrawal to the Vistula River in the area around and on both sides of Kamienna. Practically speaking, only three groups operated against the Lodz combat area, concentrating on the railroads at Lowice, Skierniewice, Brzeziny, and Kutno. No attacks at all were flown against the railroads in and around Lodz. Available reports show hardly any indication of action in direct support of the Tenth Army, although such action was provided for in previous plans; only elements of the Special Purposes Air Command were committed periodically in such missions. However, even the units of this command were employed mainly in rail interdiction missions. One group-size attack was flown against the eastward rail route in the Lvov area, and one group-size attack was flown against the Dublin airfield, on which planes were reported. The air transportation of supplies for the Army continued successfully, including the movement of 74 000 liters (approximately 18 000 gallons) of fuel for the 1st Panzer Division and ammunition and rations for the 10th Infantry Regiment.

On the evening of the fifth day the Commander in Chief of the Luftwaffe apparently interpreted the overall situation as follows: Operations in the Polish Corridor were drawing to a close. There were no longer any important targets in



106a

the general area of Poznia. The areas of main effort were moving diagonally apart, the one toward the extreme northeast, the other southward into the zone of the Fourth Air Fleet. The Commander in Chief of the Luftwaffe therefore considered that he could use the air units released by the rapid development of ground operations in the zone of the First Air Fleet to reinforce the Fourth Air Fleet. This reinforcement was to enable the Fourth Air Fleet to counter a possible intended Polish counterattack against the left flank of the German Eighth Army. This train of thought is revealed by a remark in the War Journal of the Commander in Chief of the Luftwaffe entered at 1740 on 5 September. This is the first indication that the Commander in Chief of the Luftwaffe recognized the danger of a flank attack as a threat to the entire operation, and that he had drawn the logical and proper conclusions. These conclusions resulted in two decisions later formulated in directives to the troops.



107

The first concerned the previously mentioned transfer of bomber forces to the Fourth Air Fleet. The second, however, had the effect of changing the operational areas to conform to three different directions: For range considerations the rail routes from west to Warsaw were included in the zone of the Fourth Air Fleet; responsibility for action against the Vistula River crossings southeast of Warsaw also was assigned to the Fourth Air Fleet; the entire area in front of the German Third Army, now also including the far Polish rear, was assigned to the First Air Fleet.<sup>98</sup>

The evening report submitted by the Luftwaffe Operations Staff to the Wehrmacht High Command at 2300 hours mentions the successful attacks against the various rail routes in the entire theater and against Polish troop columns, primarily ahead of the German Third Army but, as on the previous day, contains no mention of the First Air Fleet concerning the southward and southeastward withdrawal of the Polish forces from the Wreschen-Kutno line. Situation Report (East) # 17 by the Commander in Chief of the Luftwaffe at 2400 hours also contains no mention of these southward and southeastward movements of Polish troops. It mentions only large Polish retrograde movements to northeast and east from the areas around Kielce-Radom and Lodz-Tomazow<sup>98</sup>. In Directive 95 for 6 September. See Appendix 50.



108

The clear and important conclusion drawn by the First Air Fleet concerning the real direction of the Polish withdrawal (namely, against the left flank of Army Group South) is not taken into consideration at all in the daily report. What makes this all the more remarkable is the fact that the Commander in Chief of the Luftwaffe as early as at 1740 had decided to assign the Fourth Air Fleet considerable reinforcements to enable it to take effective action against any counterattack which the Polish Command might intend against the left flank of the German Eighth Army. Contradictions obviously exist here.

The decisively important <sup>factor,</sup> however, is the measures taken on the interpretation of the situation, and these undoubtedly were appropriate. In spite of the relatively late realization by the Commander in Chief of the Luftwaffe that the possibility existed of a flank attack by Polish forces from the Lodz area, he still seemed intent on counting basically upon a general Polish retrograde movement all along the line. However, unmistakable indications for such a movement were evident only in the southern sector. The interpretation of the overall situation in this sense resulted on 5 September in a new decision by the Commander in Chief of the Luftwaffe; the commitment



108a

of the 7th Air Division in the southern sector to support the decisive envelopment maneuver there. This intention is expressed in entries at 1130 and 1140 on the fifth day of combat in the War Journal of the Commander in Chief of the Luftwaffe as follows:

Strategic reconnaissance yesterday and this morning leaves no room for doubt that the southern Polish forces have commenced a northeastward retrograde movement toward the Vistula River. To prevent a Polish withdrawal across the Vistula, preparations have been made to commit the airborne forces of the 7th Air Division at Dablin, east of the river. The airborne operation is to be so timed that they will be relieved by Army forces at latest within fortyeight hours.



109

Actually, this decision by the Commander in Chief of the Luftwaffe involved not only technical preparations as part of the planning done by the Luftwaffe General Staff. Nor was it merely a general order for an airborne operation or for an operation east of the Vistula in general. What we have to do with here was rather a clear-cut order by the Commander in Chief of the Luftwaffe to the 7th Air Division requiring the commitment of the entire division at Pulawy on the Vistula River. This order read literally:

99

To seize the important road bridge at Pulawy; at the same time to isolate strong hostile forces.

This order was transmitted personally by Goering to the commanding general of the 7th Air Division, who was given a free hand in the execution of his mission. The commanding general intended taking the bridge in an attack by paratroopers from both sides in order to seize it intact. All air carried infantry troops were then to be landed west of the river on airfields identified through air photo reconnaissance, which were to be secured first by paratroopers landed by air jump. The commander described the entire

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99. The account given here and in the following passages follows a written statement by Generaloberst Student, at the time in command of the 7th Air Division, dated 31 May 1955. His statements are submitted in Appendix 51 in the form of a completed questionnaire. Pulawy is on the banks of the Vistula River, approximately 10 miles southeast of Dablin-Irena.



110

area as "ideal air jump and air landing piece of terrain" and expressed his opinion that he could not fail to achieve complete surprise. The operation was planned in all detail and was to be executed approximately between 8 and 11 September but was cancelled at the last moment, when the paratrooper units were already aboard their planes ready to take off.

The reasons for this cancellation are still unknown, and the following possible explanations are offered:

1. The plan was conceived on 5 September but probably could not have been executed until five days later. Meanwhile the advance toward the Vistula on the ground had made good progress so that the commitment of airborne forces appeared superfluous;

2. Hitler's desire to avert premature disclosure of the existence of a German airborne force may have produced a last moment veto;

3. Goering intended that his most modern arm should decide the entire campaign and was prevented from such action by Hitler at the last moment.

Although this operation was to be staged on 7 September it seems appropriate to deal with it here since the plan

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100. This possibility is an assumption of the present author.



111

apparently was conceived on 5 September on the basis of the situation on that day.

On the fifth day of combat the situation again was favorable for the Luftwaffe. Two counter-air missions were flown, one in the north and one in the south, with units of the First Air Fleet attacking the Polish Brest-Terespol airfield and units of the Fourth Air Fleet attacking the Deblin airfield. At Brest-Terespol the 2d Group of the 26th Air Wing set hangars, billets and shelters, and tanking installations on fire, and at Deblin the 1st Group of the 76th Bomber Wing destroyed three Polish planes on the runway and shot down one reconnaissance plane. Both attacks seem to have been quite in line with the directives received and produced evidence that the Polish command still had bombers on airfields they considered secure against German attack. What remains unexplained is why these bombers had not been committed in the past operations, during which they could have relieved the strain on the Polish troops even though only slightly.

A somewhat larger number of Polish fighters were in evidence than on the previous day. However, owing to their scattered commitment and their inferior flight properties even in comparison with German bombers, they were unable



112

to achieve results in any areas. One example is that of a German bomber squadron, the 3d Squadron of the 2d Bomber Wing, which encountered a Polish fighter squadron at Wyskow, ahead of the left flank of the German Third Army. Of the nine Polish PZL fighters two were shot down without German losses.

It was evident that the power of the Polish fighter arm was broken, and although they were encountered here and there right up to the end of the campaign, they could be considered from this juncture on to have been eliminated as a serious combat factor. They even kept at a safe distance from German bombers and reconnaissance planes and in no case attacked.

101

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101. Based on personal experience of the present author.



112

From now on the German fighter units were relieved almost completely of the necessity to fly counter-fighter and escort missions. From 5 September on they could be committed in roving missions but were hardly able to find opponents. German air supremacy throughout the theater thus remained uncontested.

In contrast, Polish antiaircraft forces on the fifth day of combat again were a serious factor. It appears that they were concentrated chiefly along the Konin-Kolo-Kutno-Lowicz rail route, which seems quite logical in view of the newly observed Polish concentration movements. In the south the rail juncture at Kamienna appears to have been protected by particularly strong antiaircraft artillery forces. On the German side the general impression was that Polish antiaircraft delivered heavy and well-placed fire. On this fifth day of combat alone, three German bombers were brought down by antiaircraft fire. In the numerous low-level attacks flown by German air units against ground targets, the heavy and accurate fire delivered by the Polish ground forces proved extremely harassing.

According to a summary by the Commander in Chief of the  
102  
Luftwaffe a total of 20 Polish aircraft were destroyed  
on 5 September.

102. Without details as to time and sources of information.



## CHAPTER 7

6 September: REGROUPMENT OF AIR FORCES FOR  
COMMITMENT IN DIRECT SUPPORT OF THE ARMY

Before dealing with air operations on the sixth day of the campaign it seems appropriate to review the status of ground operations at this stage because of the close imminence of spectacular events.

Army Group South,<sup>103</sup> which had wheeled its Eighth and Tenth Armies north, assumed that the Polish forces were withdrawing from the Skarzysko-Kamienna-Kutno line and falling back on the Vistula-Sandomierz-Warsaw line. The intention was to make an all-out effort in pursuit, in which the Eighth Army was to advance south of the Bzura River with main effort in the direction of Skierniewice.

Army Group North was assigned responsibility for reconnaissance in the entire Meseritz-Poznia-Konin-Kutno-Skierniewice-Warka-Brest-Baranowice-Lida-Grodno-the borders of Lithuania area, with special emphasis on establishing the direction of movement of the Polish forces in the Kolo-Kutno-Skierniewice-Modlin-Plonsk-Lipno area; for this purpose the Fourth Army shifted emphasis in its reconnaissance activities to the Wlocklawek-Kutno-Plock area. In addition, reconnaissance was to be carried out over the rail and roads routes

<sup>103</sup>. Study by the 8th (Military Science) Branch of the Luftwaffe General Staff, Nov. 39. Karlsruhe Doc. Collection.



114

leading from Obornik through Ghesen, Thorn, and Hosslerhausen and farther southeastward. Utmost importance was attached to reconnaissance on the right flank.

In the manner followed since the beginning of the campaign the Commander in Chief of the Luftwaffe issued his general directives to the First and Fourth Air Fleets for 6 September, reading as follows:

Main emphasis will be on support for the Army.

First Air Fleet will operate in front of left flank of Third Army, for which purpose 1st Division will move to Eastern Prussia. Fourth Air Fleet will hold forces ready for action ahead of Tenth Army in Kielce-Lodz area to repel Polish forces attacking today at Sieradz. Boundary between First and Fourth Air Fleets, effective midnight 6 September: Present line to Kutno (First Air Fleet), from there to Sochaczew to Plonie to Pruskow to Gora-Kalwaria to the Vistula River as far as Pulawy to Lublin to Cholm to Kowel (Fourth Air Fleet responsible for river and settlements). First Air Fleet will prepare for transfer of two dive-bomber groups released in Pomerania to Fourth Air Fleet on 6 September.

104



114a

The above preparatory directive was followed at 1740 on 5 September by Directive # 5 to both air fleets for 6 September as follows:

1. Emphasis in combat activities will remain on support for the Army. First Air Fleet will operate in front of First Army left flank, for which purpose elements of 1st Division will transfer to Eastern Prussia. Fourth Air Fleet will operate in front of Tenth Army in Kielce-Lodz area. Elements will be held ready for action against possible enemy on left flank of Eighth Army.

2. Boundary between First and Fourth Air Fleets effective midnight 5-6 September: Present line to Kutno (First Air Fleet) to Sochazew to Flonie to Pruszkow to Gora-Kalwaria to Vistula as far as Pulawy to Lublin to Cholm to Kowel (Fourth Air Fleet responsible for river and settlements).

3. First Air Fleet will conduct reconnaissance around Bialystok, Fourth Air Fleet in the Sandomierz-Tarno and the Przemysl areas. The important point is to ascertain whether new Polish forces are building up.



115

4. On 6 September the Fourth Air Fleet probably will be reinforced by one dive-bomber group and a wing headquarters with two He-111-H bomber groups. Preparations will be made to commit these forces primarily in the left flank area of the Eighth Army and in support of the Tenth Army. The First Air Fleet on 6 September will again release two transportation squadrons--the 5th and 6th Squadrons of the 186th Group, to the Second Air Fleet.

105

The Commander in Chief of the Luftwaffe further addressed the following special instructions by telephone to the Fourth Air Fleet:

106

"No bridges will be attacked; rail routes to Rumania will be interdicted; Lvov airfield will be attacked."

The essential points of these new directives can be analyzed as follows:

1. Main effort throughout was to continue in Army support operations;
2. Emphasis in the theater was shifted to the Fourth Air Fleet, which received considerable reinforcements from the First Air Fleet;
3. For the first time the Fourth Air Fleet received instructions to prepare for action against the



115a

threat to the main attack army. The Commander in Chief of the Luftwaffe had thus recognized this threat;

4. All forces of the First Air Fleet were concentrated in Eastern Prussia and the air fleet was restricted to operations in direct support of the Third Army, with main emphasis on the left flank;

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105. Ob. d. L. Fuehrungsstab Ia, # 4396/39, geh., Karlsruhe Document Collection.

106. Received by Fourth Air Fleet at 2245 on 5 September according to Commander in Chief of the Luftwaffe War Journal; Karlsruhe Document Collection.



116

5. The boundary between the two air fleets, which had remained unchanged since 31 August was changed for the first time in consonance with the assigned missions.

6. In view of the suspected new Polish assemblies in the northeast and southeast, strategic reconnaissance was concentrated in new zones in these areas.

The whole tenor of the directive from the Commander in Chief of the Luftwaffe for the first time expresses clearly and unmistakably that from now on the main mission for the entire operational Luftwaffe was to support the Army. In this sense two separate areas of main effort and groupments become obvious: (1) The First Air Fleet was to support the left flank of the German Third Army in its drive east of the Vistula, and thus had a clear-cut offensive mission; (2) The Fourth Air Fleet was to continue its offensive action in support of the German main army of attack. In addition it had a defensive mission, that of holding tactical reserves ready for action against the recognized threat to the Army Group South north flank which was developing. The entire complex of the mission assignments for both air fleets thus clearly reveals that emphasis in air operations had shifted almost exclusively to direct support for the Army.



117

107

The new division of sectors gives rise to the following reflections: (1) It does not appear fully justifiable to assume that the expansion of the attack zone assigned to the Fourth Air Fleet west of the Vistula was due to the inadequate operating range of the forces under the First Air Fleet for the new mission assignments. The probable area of combat between Kutno and Warsaw obviously was just as accessible to air units operating from Eastern Prussia as to those based on airfields in Upper Silesia. In fact, it was to be assumed that the scene of action would move steadily closer to Eastern Prussia as the battle moved eastward;

(2) It was to be assumed that as Army operations progressed the importance of the rail and road system southwest of Warsaw would increase, so that the expansion of the zone of operations of the Fourth Air Fleet towards Warsaw was perfectly logical if the air fleet was to succeed in its dual mission of supporting the main attack army and protecting the northern flank;

(3) However, these apparently sound ideas obviously were not carried through to their logical conclusion, since all rail and road routes assigned as targets to the Fourth Air Fleet centered on Warsaw, so that it would have been logical to assign the air fleet responsibility for Warsaw



117a

and the entire Vistula River bend region around Warsaw as well. This was all the more the case in view of the fact that the entire Army operation was directed clearly at Warsaw. Under any circumstances it remains inexplicable why Warsaw, the major part of which is west of the Vistula, was not included in the Fourth Air Fleet zone in the current overall situation;

(4) Another flaw in planning is evident in respect to the Lodz region. Assuming that the intention was to give appropriate tactical attention to the general area of Lodz, the unequivocal reconnaissance results of the previous day clearly also required that the road and rail routes in the region between Konin and Kutno and leading into the Lodz area should have been included in the zone of the Fourth Air Fleet to insure a uniform conduct of reconnaissance and combat operations against the threat from the north. At any

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107. See Appendix 38, where Map 2 shows the old and the new boundary lines between the First and Fourth Air Fleets.



118

rate it would have been necessary at this juncture to consolidate under one air fleet responsibility for operations in the entire Lodz area;

(5) East of the Vistula the new boundary line southeast of Warsaw also does not appear quite logical. If the Commander in Chief of the Luftwaffe believed that the Polish armies within the zone of the Fourth Air Fleet were in full retreat to and across the Vistula, it was definitely wrong to establish the boundary line between the two air fleets along the river itself. A river crossing movement on the large scale expected here must be kept under constant observation and attack even on the opposite shores and far inside hostile territory. All operational and tactical activities of the hostile and of the friendly forces on the near and far banks of the river are but part of one inseparable whole. There was no need to break continuity of action by assigning responsibility for the western bank to the Fourth Air Fleet and for the eastern bank to the First Air Fleet;

(6) The major new feature arising from the new alignment of the boundary and the new allocation of forces was the fact that from now on the First Air Fleet had only one army, the Third, to support, while the Fourth Air Fleet was required to provide air defense and air support for all



119

the other armies, and thus for the large bulk of all theater ground forces in their main operations. This resulted logically in a progressive weakening of the First Air Fleet and a corresponding reinforcement of the Fourth Air Fleet. From this juncture on main emphasis in all future decisively important air operations was exclusively with the Fourth Air Fleet. This realization was further stressed on the very next day, 7 September, by the assignment of First Air Division Headquarters with its remaining forces to the Fourth Air Fleet. Another logical consequence was the displacement of First Air Fleet Headquarters to Eastern Prussia. The new headquarters locality appeared most suitable for the reorganization and command of the forces remaining to the air fleet;

(7) Concurrently with the last-mentioned realignment of power within the attack forces of the Luftwaffe in the east, the transfer of air defense forces to the western theater commenced. Strong antiaircraft artillery forces were transferred from the First Air Fleet to the Second Air Fleet--in the western theater, after British air attacks in the North Sea areas had created the necessity to reinforce the air defense forces stationed there, and, also as a part of this shift to the west, Directive # 5 ordered the release



120

of two air transport squadrons, also for transfer to the Second Air Fleet. However, the latter order was due apparently to an error at Luftwaffe High Command, since the two air transport squadrons were at no time under the command of the First Air Fleet. They probably were under Air Command East, and thus allocated to the Navy, and had been employed hitherto in the Danzig-Gdynia area.

As had been the case on the preceding days, the First and Fourth Air Fleets issued their orders to subordinate headquarters primarily in consonance with the directives received from the Commander in Chief of the Luftwaffe. Following up warning orders transmitted at 2105 on 5 September, the Commanding General, First Air Fleet, issued the following Air Fleet Order for 6 September:<sup>108</sup>

1. As on 5 September main emphasis will be on support for the Army, primarily ahead of the left flank of the Third Army. For this purpose Luftwaffe Command Eastern Prussia will maintain close contact with Third Army Headquarters. The 1st Air Division must still be ready to commit elements to relieve the strain on Army Group South.

2. Counter-air action will be restricted to quick attacks against sizable hostile air forces reported



120a

on the ground by reconnaissance planes. These attacks will be carried out by units held ready for the purpose.

3. The boundary between the First and Fourth Air Fleets, effective 0000 hours, as follows: .....<sup>109</sup> Reconnaissance and combat operations against the Polish ground organization around Dablin thus will be of increased importance.

4. The boundary line for reconnaissance and combat operations between Luftwaffe Command Eastern Prussia and the 1st Air Division in Polish territory will be as follows.....<sup>110</sup>

5. The 2d Group, 27th Bomber Wing (at Neuhardenberg) will be transferred and moved from the First Air Fleet to Luftwaffe Command Eastern Prussia. The movement will take place to Seerappen in accordance with peacetime regulations on 6 September at daybreak or as weather conditions permit.

6. The 1st Air Division will designate one dive-bomber group for transfer to the Fourth Air Fleet on call, until which time the group will remain available

108. No source given.  
109. P. 116, above, Directive # 5.  
110. Appendix 38: Map.



121

for operations in present sector. The following units are intended for action in the zone of the Fourth Air Fleet on call: 26th Bomber Wing Headquarters with its headquarters squadron and its 2d Group, plus the 1st Group of the 53d Wing. Until required the 26th Wing will remain with the 1st Air Division.

7. The 121st Reconnaissance Group has received instructions to maintain constant railroad reconnaissance over the Warsaw-Bialystok-Grodno route and over the area taken over from Fourth Air Fleet. It is of importance in this area to ascertain whether new Polish forces are grouping and whether fortifications exist on the eastern bank of the Vistula. Air photos will be obtained of Deblin;

8. On 6 September one-third of all units will be withheld from action for repair and maintenance;

9. Fighter escorts will be provided for army reconnaissance aircraft wherever Polish fighters appear.

The above order by the First Air Fleet necessarily is consonant with Directive No.5 from the Commander in Chief of the Luftwaffe. In Paragraph 2, however, it exceeds the requirements of that directive by again providing for units to be held available for counter-air action. It is safe to assume



122

that reconnaissance information not presently known was the reason for this measure.

The instructions received by the air fleet to transfer certain units to other commands and to hold others ready for transfer on call produced the following results: (1) Through the transfer of its 2d Squadron to Eastern Prussia, the 27th Bomber Wing was again complete, under Luftwaffe Command Eastern Prussia, which simplified command channels; (2) Luftwaffe Command Eastern Prussia thus on 6 September had a strength of at least 9 bomber and 1 dive-bomber groups; (3) The 1st Air Division, in contrast, retained only two bomber groups-- the 1st Group each of the 1st and 152d Bomber Wings--, and two dive-bomber groups; (4) This meant that the First Air Fleet now still controlled three high level command staffs but had aggressive forces only equal approximately to those of the 2d Air Division under the Fourth Air Fleet; (5) In fighting strength the First Air Fleet thus was only equal to an air division.

Pursuant to the directives received from the Commander in Chief of the Luftwaffe, the Commanding General, Fourth Air Fleet issued the following Air Fleet Order for 6 September:

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ber:

1. Air Situation.....;



122a

2. Air Fleet boundaries....(as in Directive # 5 from the Commander in Chief of the Luftwaffe);
3. On 6 September all air fleet forces will attack in direct and indirect support of ground operations;
4. The 2d Air Division, while retaining its mission of supporting the Fourteenth Army, will place main emphasis on supporting the Eighth Army in its mission of protecting the flank of the Tenth Army by attacking the Polish forces expected from the Konin-Kolo and Lodz areas. In addition, units will attack the Vistula River bridges from Bulawy downstream. As a concurrent mission, units will attack the air ammunition installation in the forest at Lodz with incendiary bombs;
5. Special Purposes Air Command will continue to attack ahead of the Tenth Army, with main emphasis in XVI Corps sector;
6. Assigned reconnaissance zones will be expanded in accordance with the expanded air fleet zone of operations. Main emphasis will be on detecting the approach of Polish forces from the Warsaw area and to

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111. Complete documentation unfortunately not available.



123

the Vistula River bridges.

These air fleet orders bring two decisively important facts into prominence: (1) The air fleet was to commit all forces in support of army operations instead of scattering its units as on the previous day; and (2) For the first time emphasis in air support was shifted clearly to the Eighth Army, the purpose being to repel the Polish threat from the north which endangered the entire German advance.

In their entirety the directives and operational orders for 6 September introduced a completely new phase in the conduct of operations in Poland. The prominent features were a clearly defined concentration of effort in the southern part of the theater and a transition to defense against a threat endangering the entire plan of operations. The measures thus taken produced the conditions which led to victory in the battle at Kutno. The orders issued on 6 September not only influenced events on that day but shaped the entire course of the rest of the campaign in Poland in 1939. This subject will be dealt with more exhaustively in Part 3 of the present study.



## CHAPTER 8

## CRITIQUE OF FIRST PHASE OF THE CAMPAIGN

1 through 5 September

A critique of the first phase of the Polish campaign is a risky undertaking. The entire campaign was of short duration and in reality should be considered as one composite whole in which the newly created German Air Force, the Luftwaffe, was called upon to prove its capabilities in actual warfare. It is possible nevertheless to select from the first phase and from the experience gained a number of features which are of eminent importance for a later overall evaluation of the entire campaign. The object of this partial critique is to compile experiences and realizations which became evident in a retrospective view of the activities of the operational Luftwaffe in the first phase.

The following order of subject matter presents itself to the mind:

1. The transition from operational to tactical action;
2. The Luftwaffe High Command;
3. Day by day commitment of the operational Luftwaffe;
4. Night missions of the operational Luftwaffe;



125

5. Operations of the Tactical Support forces of the Special Purposes Air Command;

6. Overall situation on 5-6 September.

1. The Transition from Operational to Tactical Action.

The past six chapters of this part, Part 2, of the present study have the following titles: The Surprise attack against the Polish Forces on 1 September; 2 September--Operations in Support of the Army Commence; 3 September--Main Emphasis on Support for the Army; 4 September--Operations Aiming Primarily at Destruction of the Polish Railroad System; 5 September--Air Reconnaissance and Army Support Operations; and 6 September--Regroupment of Air Forces for Commitment in Direct Support of the Army. These titles in themselves reveal the surprising fact that within an incredibly short period the German use of air power changed from operational to tactical action, the independent conduct of operations to a conduct of operations in support of the Army and directly dependent on Army operations. This development is revealed in greater detail by the contents of those six chapters.

The planning and execution of strategic air operations in the Polish campaign was subject to the concepts of air strategy then in existence, which differed widely and fundamentally from presently accepted concepts, and was governed

112



125a

primarily by three factors: (1) The small size of the theater of operations, which could not even be compared with continental standards; (2) The current principle of blitz warfare, which gave priority to Army operations; and (3) the complete superiority of the Luftwaffe in every respect and from the very outset over its Polish opponent.

It is beyond doubt that, in planning and execution, the initial counter-air missions flown by the Luftwaffe reveal the characteristics of strategic air warfare as understood in those days. What was considered the primary and most urgent mission of air power in those days was executed thoroughly within an astonishingly short time. However, strategic planning in the proper sense, had remained restricted

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112. Handbuch der Luftstreitkrafte, Grundlegende Auffassungen der Luftstreitkrafte ueber strategische Luftoperationen, 1 May 54, Department of the Air Force; Karlsruhe Document Collection.



126

to the accomplishment of this one specific mission. No further signs of strategic planning are evident. Such plans, which would have aimed at a long-range conduct of air warfare independent of the Army and the Navy would not have been possible in the circumstances ruling in Poland.

Quite logically the commitment of the operational Luftwaffe in missions designed to render direct and indirect support to the Army--and primarily in accordance with tactical principles--commenced already on the second day of the campaign. This type of air warfare continued unchanged not only throughout the already described first phase but right up to the end of the Polish campaign. Even the massed air attacks against Warsaw, which will be related later, cannot be considered an exception. There were simply no objectives in existence which could have been considered as falling within the category of strategic air warfare in the then existing sense. Even the large scale attacks against Polish communications were all carried out in closest cooperation with various army headquarters. On the other hand, action against armament centers and other "sources of hostile power" were superfluous because, in the era of blitz warfare on the ground and all it implied, the value of these sources for the enemy was automatically illusory, and because any destruc



destruction of these sources might have hampered German exploitation of the conquered territories.

The surprisingly quick establishment of absolute German air supremacy and the decisive participation of the entire Luftwaffe in ground operations made it possible to achieve the supreme objective of the Polish campaign: the complete elimination of the Polish Army and State, within an extremely short time. Thus, the original concept of strategic air warfare, namely, "air warfare, against strategic targets, designed to serve the purposes of the overall conduct of war,"<sup>113</sup> became completely inapplicable already on the second day of the campaign. It was replaced by the purely tactical mission of air power, that of reinforcing the Army artillery, of extending its range into the far enemy rear, and even of acting as "vertical" artillery fire power. This completely shifted the emphasis in air operations from the strategic to the tactical sphere.

These developments were in no wise consonant with existing German concepts of air warfare and were brought about compulsorily by the small size of the theater of operations. In the restricted areas involved there was no possibility from the outset for the assignment of missions compatible with genuine strategic air warfare in the then existing sense. At



127a

the same time, however, the question presents itself to the mind here whether the Luftwaffe in its then current stage of technical development and with the forces actually available in the Eastern Theater would have been able at all to conduct strategic warfare in a large area of really continental dimensions. This still remains an open question. The unquestionably spectacular success of the Luftwaffe in Poland unmistakably was achieved in the restricted space of an isolated theater of operations against an in every respect inferior opponent.

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113. Quoted from the study: Die Strategischen Auffassungen der deutschen Luftwaffe ueber den Luftkrieg; Karlsruhe Document Collection.



128

2. The Luftwaffe High Command. At the opening of the Polish campaign the Luftwaffe High Command had to cope with the problem of using only two-thirds of its total air power to eliminate Polish air power, provide direct and indirect support for the Army, and, in addition, wage warfare against the hostile "sources of power." It seemed uncertain initially whether this partial commitment of German air power would suffice for the accomplishment of all these missions. To achieve the most effective results it was essential to have a highly flexible command capable of adjusting to the changing situations and developing the appropriate concentrations of power. In its operational planning the Luftwaffe High Command had prepared a clear-cut program of main concentrations and in advance had established target priorities.

The first concentration of effort was on action to eliminate the hostile air forces and their ground organization as the essential condition for the accomplishment of all other missions. The time requirements for this first mission naturally could not be calculated in advance. During preparations for the campaign, however, this whole concept had been watered down. Numerous demands by the Army and the Navy had resulted in the diversion of attack air forces from the main target for commitment in other special missions. The First



129

Air Fleet was most seriously affected by this diversion of forces. For the first all-out attack against the Polish air forces on the first day of warfare only approximately one-half of the existing strength in attack air units was thus available instead of the intended bulk of all attack air for-

114

ces of the Luftwaffe. The number of units available for commitment would have been even considerably smaller if the Commander in Chief of the Luftwaffe had carried out his plan for a mass attack against Warsaw (Operation Wasserkante) on the afternoon of the first day.

It can be established here that in the actual conduct of operations the Commander in Chief of the Luftwaffe departed from the principle of power concentration so rightly included in his theoretical planning, and that this departure led to a considerable scattering of effort in the final plans

115

and their execution. For the resounding success nevertheless achieved the Luftwaffe High Command is indebted primarily to the circumstance that the application of the power concentration was even less noticeable on the Polish side. However, the Commander in Chief of the Luftwaffe did not consider the success achieved on the first day as completely satisfactory and therefore ordered the same main mission for the second day. The complete success on the second day of



129a

proved the soundness of this measure, but again that success was due largely to the passive behavior of the Polish air forces.

In spite of the unmistakable vacillations of the Commander in Chief of the Luftwaffe in his interpretations of the situation and mission assignments, a clearly definable concentration of power nevertheless was developed by the end of the second day. At the same time the Luftwaffe High Command recognized correctly that with the surprisingly quick establishment of German air supremacy in the Polish theater the first main mission was accomplished and that it therefore could proceed to the execution of its second main mission, that of supporting the Army.

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114. On 1 September only 53 percent of the attack units of both air fleets was actually available for the main offensive mission.

115. Chapter 2, p. 29.



130

The "vacillation phase" in the conduct of air operations was by no means over on the third day of combat, as is evident from the order to attack industrial targets, an inexplicable order in the existing circumstances.

It was only with Directive # 2, for the third day of combat, that a clear line of action was established, which was adhered to consistently on the days which followed. Thus, from then on, the main mission for all air forces in Poland was to support the Army and, also from then on, the Commander in Chief of the Luftwaffe had no real command problems. The main emphasis in the conduct of air operations shifted from the strategic to the tactical sphere, so that command control shifted steadily to the air fleets, air division, air wings, and air groups. This downward shift of command control was concurrent with the increasingly close cooperation between the intermediate and lower levels of command of the Luftwaffe and the Army. The Commander in Chief of the Luftwaffe made one more effort to regain personal control by placing the 27th Bomber Wing under his own direct command. He soon relinquished such efforts, however, probably in the wise realization that it was impossible in the existing situation for the Luftwaffe High Command to exercise control by the

116. Chapter 4, p. 50, above.  
117. Ibid, pp. 51-2.



traditional Army method of building up and committing reserves, and that it would have been wrong to make any such attempt.

The results and difficulties caused by such precipitant changes in the chain of command are revealed by numerous experience reports.<sup>118</sup> In practice, the Commander in Chief could exercise control only through the issue of long range directives and the assignment of large scope missions designed to secure cooperation between the branches of the Wehrmacht in line with directives from the Wehrmacht High Command. In all other respects the best guarantee for cooperation between the Luftwaffe and the Army was practical collaboration between the lower and intermediate level commands of the two branches.

One direct result of this exclusion of the Commander in Chief of the Luftwaffe from operational control was his slowly but steadily increasing interference in details, an activity shared by his executive staffs. Having no opportunity to influence the course of events, he proceeded to direct the activities of the individual squadrons, which, in the final essence, were under his command. In some cases, orders were transmitted directly to the troops, bypassing the responsible intermediate commands, a practice which increased



131a

the existing weaknesses and lack of clarity in the command system.

119

On the other hand, the 100th Bomber Group, a unit under direct control by the Commander in Chief of the Luftwaffe, was not committed at all, although the Polish theater offered a unique opportunity to continue experiments with this unit under the desired actual conditions of war.

The overall course of operations in the first phase, from 1-5 September, is characterized by two facts. The first and most important was the achievement of absolute German air supremacy already on the second day of combat, a factor which determined the entire course of the campaign from then on. The second was the consistency displayed in the execution of the second main mission, that of supporting the Army,

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118. Study by 8th (Military Science) Branch of the Luftwaffe General Staff on the Polish campaign, pp. 2 ff.: "In the command sphere the first serious difficulties arose (in the zone of operations). It became evident that the available signal communications network was by no means adequate. The effects were particularly obvious because of the almost daily changes in the chain of command." Karlsruhe Document Collection.

119. Chapter 4, p. 71, and Chapter 8, pp. 144-5, above



which led to the destruction of the entire Polish Army and its communications system. By 6 September this objective was so far achieved that the entire Polish front was in the process of a tactical withdrawal. In this sense the first phase of the campaign already served to vindicate the hopes and principles expressed by the Luftwaffe General Staff on the basis of practical experiments in the Spanish Civil War.<sup>120</sup>

3. Daily Missions of the Operational Luftwaffe. Air operations began to become steadily more and more contingent upon the operations of the Army, and the Army, in turn, began to depend in a steadily increasing measure on direct support by the Luftwaffe on the field of battle. These circumstances resulted in an increasing neglect of the considerations of air strategy in the conduct of air operations at all levels of command and considered restriction to the missions of tactical air warfare. Since the large majority of all officers in the Luftwaffe came originally from the Army and had a thorough understanding of Army tactics, they were all the more willing and able quickly to adapt themselves to their new tactical missions.

After only a few days of warfare the stage actually was

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120. Rise and Fall of the German Air Force (British Air Ministry), Part II: The Luftwaffe in the Offensive (1939-1942), Chapter 3.



133

reached at which the air divisions of the operational Luftwaffe, including the units of Luftwaffe Command Eastern Prussia, to all intents and purposes had precisely the same mission as the tactical support group of the Special Purposes Air Command, a unit intended specifically for extremely close cooperation with the Army, and that mission was to provide direct support for the Army on the field of battle. Here it must be remembered that the capabilities of units of the operational Luftwaffe differed fundamentally from those of the tactical support group. The He-111 and Do-17 aircraft of the air divisions were not suitable for such tactical missions and the personnel lacked the appropriate training. In addition, the commands had not the necessary experience available to the Special Purposes Air Command and its sub-commands. Furthermore, a natural result of the existing chains of command and the distances involved was that it was not possible for the air divisions to secure as close contact as the Special Purposes Air Command with the appropriate army commands for the unexpected new mission on the field of battle. Quick improvisations were necessary to establish these close contacts.

Another disturbing circumstance was that the support missions of the bomber units of the operational Luftwaffe were



134

restricted in time and area and were interrupted time and again by the assignment of long-range air missions, such as operations against airfields, railroads, and industrial targets. Briefly stated, continuity was lacking in Luftwaffe-Army cooperation. On the other hand the constantly changing types of missions produced a degree of flexibility in the command and troops which proved highly advantageous in the long run.

In practice, two separate systems of Luftwaffe-Army cooperation soon evolved. The one system was to maintain contact through air liaison teams or officers equipped with radio stations and attached by the air divisions, bomber wings, and bomber groups to the Army units they were to support. The other was a system of direct personal contact between the Luftwaffe and Army field commanders. Both systems functioned satisfactorily according to the current situation. Here again flexibility and the proper choice of systems were of decisive importance.

The air liaison teams proved particularly satisfactory in cooperation with large panzer forces and their spearhead units. The teams were able to move with the spearhead units and thus to report currently, thereby enabling the appropriate



134a

air commander to direct the operations of his units in accordance with his own interpretation of the existing situation. On the whole personal contact between the Luftwaffe and Army commanders concerned proved the most frequent and most fruitful form of cooperation. Various possibilities existed here to establish contact, for example, between air division and army headquarters, air wing and army corps headquarters, air group with army division, and air group with the individual infantry regiment. In the course of the campaign it was found that the best chances for success existed when personal contact could be established between the lowest level Luftwaffe and Army commanders concerned.

Friction resulted repeatedly in cooperation at higher levels, for example at the army level. The main reason was that the various army level headquarters frequently did not receive timely information on developments in the front lines so that requests for air strikes usually arrived too late. The air units were thus to some extent compelled to



135

orient themselves on the tactical situation on the ground and more or less had to seek their own targets. In general, however, the principle became established that as a rule the air wing would first conduct reconnaissance with its headquarters squadron and would then direct air strikes on the basis of clearly established reconnaissance results. This method naturally could succeed only if it was possible to hold the necessary bomber units constantly available for action, in other words, only if these units were not diverted frequently for use in strategic missions.

The tactical missions dealt with here usually involved low-level attacks, in which the chances of success varied widely. The majority of the bomber units were equipped with He-111 aircraft, which were relatively stable and secure against weapons fire and were thus suitable for these missions. In contrast the Do-17 bombers with which some units were equipped had highly inflammable fuel tanks and were therefore decidedly unsuitable for the purpose. Nevertheless, the units frequently had to be employed in spite of these drawbacks.

It would be wrong not to mention here that, on closer examination, the first combat missions flown by the Luftwaffe were disappointing. This is true in spite of the resounding initial successes achieved against a practically nonexistent



136

opponent. The existence of the training deficiencies previously referred to in this study was clearly confirmed in the first combat engagements. The unit commanders responsible in peacetime for training and in wartime for combat activities state unanimously that the initial aiming results were poor. This was due in part to mistaken identification of or failure to find assigned targets and in part to weather conditions and training deficiencies which resulted in the units scattering after approaching their targets in closed formation. A result of the indisputable training deficiencies was that only a fractional percentage of the aircraft reached their assigned targets at all. Particularly serious difficulties were encountered initially in railroad interdiction missions, and quite frequently only a few hits were scored in group-size attacks.

On the other hand it must be admitted that the aircraft crews after only a few missions accustomed themselves to bombing with live ammunition under actual war conditions and that bombing results improved considerably. On the whole the overall performances and the aggressiveness of the air units and their individual crews deserve recognition; in frequently continuous missions and in unaccustomed and dangerous low-level attacks they gave a good account of themselves.



137

In appraising the overall performances of the Luftwaffe in the first five days of the campaign the whole complex of ground service organization plays an important role. For a balanced approval of the direction and execution of operations it must be remembered as an important factor that, during the first phase of the campaign, the units of the operational Luftwaffe operated from their home air bases, where the ground service organization had been developed under peacetime conditions. This applies with only a few exceptions. This means that in practice the air units were supported by a well developed and excellently functioning network of signal communications and by a supply and replacement service based on a closely meshed rail and road system. Furthermore this extensive network of communications remained unexposed to enemy action throughout the campaign.

In all their operations the bomber forces thus were able to plan, prepare, and execute their missions in the most favorable peacetime conditions conceivable. From the third day of combat on the logically expected difficulties remained restricted to those caused by weather conditions. This is the only explanation for the high daily frequency of missions flown and for the very small percentage of



137a

losses through damage while taking off or landing. Another favorable factor was the small size of the theater of operations and the fact that it was flanked on both sides by German territories--Pomerania and Eastern Prussia in the east and Silesia in the west--in which established ground service organizations existed. In most missions the units thus had only a short approach route to their targets and, if unable to return to their take-off airfields for any reasons, could find favorable landing conditions in practically any direction. Here again, therefore, the conditions under which the units operated were the most favorable conceivable. In the few cases in which units later lacked the advantages of their home bases because of their transfer to airfields in Polish territory, the unfavorable results became apparent immediately: the daily mission capacity per unit was lower, supply difficulties developed; signal communications were deficient; repair facilities were lacking; and the condition of runways was poor. This usually led to the units being transferred back to their former bases as speedily as possible for practical reasons.

This latter fact deserves special mention because it resulted naturally in the inability to gather experience



138

throughout the Polish campaign on the subject of the large-scale forward displacement of air units to unprepared airfields in enemy territory. It was also the reason why the previously established special air administration area commands could not be tested. The activities of Special Air Administration Command 3 (Air Administration Command III, Berlin), for example, remained restricted to the speedy construction and development of the signal communications network and to the reconnoitering of a few airfields never used in later operations and the developments of four existing Polish airfields in Western Prussia. Its activities soon ceased.

The quality of the ground service organization varied widely in the various areas. In Silesia and Pomerania it was adequate and well developed; in Eastern Prussia, in contrast, it was inadequate for offensive formations and only barely adequate for operations by dive-bomber and fighter units. What seems a failure by the ground service command here was in reality due to existing circumstances. The defense plans valid for Eastern Prussia for many years had resulted for a number of years in restriction of all defense preparations to the Heilsberger Triangle, and consequently the Luftwaffe ground service organization also had remained



139

restricted to this area. No airfields at all were developed in the border areas. Under the new plan of operations, the forces of both branches of the Wehrmacht already in Eastern Prussia and the additional units assigned to there were assigned a decisively important aggressive mission. Then it was found immediately that the available base area was far too small for the operational air forces required. The base area can only be described as congested when the transfer of additional strong forces to Eastern Prussia commenced on 5 September.

The only reason why it was possible at all to operate from the overcrowded airfields was that there was no longer any need to fear enemy action. The first condition for use of what might be called "the Isle of Eastern Prussia" as an aircraft carrier was absolute German air supremacy, and the Luftwaffe had the unexpected good fortune to acquire such undisputed supremacy from the second day of combat on. Even if the Poles had launched only one air attack against the base area in Eastern Prussia at the outset, this probably have created practically insoluble problems for the German command. In summarizing the above findings it must be stated that the existence of home bases for the Luftwaffe around Poland and the possibility to use them under conditions identical with



139a

those of peacetimes was one of the decisive factors contributing to the success of the operational Luftwaffe.

The idea of providing escort aircraft had developed from theoretical considerations and practical experience in the years immediately prior to the war, and had not yet been included in Luftwaffe Service Manual # 16.<sup>122</sup> Escort missions were to be carried out by single- and twin-engine fighter units.

The Me-110 twin-engine fighter had been developed specifically for escort missions, and was just being introduced in air units at the outbreak of war, so that no practical experience in this field was available at the time. During the Polish campaign there was also no possibility to gather such experience because already from the third day of the campaign on bomber units no longer required escorts. Insofar as the German command was satisfied with the results obtained in the few successful escort missions flown it was indulging in self-deception: in the small areas involved in the campaign and the short approach flight to assigned targets the operating ranges of the twin-engine

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122. See Part 1, pp. 6 ff.



140

fighters then available were barely adequate. For real strategic air warfare on a continental scope the Me-110-C planes then in service would have been inadequate.

123

No useful tactical experience was gained in the first phase of the campaign, and just as little was gained in the field of cooperation between twin-engine fighters and bomber units. At the beginning of the campaign the training of twin-engine fighter crews was still in the initial stages. Fighter squadrons at the time consisted of three flights (at the time called swarms--Schwarme) each containing four aircraft. The fighter group thus had one headquarters flight of four aircraft and three squadrons totaling 36 aircraft, making a total strength of 40 aircraft in

124

addition to twelve held in reserve. Developments in the Polish campaign from 3 September on had the result that twin-engine fighters from then on were employed primarily in roving fighter missions. Here, they were particularly successful in low altitude attacks against airfields, troops, and road and rail targets.

On the first few days of the campaign the operations of normal fighter units also were restricted largely to escort missions for bombing units. All German fighter



140 a

units were equipped with Me-109-E aircraft with a maximum penetration range of 108 miles, so that their tactical capabilities were limited. They were capable of combat action for any appreciable time only when circumstances were such that the approach route to the target area was short. Furthermore, immediately after German air supremacy had been achieved the fighter units also were employed in roving missions and in low-altitude attacks against Polish airfields, troops, and road and rail targets, in which they were highly successful. In addition the units provided escorts for the tactical reconnaissance planes of the army, and for courier planes, and executed similar other missions.

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123. For Performance data see Part 1, p. 60.

124. See Part 1, p. 56.



141

The superiority of the German over the Polish fighter arm in speed, maneuverability, and fire power became clearly evident in the battle for air supremacy from the first day of combat on. The German Me-109-E fighter was armed with two 20-mm Oerlikon cannon and two Type 17 machine guns. That the German fighters in spite of their superiority in so many aspects over their opponents shot down so few Polish fighters was due to the increasing frequency with which the latter avoided battle.

Cooperation between fighter and bomber units was secured either by means of orders from higher headquarters or by means of personal contact and oral agreement between the commanding officers concerned. Although voice radio communication between bomber and fighter units was technically possible it was rarely used because the method of oral agreement soon proved satisfactory and was far more simple and reliable.

In the matter of tactical control the rule was established that units were to be assigned directly to air divisions and only in exceptional cases to an air fleet. The organizational consolidation of bomber and fighter units under a commander of bomber units was a rare exception, as in the case of the establishment of a tactical support



142

group, and was limited to the execution of a few special missions. After execution of the mission involved the assignment of fighter units under a bomber command was immediately revoked.

Cooperation with the Army became increasingly prominent. Arrangements for fighters to escort Army tactical reconnaissance or other individual planes, and particularly to carry out low-level attacks against Polish troops were made in personal discussions between the fighter unit commander and the army commands concerned, a system which appears to have proved satisfactory in every respect.

Fighter operations thus within the very first few days of the campaign, after the specific missions of air power had been accomplished, shifted to missions in support of the Army, such as participation in ground combat and the provision of escorts for individual Army planes. These new types of missions necessarily resulted in new methods. Gradually group and squadron size missions gave way to swarm (four or five aircraft) and pair size missions. Strictly speaking, fighter operations in the real sense thus ceased very soon after the beginning of the Polish campaign.

4. Night Operations of the Operational Luftwaffe. For the bulk of the air forces night attack missions were some-



143

something completely new, a field in which no peacetime experience whatever was available. The only two night air attacks on record were carried out in the first phase of the campaign, so that they must be treated here in the detail their importance merits. Initially, the Commander in Chief of the Luftwaffe planned to order continuous night harassing attacks against certain individual targets in the night following the first day of the campaign. Two different technical methods were to be employed, but the attacks were not carried out, partly because of weather conditions and partly for other, unknown, reasons.

The first night attack thus was carried out in the night of 2-3 September, without radio navigation. The 2d (Bomber) Group, 1st Training Wing, which was based on the Powunden tactical airfield in Eastern Prussia, was directed to dispatch one squadron each to attack the Vistula River bridges at Graudenz and Kulm and the bridges across the Netze Canal in order to prevent an assumed withdrawal of Polish forces during the night from the Corridor area towards the southeast. The third squadron was to increase the effectiveness, by means of night harassing raids, of the results achieved in daylight attacks against the Warsaw-Okecie airfield. No reliable information is



143a

available as to what headquarters ordered this night attack.

Detail information is available concerning the attack by the 4th Squadron of the training wing<sup>125</sup> and from this information it is possible to gain an insight into the standards achieved in night operations at the time and into the training status of the crews participating. It must be borne in mind, however, that the the 2d Bomber Group was a specially organized unit, superior in every respect to the average bomber units then existing. The entire group was equipped with He-111-H aircraft powered by Jumo 211 engines, and the entire attack was flown by terrestrial navigation. According to the reports turned in by the crews all assigned targets were hit.

The attack by the 3d Squadron against the Warsaw-Okecie airfield took place in complete darkness, so that the airfield could not be seen. For this reason the attack was diverted to other military targets in the outskirts of Warsaw. It was impossible to observe the results, but

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125. War Diary and Log Book of the 4th Bomber Squadron, 1st Training Wing; Karlsruhe Document Collection.



144

30 Polish searchlights were counted within the Warsaw, <sup>area</sup> the penetration range of which did not exceed 13 000 feet. These three squadron size attacks were the only ones flown without radio navigation in the Polish campaign. The most remarkable feature about them is the primitive method of navigation employed. In retrospect, the objective also appears questionable. The best that could be achieved was a certain measure of disruption in traffic crossing the bridges, presuming that bombs actually landed in the immediate vicinity of the bridges and that sizable bodies of troops actually were crossing the bridges that night, and both of these points were completely unclear. The mistake was made here of not exploiting for the first time the possibilities of radio navigation in a combat mission.

In sharp contrast with the above attack by a bomber group of the training wing was that carried out by the 100th Bomber Group in the following night, the night of 3-4 September. This time radio navigation and blind precision bombing methods were employed. At an early stage Hans Flendl, an engineer, had developed at the Luftwaffe testing station at Rechlin what was called the X-method, by which planes could be guided to a target up to 240 miles distant with a margin of error of approximately 1200 yards square. The first



145

practical application of this method in war marked a decisively important turning point in the techniques and tactics of the Luftwaffe and beyond that of all existing air powers.

v The initial intention had been to employ the X-method for the first time in a night attack against government buildings in Warsaw in the first night of the campaign. This plan was cancelled for reasons still unknown. Instead, the first attack by the unit specially organized for the purpose was carried out in the night of 3-4 September against ammunition installations in the vicinity of Warsaw. The attack order issued by the Commander in Chief of the Luftwaffe at 1620 on 3 September read as follows:

100th Air Signal Battalion\*in the night of 3-4 September will conduct continuous attacks against ammunition depot at Regny; secondary target Palmiry ammunition depot.

The attack was flown at an altitude of 18 000 feet with 550-pound explosive bombs and incendiaries. The unit reported that the bombs were well placed, which statement was corroborated by air photo reconnaissance on the following day. Interpretation of the air photos revealed that the bombing data used in computing the release for the 550-pound bombs had been adequately precise. On the other hand, it was clear that the



145a

incendiary bombs had been blown sideways by winds of an unknown velocity in the target area. Nonetheless, the overall results of this first blind precision bombing of a target under actual war conditions could be considered satisfactory.

However, the German air command at the time did not appreciate fully the significance of this success. One reason for this may have been that it was considered justifiable to believe that another bomber unit had attacked the same target.

126

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126. For the principles of the X-method see Appendix B at end of the Appendix Volume.

\* Code designation of the 100th Bomber Group.

127. This is a personal opinion expressed to the present author by General Martini, Luftwaffe Chief Signal Officer.



5. Operations of the Tactical Support Units under the Special Purposes Air Command. The establishment of a special tactical support force in the form of the Special Purposes Air Command was a deliberate innovation in the history of air warfare resulting from experience gained by the German Condor Legion in the Spanish Civil War after 1936. The establishment of this force for the Polish campaign was suggested in the summer of 1939 by Generalmajor Freiherr von Richthofen, who later commanded the force and who had commanded the Condor Legion in Spain, from where he and his staff had only returned in May 1939. It is only natural that in organizing his new command staff for the planned Special Purposes Air Command he selected primarily seasoned members of the Condor Legion.

128

The organization of a special tactical support command patterned after the close support force tested in Spain was to undergo its first trial by fire in the Polish campaign. The command tactics and techniques to be used were entirely new and were to be tested in combat as a basis for the future development of the new arm of the Luftwaffe. It proved satisfactory not only in Poland but later also

128. In discussions with Colonel D.H.W. Deichmann, Munich, the present author obtained valuable information on this subject. Colonel Deichmann, a former member of the Tactical Support Group, also served an assignment as adjutant to General von Richthofen.



147

in the 1940 campaign in the west. It is only natural that the combat experience gathered in the Spanish Civil War had been on a considerably smaller scale, but it served nevertheless as the new starting point for the Polish campaign. It resulted in a flexibility in air operations hitherto unknown and in particularly close collaboration with the Army on the field of battle.

The mission of the new force in the Polish campaign was to support the center of the German Tenth (main attack) Army, particularly the XVI and XIV Corps through close cooperation of the tactical support forces of the Luftwaffe (dive-bombers, ground-attack aircraft, single- and twin-engine fighters) with tank and infantry forces, and in addition to combat the Polish air forces in the air and on the ground. The general direction of the attack was from Silesia (the area around Oppeln) towards Warsaw. The mission was achieved through the application of two basic principles: (1) the maintenance of particularly close contact between the tactically responsible Luftwaffe and Army commanders in the battle area, and (2) firm control of all air operations by the responsible air commander.

Close cooperation with the Army produced good results at a very early stage. Day and night the Chief of the



147a

Special Purposes Air Command was in close personal contact with the various army field commanders, particularly with General von Reichenau, in command of the Tenth Army. This close contact was achieved by establishing the Luftwaffe and Army local command posts as close together as possible, by constant telecommunications, by car trips, and by personal discussions on the actual field of battle. In addition, permanently assigned liaison officers were exchanged to insure current contact. The air liaison officers thus attached to army commands had functions entirely different from those of the former air tactical support commands attached to armies and army groups, the activities of which had been restricted to such functions as advising the army commands, interpreting the tactical situation on the ground, and requesting air strikes when necessary. Relieved of these responsibilities, the new air liaison officers were required to keep their own commanding officers directly and constantly informed on the current situation in ground operations.



148

As a rule very young air officers were assigned to these posts. They were given radio cars and attached primarily to the army corps and divisions in the areas of main effort or even to panzer spearhead units. Their main task was to transmit factual reports to the rear and to relay Army requests to the rear and to higher headquarters. In this way the local air commander was able to develop his own interpretation of the current situation and form his decisions, and the Chief of the Special Purposes Air Command as a result was often more accurately and speedily informed concerning the actual situation on the ground than the high-levels of army command and no longer needed to wait for army requests for air strikes, which usually had arrived too late. This, in turn, enabled him to commit his firmly controlled tactical support units speedily in the proper area. The method thus established proved highly satisfactory in all situations and at all times. It was this disregard of conventional official channels which made it possible at all to provide timely and effective local support for army units.

Collaboration with the tactical air support commands attached to armies and army groups ceased almost entirely. These commands were the official representatives of the



149

Luftwaffe at the various army headquarters and had their own specific missions. They were bypassed deliberately in matters concerning the tactical employment of air forces because their inclusion in the chain of command could only cause delays. Cooperation with the Army was improved even further through the current transmission of all information obtained by the reconnaissance and combat units of the Special Purposes Air Command to the Army, and what is most important, to the units on line directly. Here the higher and intermediate army commands frequently were bypassed and only informed later.

Closely integrated air and ground action on the field of battle thus was secured by a threefold method, and the development of the systems used was due almost exclusively to the initiative of the Luftwaffe. Cooperation in this area was favored by the personal characteristics of the two responsible officers concerned, the Chief of the Special Purposes Air Command and the Commanding General, Tenth Army, and it was not in all areas that Luftwaffe-Army cooperation functioned as smoothly.

Cooperation between the Special Purposes Air Command and higher Luftwaffe headquarters presented an entirely different aspect. The extremely close Luftwaffe-Army cooperation



150

which proved so highly satisfactory in the case of the Tenth Army automatically precluded the possibility of tactical control by higher level Luftwaffe headquarters, because their orders and directives as a rule arrived too late.

As a result all control by higher Luftwaffe commands was almost completely excluded within a very short time. Initially, the Special Purposes Air Command was assigned under

129

the 2d Air Division. However, this division had missions of an entirely different type, which kept it fully occupied.

In addition, the division headquarters was tied down to its ground organization and its signal network in Silesia, so it very soon ceased to exercise any influence. In the surprisingly rapid development of combat operations all orders

and instructions from the division arrived too late. The

first step towards complete operational independence was

made when the special force was placed directly under the

Fourth Air Fleet. This measure was requested on 3 September

by General Loehr, in command of the air fleet, orally,

130

and became effective on the next day. In practice, however,

the air fleet control existed only on paper. The air fleet

headquarters was too far distant, did not have adequate

communications available, and was unable to direct opera-

tions on the field of battle.

129. See Order of Battle, Part 1, p. 4.

130. See Part 2, p. 81.







151a

77th Bomber Wing in response to a request submitted as early as on 4 September.

In many respects the command techniques and tactics of the Special Purposes Air Command differed entirely from those of other high level Luftwaffe commands assigned similar missions. The tactics, which the commander was able to develop on the basis of his experience in Spain and because of his complete independence, were determined on the one hand by the specific mission of his tactical support force, that of supporting the Army on the field of battle. The other determining factor was the strength and composition of the tactical forces available to him in the form of dive-bombers, ground-attack aircraft, and single- and twin-engine fighters. Other important factors were the ground service organization, the available supply system, and the signal communications system.

The ground service organization available for the units of the special force in their assembly area at the outset of the campaign was assigned in accordance with Operational Plan Weiss of 1939 by the Commander in Chief of the

131

Luftwaffe. The commander was in no way satisfied with the organization which, in his expressed opinion "had been  
131. See Appendix 17: Ground Service Organization Map.



152

allocated on the basis of faulty considerations and inadequate experience in close support operations." However, the mistakes made in this respect are explained by the fact that the plans and preparations for the concentration against Poland were already completed before the Commander in Chief of the Luftwaffe decided to establish a special tactical support force. As a result, the tactical support units had to be fitted into the existing organization in Silesia in addition to the air forces already allocated to the area. The requests of the special force commander called for an allocation of airfields closely adjacent to each other for his units in order to facilitate control. He also argued soundly that his units should be based closer to the frontier from the very outset in order to be able to exploit fully the relatively small penetration range of his aircraft. Finally, he stipulated that his units should be based in an area with the same weather conditions as those in the anticipated area in which they were to operate.

It appeared impossible to remedy the existing disadvantages before an advance was achieved into hostile territory, when every effort was to be made to displace the units speedily to airfields close to the front. One condition



152a

which was indispensable for the flexible and close-range tactics involved was the establishment of a ground service organization in hostile territory and secure supply services for the tactical units. For the performance of this task the air administrative command responsible in Silesia, the Air Administrative Command VII, with headquarters at Breslau, established two Special Air Administrative Area Commands. Of these, Special Air Administrative Area Command, under Generalmajor Pflugbeil, was assigned exclusively to take care of the needs of the Special Purposes Air Command, the chief of which continued to insist that his force must have a supply and replacement system of its own, which would be able to handle the requirements of the air units even far inside hostile territory and independently of the home organization of the base area, which would be too far in the rear.

Similarly to the other <sup>frontier</sup> air administrative area commands which were all organized and committed simultaneously, Air Administrative Area Command 16 had a threefold mission. First, it was required to expand and organize the terrain in the wake of the German advance; secondly,

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132. See Part 1, p. 78.



153

it was to reconnoiter the ground and develop the ground service organization in occupied hostile territory; and thirdly, it was to supply the air units with all requirements in the newly established base areas.

In practice, the units of the Special Purposes Air Command themselves reconnoitered their air fields. The supply situation naturally became increasingly difficult as the air units moved farther and farther from their home bases. It was impossible to make prior preparations, because the forward displacement of the units to near front airfields hinged exclusively upon developments in the ground situation. For this reason supply problems were a source of grave concern even in the first few days of combat. The units of the tactical support force flew far more missions daily than the Chief of Luftwaffe Supply and Administration had allowed for in his advance computations, and within the first few days of operations the intense air activities resulted in an ammunition consumption far exceeding the calculated requirements. The first result of this circumstance was that the units were instructed to economize in bombs and to load only seventyfive percent of their possible load.

Situations arose in which dive-bombers had only enough bombs available for one single mission. Other units at times



154

had only sufficient fuel available for a few planes. The air administrative area command admittedly had a transport group of forty Ju-52 planes, but these frequently had to be employed in other areas under orders from higher headquarters. The air transportation space available to the Luftwaffe was inadequate to move forward by air all supplies required by the field units during their advance.

Other difficulties arose from the fact that surface reconnaissance and advance parties and supply columns closely following the advance on the ground frequently strayed into No-Mans Land, where they came under attack by isolated Polish ground forces. This repeatedly resulted in personnel losses and necessitated the withdrawal of elements which had advanced too far. These difficulties all were due to the unexpectedly rapid tactical developments on the ground and the urgent eagerness of the air units under the Special Purposes Air Command to move forward.

The last important condition for the intended, and later implemented, flexible conduct of operations by the Chief of the Special Purposes Air Command was a flexibly and smoothly functioning signal communications system. A foundation for this important service existed in the peacetime network of Air Administrative Area Command VIII in Silesia, which



154a

was expanded as part of the mobilization preparations. This entire network was available for exclusive use by the tactical support units because the long-range bomber forces of the operational Luftwaffe--for which the network had been intended--were to operate from their home bases for the time being. On the other hand, the tactical support units were to follow the advance on the ground as speedily as possible, so that an additional signal communications system became necessary. The establishment of this network was a responsibility of Colonel Aschenbrenner, under Air Administrative Area Command 16. Following the German Tenth Army in its advance an air signal regiment under Colonel Aschenbrenner constructed Trunk Line # 2 from Koethen to the

133  
front areas.

From the outset the Special Purposes Air Command was assigned a Special Luftwaffe Signal Company. This company was controlled by the command's signal staff officer and consisted of telephone and radio operating platoons. It was



155

responsible for the establishment and maintenance of communications between the command headquarters and its tactical units and the appropriate Army commands. The company was to commence operating in hostile territory simultaneously with the other Luftwaffe signal units intended for this purpose, but it had to displace forward sooner because the Special Purposes Air Command considered the existing network completely inadequate. The main requirement throughout was to push forward wire communications to as close as possible behind the spearhead units in order to enable the command post to move forward as early as possible.

On the third day of combat already the Special Purposes Air Command found itself compelled to take direct action in this field because none of the Luftwaffe signal commands was able to keep pace with operational developments. The action taken consisted of seizure of some of the Polish communication network. The parts taken over were realigned, improved, and in some cases reconstructed. On 6 September it was established that the signal communications system within the command zone was functioning satisfactorily, so that the communications conditions necessary for a smoothly functioning tactical control could be considered to exist.

The methods of command employed in this tactical control



156

were a personal and direct matter of the commander, in contrast with the slowly functioning control by the Commander in Chief of the Luftwaffe, or by air fleet or air division headquarters. The independence of the command, necessitated by the existing circumstances, facilitated quick decisions consonant with the current and quickly changing situation. The structural organization of this command system and the small strength of the air units controlled enabled the commander to issue operational orders directly to each individual group. This aimed at and achieved a centralized and firm control of operations. In contrast with the practice of requiring individual groups and wings to cooperate directly with specific Army commands, a practice which developed soon in the case of the three air divisions operating in Poland, the individual units of the Special Purpose Air Command had no direct contact with army headquarters or troops.

The commander frequently proceeded personally by liaison plane to the various Army commands and the spearhead units to reconnoiter the situation. He himself interpreted the radio reports concerning the tactical situation received from his air liaison officers in the various sectors, evaluated the situation and the possibilities for action,



156a

and then, without coming to an agreement with the Army, himself directed his units to the targets he had decided upon. One advantage of this method was the possibility within the shortest possible time to support the Army's advance at the point most appropriate in the existing situation. Another advantage was the possibility to obtain maximum performances each day from the air units: dive-bomber units took off on missions as many as five times daily on the average, bombers were dispatched as often as ten times daily.

So far as unit attack tactics were concerned, the following proved highly successful time and again: Acting as air-carried artillery, dive-bombers attacking immediately ahead of the German lines prepared the way for the attack on the ground. The effects of these attacks, particularly on the enemy morale, was often a decisive factor. Immediately after the dive-bomber attack, ground-attack aircraft took off in low-level attacks against the still paralyzed enemy defenses. In other cases the ground-attack aircraft supported the ground forces directly, searching out



157

their own targets within the battle area. Finally, they would make a surprise appearance at low altitudes in the enemy rear, where they would attack movements on roads.

At an early stage low-level air attack operations were restricted to ground-attack units. At the outbreak of the war dive-bombers were also used in low-level attacks, but already on 1 September the losses due to ground fire were so heavy that they received orders on the same day to refrain from such operations. One regrettable feature about the high- and low-level operations of the tactical support forces was that units now and again inadvertently attacked German troops. During sudden panzer drives and rapid infantry advances by forward elements it sometimes was practically impossible for aircraft crews to differentiate between friend and foe.

Basically, the main mission of the single- and twin-engine fighters was to protect German units attacking on the ground against air attack. However, this mission was only of practical importance as long as threat of Polish air action existed, and that threat was abolished already on the second day of combat.

The expansion of the tactical support force which commenced on 6 September is shown clearly in the following



158

table, which extends beyond the phase of the campaign dealt with in this chapter in order to reveal the development in continuity.

Type	Unit	Assigned on
1. Reconnaissance	1st Strat Sq, 124th Wing	
2. Dive-bomber	a) 77th Wing w/1st & 2d Gp, plus 3d Gp of 51st Wing & 4th Gp of 2d Tng Wing	Sep 8 Sep 24
	b) 2d Tng Wing w/1st Gp plus 1st Gp of 76th and 1st Gp of 1st Wing	6 11
3. Ground-attack	2d Gp of 2d Air Wing	3 or 4
4. Twin-engine fighter	1st Gp of 2d Wing (on 4 Sep under 2d Air Div) 1st Gp of 76th Wing	22-30
5. Fighter	1st Gp of 76th Wing 1-4 Sep under 2d Air Div	
6. Bomber	77th Wing w/2d & 3d Gp plus 1st Gp	9 20
7. Transport	4th Gp, 1st Sp Bomber Wing	23-26
8. Air Signal	Sp Air Sig Company	
9. Paratrooper	3d Gp of 1st Regt (for protection of airfields)	11-16
10. AAA	a) 1st Bn of 23d Regt b) 1st Bn of 3d Regt (both for protection of airfields)	4-16 <sup>134</sup> 14-15

It can be said in summarizing that the principles governing

134. Units for which no date or dates of assignment are given were under the Special Purposes Air Command throughout the period.



158

the command and tactics of the tactical support force were developed, tested, and found satisfactory within the first five days of the campaign. Although methods were in some cases more refined later in the campaign, no fundamental changes took place. In particular the two newly developed weapons, namely, the dive-bomber and the ground-attack aircraft, were subjected to a comprehensive test during this period and proved satisfactory in every respect.