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P R E F A C E

The multiple-front air war which confronted the German Luftwaffe in the summer of 1941, with the outbreak of the war with the Soviet Union, represented -- in terms of its intensity and geographic scope -- an unprecedented innovation in the history of air warfare. In view of its unfortunate outcome for the German Reich, it would seem to be advisable to examine the reasons for this tragedy. In the meantime a good many publications and source documents have come to light, so that an investigation of the problem is now possible. Nevertheless we must bear in mind from the very beginning of such an investigation that the time which has elapsed since the events in question and the nature of the available source materials preclude a really critical analysis of the progress of the multiple-front air war, especially in regard to the overall measures taken by the Luftwaffe command in connection with its conduct.

Accordingly the present study must limit itself to providing a further clarification -- on the basis of the sources presently available -- of the views generally held regarding the conduct of multiple-front air warfare during the period from 1941 to 1945. The study is based on a description of the problems of aerial warfare on a number of fronts, as these problems arose to confront the Luftwaffe top-level command. The account of the progress of the air war and its effects on the developments of the war as a whole will provide a picture of the way in which Luftwaffe leaders sought to ~~resolve~~ resolve the problems of this new type of air employment. The author is well aware of the fact that the resulting criticisms of the measures taken by the Luftwaffe command may well be rendered invalid or at least proved subject to modification by the appearance of additional source material.

The study is restricted to the part played by the Luftwaffe flying

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units in the multiple-front air war; the antiaircraft artillery forces and other Luftwaffe elements have been omitted intentionally.

Section 1: Germany's Geographical Position and the Multiple-Front Air War¹a. Historical Factors

As a result of its position in the geographic heart of Europe and of the fact that most of its borders were not protected by natural barriers, even the old German Reich was frequently forced to wage war on a number of simultaneous fronts in order to gain its political goals and to preserve its existence as an integral nation. It was not mere coincidence that the assaults which brought the Turks to the gates of Vienna in their struggle to conquer the southeastern part of the Reich and the wars against Louis XIV, which resulted in the surrender of Strasbourg, came approximately at the same time. And after the collapse of the Reich, Prussia had no alternative but to accept the heritage represented by Germany's unfortunate geographic position. During the Seven Years' War Frederick the Great faced enemies in the west, the east, and the south, and it was due solely to his military genius and superhuman determination that he was able to stand firm against them and thus preserve the integrity of the German nation. Later it was the political genius of Bismarck which managed to avoid a multiple-front war against the enemies of Prussia, either crushing them in campaigns which followed one another in quick succession or avoiding war altogether by dint of skillful political maneuvering. But the danger of a multiple-front war remained even after the establishment of Bismarck's Reich. For three major and five minor powers bordered on Germany, which now had a border some 700 miles long, completely unprotected by natural barriers, to defend in the east; in the west, to be sure, the Rhine River provided a natural barrier,

1 - The following sources were consulted in the preparation of Section 1:
S. Freiherr von Falkenstein, "Entwurf zur Studie 178" (Draft for Study 178); Reichs Archives (Reichsarchiv), "The World War" (Der Weltkrieg),

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Footnote I (cont)

Volume I, pages 3-24; IMT, Volume IV, pages 464/465, Volume VII, page 158, Volume XXIX, pages 41-43, Volume XXXX, pages 505/506 and 509/512.

but only after the surrender of valuable German territory to the west. It is true that the North Sea and the sand banks and marshes represented a geographical barrier in the north, but on the other hand they also provided an ideal opportunity for a mighty sea power to instigate a blockade. Thus the only really strong natural barrier was provided by the Alps in the south.

This lack of natural barriers and the impossibility of achieving a permanent settlement of the conflicting interests of Prussian Germany and her neighbors in the west and east were a source of constant worry for the German Empire -- and a constant reminder of the threat of a multiple-front war. Germany's military leaders endeavored to neutralize this threat by means of a detailed system of offense and defense which deliberately exploited the advantages inherent in the "inner line" of defense.

In 1907, when the Franco--Russian alliance of 1893/94 was further strengthened by the Anglo-Russian agreement -- which made Italy's withdrawal from the Triple Alliance seem highly likely -- the German-Austrian central European block found itself surrounded by foes. In the event of a major conflict, it was almost inevitable that this situation would result in a war which would have to be fought in the east, west, and south simultaneously. It was a fateful situation, which in August 1914 exploded into World War I.

b. Between the Two World Wars

As far as geographical factors were concerned, the outcome of World War I failed to bring about any improvement in Germany's situation. On the contrary, her position was made even worse by the unfortunate alterations made in the eastern border, by the separation of East Prussia from the rest of the country, and by the fact that the new Czechoslovakian nation projected deeply into the former territory of the Reich.

France's enmity towards Germany continued unabated, and in place of Russia, Poland, Czechoslovakia, and Yugoslavia were now closely allied with France; all three countries had announced their intentions to expand territorially -- more or less at the expense^S of Germany. Thus, at the end of World War I the ring encircling Germany was even tighter than before and -- concomitantly -- the danger of a multiple-front war even greater than before for the German Reich². In this respect Czechoslovakia's potential role as a basis for air operations was of particular importance, and not only France but also the Soviet Union lost no time in providing personnel and material assistance to the new nation. And in 1936, when Russia joined the enemy alliance, the situation became even more menacing for Germany.

Moreover, it must be borne in mind that the German National Army (Reichswehr), weak as it was, was forced to restrict its planning to the defense of the German borders, i.e. to the conduct of purely defensive operations in both east and west, and under these circumstances the outcome of a conflict against^Q the superior military might of the enemy could not remain in doubt for long. It was this situation which made it possible for Hitler, once he had seized power, to persuade the German people of the necessity of an all-out armament effort -- regardless of the tremendous sacrifices involved -- in order to prepare Germany to meet the long-standing threat. In the early stages^f of rearmament, the original concept of a military instrument to be used solely for the defense of Germany was retained. The fact that this defense would have to be carried out on several fronts at the same time was highly probable on the basis of the general situation and had to be taken into account in military planning.

2 - See Appendix 1: The Military-Geographic Situation of Germany after World War I.

c. Encirclement as a Factor Leading to Multiple-Front Warfare

The developments leading to World War I had already shown clearly that the encirclement of a nation is apt to bring about the outbreak of a war, which then inevitably develops into a multiple-front war. In the case of World War I, the so-called automatic alliance commitments played a particularly unfortunate role. The Franco-Russian military agreement of 1892, for example, as well as the resolution of the French and Russian general staff chiefs of 1910 (based on the agreement and approved by both governments) provided for immediate all-out mobilization of the French and Russian armed forces and for simultaneous attacks on Germany in the event of German military mobilization. And in 1914, when Germany began to mobilize in response to the Russian mobilization which followed the Austrian ultimatum to Serbia, these commitments automatically took effect and World War I began.

The military alliance concluded by France and the Soviet Union in 1936 was similar. The reciprocal guarantees previously agreed upon among France, Poland, Czechoslovakia, Great Britain, and Belgium could not take effect without a declaration by the League of Nations, while the Franco-Russian alliance provided that the decision for war or peace could be taken directly by the two governments concerned. An extremely dangerous agreement in view of the fanatically aggressive attitude displayed during the revolution in the Soviet Union! And it was not only the Germans who recognized this danger; the French were equally aware of it. In the French Chamber of Deputies one speaker declared that the ratification of the Franco-Russian alliance might well obligate France to take part in a war

which she might otherwise avoid and that the danger of war could well reach its peak the moment the French government awakened the suspicion in Europe that it had come under the secret protection of Moscow³. Today there is no longer any serious doubt that France's efforts to encircle Germany politically prior to 1939 were largely responsible for favoring -- and indeed for indirectly bringing about -- the developments which later resulted in World War II. The endeavors to build Czechoslovakia into a basis for air operations against Germany were undertaken from the same motivation and, as a reaction, unleashed German efforts to eliminate this "thorn in the flesh"; it was this situation which, in the last analysis, led to the Czechoslovakian crisis.

Thus it became apparent once again that Germany's position in the center of Europe and the lack of natural barriers to protect its boundaries played a not inconsiderable role in bringing about the political encirclement of the Reich and the multiple-front war which ultimately resulted. This time, however, in an era of air power, multiple-front warfare was bound to mean multiple-front air operations as well.

3 - From a speech delivered by Deputy Montigny on the Franco-Russian military pact before the French Chamber of Deputies, 13 February 1936.

Section 2: Germany's Political Leadership after 1933 and the Measures Taken to Avoid a Multiple-Front War⁴

a. Political Measures

The political leaders of the Third Reich were well aware of Germany's unfortunate geographical position and the resultant danger of simultaneous military operations on a number of fronts and were thus eager to obviate this danger by means of political moves. Their efforts were reflected in the following pacts and agreements:

the German-Polish treaty of 1934

the German-British Naval Agreement of 1935

the Munich Agreement on the Sudeten Land of 29 September 1938

the alliance with Italy of 22 May 1939

the German-Russian Non-Aggression and Consultation Pact of 23 August 1939.

In the firm conviction that conditions in Europe could not be improved by another war -- indeed that a war would only serve to aggravate the existing discrepancies and difficulties -- Hitler was determined to avoid war for the time being. In the awareness of the dangers entailed in a simultaneous conflict with two or more neighbor nations, he was particularly vehement in his rejection of a multiple-front war and made no secret of his disapproval of the policies pursued by the German Empire, which had proved so ineffectual in solving this problem. Hitler was supremely confident of

4 - The following sources were consulted in the preparation of Section 2: S. Freiherr von Falkenstein, Draft for Study 178; P. Deichmann, "Die deutsche Luftwaffe und der vier-motorige Bomber" (The German Luftwaffe and the Four-Engine Bomber); Denkschrift des Generalstabschefs des Heeres" (Memorandum of the General Staff Chief, Army), Generaloberst Beck, 5 November 1937; Karlsruhe Document Collection -- "Der Abschluss des deutsch-russischen Paktes" (The Conclusion of the German-Russian

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Footnote 4 (cont)

Pact); IMT, Volume XXII, pages 78-82, Volume XXVIII, pages 353, 373-390, Volume XXIX, pages 41-53, Volume XXXI, pages 155-159, Volume XXXIX, page 31, Volume XXXX, pages 509-512, Volume XXXXI, pages 19-22; Schriftenreihe der Wehrpolitik (Military Policy Publications Series), No. 8, "War der deutsche Generalstab ein ständiger Kriegstreiber?" (Was the German General Staff a Continual Warmonger?); A. Kesselring, "Gedanken zum zweiten Weltkrieg" (Thoughts on the Second World War); E. von Rintelen, "Mussolini als Bundesgenosse" (Mussolini as an Ally); E. Heinkel, "Stürmisches Leben" (A Stormy Life).

his ability to limit a war to a single front even if he should be forced to attack in the east. But his reasoning overlooked the fact that although the treaties and agreements mentioned above did, to a certain extent, effect a relaxation of the political encirclement of Germany, his own policies, both foreign (unilateral dissolution of the Locarno Pact by the occupation of the Rhineland, annexation of Austria, settlement of the Sudeten question and of the fate of the rest of Czechoslovakia, etc.) and domestic (particularly the treatment of the Jews) were bound to increase the tension in Europe and thus the danger of war. And not even the various offers made by Germany to France and Poland to settle existing differences in peaceful fashion were able to mitigate the situation.

Thus, until the outbreak of war, Hitler believed that a military conflict could be localized, especially after he had succeeded in outsmarting the Western Powers in Moscow and in preventing the further encirclement of Germany by the conclusion of the German-Soviet Pact. His ally, Mussolini, on the other hand, was convinced that a military conflict with Poland would lead inevitably to another war of international scope, i.e. to a war on a number of fronts.

b. Military Measures

Apart from the political measures, it was primarily Germany's military measures which were expected to prevent a multiple-front war; it lay in the nature of the situation that the military measures also had political repercussions, just as the political measures automatically had some influence on the military preparations. The most important military factors were the following:

the restoration of German military sovereignty in 1935 and the rearmament efforts connected with this step,

the occupation of the Rhineland in 1936, which restored the Rhine

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River to Germany as a potential line of defense, the annexation of Austria in March 1938 and the occupation of the rest of Czechoslovakia in the spring of 1939, which eliminated the danger of a threat to Germany's southeastern flank, the construction of the West Wall (Westwall), including the Western Air Defense Zone (Luftverteidigungszone West), and the fortifications in the east, thus increasing the strength of Germany's defenses, particularly along the western border.

Inasmuch as Germany's rearmament was to have a deterrent effect, armament in depth was deliberately sacrificed in favor of a broad program of different items -- a measure which was to make itself painfully felt later on -- and extensive use was made of deceptive measures. In August 1938, for example, the chief of the French Air Force, General Vuillemin, visited the Heinkel aircraft works, where he was shown the He-100, the fastest fighter model in existence at that time, and was told that mass production of the aircraft was already well under way; in reality the Luftwaffe had only three test aircraft at its disposal, and a good deal of work still had to be done on them before mass production could even be started⁵. On the whole, however, the German Wehrmacht, whose rearmament had cost approximately forty billion Marks by 1939, had developed by that time into a strong military instrument, superior in many respects to the armed forces of the other European nations.

The annexation of Austria and the incorporation of Czechoslovakia had done much to improve Germany's military-geographic position, particularly by eliminating the danger of air attack -- a constant menace until that time -- from the Czechoslovakian "aircraft carrier". It is not the purpose of this study to determine whether these territorial gains in the military sector were not perhaps offset by the resultant tightening of Germany's political encirclement. Similarly, the occupation of Albania by Italy must also be counted as a reinforcement of the military-geographical position of the Axis.

5 - Heinkel, op. cit., pages 381-383.

The overwhelming importance accorded the construction of the fortifications in the west and east by Germany's military leaders proved to be entirely justified. By the autumn of 1939 the West Wall had been made so strong that a French breakthrough seemed out of the question. The effectiveness of the Wall itself was augmented by that of the Western Air Defense Zone, which was all but complete by the fall of 1939. Fully manned, its 197 heavy and 48 light antiaircraft artillery emplacements guaranteed an uninterrupted barrage of fire at three overlapping levels for three to four minutes of flight. The eastern fortifications, too, -- above all in East Prussia, but also along the border and in Silesia -- had progressed to the point where they could be expected to offer effective resistance to any attack by Poland (though, in any case, there seemed to be little likelihood of such an attack).

In combination with the political measures discussed above, these military measures resulted in a vast improvement in Germany's military-geographical position, which -- as of 1939 -- could be termed far more favorable than during the period from 1918 to 1933. The encirclement of the Reich had relaxed considerably⁶. Nevertheless the danger of a multiple-front war continued to exist, and for this reason all three Wehrmacht branches devoted themselves assiduously to the problems of waging war under these conditions. Their deliberations were based on the premise that a war with Poland would inevitably lead to the intervention of the Western Powers. At the same time Wehrmacht leaders were of the opinion that Germany could not possibly hold out in a multiple-front war if it should last any length of time.

6 - See Appendix 2: The Military-Geographic Position of Germany as of the Autumn of 1939.

c. Divergent Views of Political and Military Leaders Regarding the Presumable Development of a War into a Multiple-Front Conflict

The views held by Hitler, on the one hand, and Germany's military leaders -- particularly the Army leaders -- on the other, as regarded a multiple-front war were diametrically opposed and completely irreconcilable. Whereas Hitler was certain that he could avoid a multiple-front war even if Germany should launch an offensive in the east, the military were equally certain that such a move would inevitably lead to a conflict on a number of fronts. It was Generaloberst Beck, Chief of the Army General Staff, especially who warned repeatedly -- orally and in writing -- against the dangers of a policy which was bound to lead to an unpredictable military involvement and which might well result in the ill-considered employment of the Wehrmacht before it was really necessary. In a memorandum dated 5 May 1938, Generaloberst Beck dealt in detail with the problem of a multiple-front war⁷:

"Germany's military-political situation does not offer the geographic prerequisites which a nation situated in the middle of a continent must have in order to wage a large-scale war on land, at sea, and in the air. The last world war clearly demonstrated the fallacy of relying on the continued neutrality of certain nations. Germany cannot prevail in a long-term war, if only because of lack of space."

The conflicting views of Hitler and his military advisors in this respect led to open controversy once more when Hitler signed his instructions for Operation GREEN (Grün) on 30 May 1938, thus announcing his decision to attack Czechoslovakia in the near future. Once again military leaders came forward with their objections, pointing out

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7 - Military Policy Publications Series, No. 8.

that the invasion of Czechoslovakia would lead to the intervention of the Western Powers and thus to a war on two or more fronts, for which Germany was not prepared. These views were substantiated in a memorandum prepared by Generaloberst Beck, which was to be given to Hitler by the Commander in Chief, Army, in the presence of the assembled generals. Beck's memorandum was generally accepted as valid by his colleagues, but the planned assembly of the generals did not come about since the Commander in Chief, Army, refused to cooperate. Generaloberst Beck, who had ardently opposed Hitler's military plans from deep inner conviction and on the basis of his outstanding military knowledge and experience, was retired soon afterwards.

Hitler's obvious success in the foreign policy field not only made it impossible to oppose his policies effectively but also led to a split in the ranks of the Wehrmacht generals. While the majority of Army generals continued to advocate the view that a war in the east was bound to result in the intervention of the Western Powers, the Wehrmacht High Command and part of the Luftwaffe High Command were inclined to accept Hitler's view, namely that he could manage to avoid a war on several fronts. During a conversation with Professor Heinkel in late 1937⁸, for example, the later Generaloberst Udet stated that -- according to an interview Goering had had with Hitler -- a war with England was completely out of the question; if there was to be war at all, it would be limited to the Continent, and therefore there was no reason for Germany to develop a long-range four-engine bomber. The disastrous effects of this decision were to become all too apparent later on. Nevertheless, regardless of these views, the Luftwaffe High Command included the possibility of a multiple-front war and a conflict with Great Britain in its planning and demanded the

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8 - Heinkel, op. cit., page 411.

occupation of Holland and Belgium as an advance air defense zone and as a base for later air operations against England. Comprehensive studies prepared by the Second Air Fleet under General Felmy substantiated the conclusion that Germany's armament potential was not sufficient to guarantee her achieving the defeat of Great Britain ~~front~~ from the air.

While most German military leaders -- even after the bloodless settlement of the Czech crisis -- still clung to the opinion that an attack on Poland would mean a war on two or more fronts, Hitler was more and more firmly convinced that he could manage to isolate Poland. As late as 22 August 1939 he called a conference of his generals and admirals and, pointing out the unpreparedness of the Western Powers for war, the unwillingness of France to become involved in a military conflict, and the recently concluded non-aggression pact with Soviet Russia, tried to convince his audience that the Western Powers, including England, would refrain from intervening in a conflict between Germany and Poland. This inaccurate evaluation of the military-political situation was in part the fault of Reichs Foreign Minister von Ribbentrop and in part due to Hitler's own deeply-ingrained wish to keep England out of the conflict. Hitler refused to face the reality represented by the alliance commitments of England and France towards Poland.

Section 3: The Build-Up of the German Luftwaffe During Peacetime and the Multiple-Front War⁹

a. Political Guidelines

The political guidelines which governed the build-up of the German Luftwaffe were based primarily on the premise that the German Reich had to reckon with the possibility of attack by its enemies in the east and west and that it therefore needed to have a respect-inspiring air arm at its disposal as soon as possible for defense and counterattack. It was this thinking which led to the establishment of the so-called "risk Luftwaffe" (Risikoluftwaffe). But in the fall of 1937, Hitler had already informed the top-level Wehrmacht leaders that Germany's problems could be solved in only one way -- by force, and that this way, of course, could never be entirely without risk¹⁰. For this reason he intended to act prior to 1943 or 1945, although, as he pointed out, circumstances might arise which could unleash a war before this time, and because of this it was imperative that Germany be prepared for war.

9 - The following sources were consulted in the preparation of Section 3: S. Freiherr von Falkenstein, Draft for Study 178; P. Deichmann, "Gedanken zum Thema 'Mehrfrontluftkrieg'" (Thoughts on the Subject of Air Warfare on Several Fronts) and The German Luftwaffe and the Four-Engine Bomber; Karlsruhe Document Collection -- Planning Study 1939 (Planstudie 1939), Parts II and III; "Konzentriertes Flugzeugmusterprogramm" (A Concentrated Program of Aircraft Modles), Luftwaffe General Staff, No. 3244/38, Classified, 7 November 1938; Report of the Quartermaster General, Luftwaffe, dated 2 September 1939, concerning aircraft strength; Tentative account of the air war, 1939-1945; IMT, Volume XXII, pages 78-82, Volume XXV, pages 433-439, Volume XXIX, pages 41-53, Volume XXXI, pages 19-22; E. Heinkel, A Stormy Life; H. Conradis, "Nerven, Herz und Rechenschieber" (Nerves, Heart, and Sliderule); H. Riegler, "Weltkrieg 1939-1945" (The World War 1939-1945), Part III; K. von Tippleskirch, "Geschichte des zweiten Weltkriegs" (History of the Second World War); S. Zantke, "Operative Luftkriegführung deutscher Kampfverbände im Endstadium des zweiten Weltkrieges" (Strategic Air Operations by the German Bomber Units

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Footnote 9 (cont)

during the Final Stage of World War II).

10 - Hitler's conference with Wehrmacht leaders, 5 November 1937.

by 1942 at the latest. But as early as the fall of 1938, Hitler -- doubtless motivated by the favorable military-political developments along the eastern border (the settlement of the Czech crisis) and by the accelerated armament activity being carried on by Germany's potential enemies -- decided to begin the war against Poland in the fall of 1939. His decision led to a number of military measures, one of which was the order for a fivefold increase in Luftwaffe strength, an order which, from the points of view of personnel, training, and equipment, could not possibly be complied with within the period of time allotted.

In addition to the basic concept of attack, the factor of surprise played an important part in all the political deliberations of this period. Thus, in the peacetime build-up of the Luftwaffe it was imperative that the proper measures be taken to guarantee its immediate readiness for employment when the time came. The basic principle was not affected by the fact that, during the period between the occupation of the Sudeten Land in the fall of 1938 and the spring of 1939, defensive measures only were planned, both in the west and along the Polish border.

In his implementation of these political guidelines, the Commander in Chief, Luftwaffe, proceeded from the premise that a rapid decision would be needed, to be achieved by an overwhelmingly strong air force capable of establishing air superiority right at the beginning and of destroying the enemy morally and materially. But from the very start, the Luftwaffe ^{build-up} period was beset by those problems which were to play an even greater role later on -- whether the Luftwaffe should be separate from the other Wehrmacht branches, for example in the event of an offensive against England, whether its employment should be primarily strategic or closely coordinated with the operations of the Army and Navy, for example in case of war against Poland or France, or whether it should be utilized chiefly

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in tactical operations. The organization and equipment of the Luftwaffe largely depended on the answers to these questions. The accepted concept of a

Continental war in any case was responsible for the decision not to establish a strong offensive air arm. Under the given circumstances Luftwaffe leaders, realizing that simultaneous operations against a number of enemies on a number of different fronts were a definite possibility, regarded it as imperative that the striking power of the Luftwaffe be brought to bear in its fullest extent on one front or the other at a time. Thus the possibility of air warfare on several fronts was included in the deliberations of Luftwaffe leaders, although no concrete attempt was made to prepare for such an eventuality.

b. The Enemy Air Forces

In planning the build-up of the Luftwaffe, air leaders had to consider the personnel strength, preparedness, technical equipment, standard of training, organization, and status of armament of the air forces of Germany's potential enemies and had to aim at the creation of a Luftwaffe which would be superior to the latter in terms of quality, technology, training, and employment. Germany had no chance of achieving numerical superiority over the combined air forces of her enemies; therefore her goal was a Luftwaffe which would be vastly superior to that of any possible enemy or coalition of enemies on one front and which, at the same time, would be capable of providing adequate defensive forces, including bomber units, for the other fronts. One point in Germany's favor was the fact that once the preliminary stage of the air armament program had been completed the Luftwaffe would have modern aircraft models at its disposal, while the combat aircraft employed by the French and British air forces, although superior in number, were largely obsolete. Thus a comparison of Luftwaffe strength with the estimated strength of the enemy air forces in 1937¹¹ reveals considerable numerical superiority in favor of the enemy, which, however, cannot be accepted as reflecting superior

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quality as well.

11 - See Appendix 3: A Comparison of Air Armament as of the Summer of 1937 (based on information contained in "Die deutsche Luftfahrt, Jahrbuch 1937" (German Aviation Yearbook for 1937); this information in turn is based on estimates of enemy armament activity).

Prior to the outbreak of the war, German leaders assessed the status of the enemy air forces approximately as follows: British air armament was considered to have made good progress, but deliveries of modern aircraft were still lagging behind requirements. The British fighter models were regarded as not quite up to the quality of their German counterparts and British bomber models as obsolete. It seemed probable that only the bombers would be used to support the French Air Force on the Continent, inasmuch as the fighters would presumably be needed for air defense operations in England itself. On the average, apart from a very few exceptions, the aircraft of the French Air Force were regarded as capable of only limited employment in combat. Adequate personnel reserves were available and the standard of training was regarded as good, but the French ground organization was no longer up to date, the supply system vulnerable to enemy interference, and the communications system inadequate. There was no reason to fear that French would be able to match Germany's production capacity in the air armament field during the next few years to come. On the whole, the combat readiness of the British and French air forces was greatly inferior to that of the German Luftwaffe. Moreover almost half of the British and French air units were stationed in the colonies.

The Polish Air Force was clearly inferior -- in number, quality, organization, leadership, and technological equipment; the ground organization and communications system were inadequate. Direct support on the part of Poland's allies was out of the question.

The Soviet Air Force, admittedly strong numerically, was regarded as fairly indifferent in point of performance; in any case, after the conclusion of the non-aggression pact, it would not play any part in the campaign in Poland.

On the basis of the above evaluation of the enemy air forces and their weaknesses, in 1939 Luftwaffe leaders were of the opinion that the Luftwaffe, in spite of its numerical inferiority, was a match for the combined air forces of Poland, England, and France. They realized, of course, that the struggle would have to be a brief one if the Luftwaffe was to prevail.

c. The Military Build-Up of the German Luftwaffe

1) Type and Scope of Air Armament

The type and scope of German air armament was determined, among other things, by the decision made by the top-level political and military leaders to the effect that a military decision should be sought only by means of joint operations on the part of all three Wehrmacht branches. Under the direction of the Wehrmacht High Command, the operations of the Army, the Navy, and the Luftwaffe were to be concentrated on the achievement of a common goal, the destruction of the enemy armed forces. Thus from the beginning the organization and strength distribution of the Luftwaffe was oriented to the accomplishment of this restricted mission rather than to the Douhet-inspired concept of independent offensive action as a means of achieving a military decision. But even this restricted mission demanded the establishment of an effective bomber arm, something which was ardently championed by the first General Staff Chief of the Luftwaffe, Generalleutnant Wever. In recognition of Germany's potential enemies in an armed conflict, Wever ordered the development of a long-range bomber in the firm conviction that "the bomber will remain the decisive weapon of the Luftwaffe". This clarity of vision was dimmed after Wever's death (June 1936), the long-range bomber was dropped from the development program, and preference was given instead to the construction of medium bombers and dive-bombers.

Wever's successors believed that the Luftwaffe could get along without a long-range bomber in view of the accepted concept of short campaigns and blitzkriegs, especially since the production of such a bomber could have been carried out only at the expense of the remaining Luftwaffe air armament capacity and would, in any case, have taken too long. The problem will be discussed in greater detail under paragraph 2 of the present section.

The factors which played the most important role in determining the scope and type of Luftwaffe build-up were the following: the planned method of operation; the question of whether the Luftwaffe ^{should} be primarily strategic or tactical; the assessment of enemy air armament activity; the measures necessary for adequate home air defense; the personnel, material, and industrial capacities available within the limited period allotted; and the need for adapting Luftwaffe armament requirements to those of the other two Wehrmacht branches. In addition, changes in the military-political situation, in the views of German leaders, and in the body of experience available all necessitated frequent modification of existing plans, so that the build-up of the German Luftwaffe was fraught with difficulty.

When the air armament program got under way in 1933, the aircraft models left over from the ^{Reichswehr} National Army ^{era} were assigned to Army support and home air defense operations. Until suitable bombers could be produced -- the Do-17 and the He-111, which were ready for employment in 1937 -- the Luftwaffe had to get along with stop-gap equipment (Do-11, Do-13, Ju-52, Ju-86). The view prevailing for some time, that fighter aircraft were no longer so important, was quickly revised after the war in Spain.

Once the German aircraft industry had left the preparatory stage behind, the Luftwaffe acquired a qualitative lead which made up for the numerical superiority of the opposite side. The decision as to the type

of air armament, of fundamental importance in the awarding of contracts to industry, was necessarily determined by the answer to the question whether the Luftwaffe was to concentrate on offense -- i.e. bombers and dive-bombers -- or defense -- i.e. fighters and antiaircraft artillery; the question was decided in favor of offensive operations -- but without the four-engine bomber.

On the basis of the developments up to 1938 and of the experience gained during the deployment of the Luftwaffe in the Sudeten crisis in September 1938 (which had revealed certain deficiencies in the strength distribution and technological equipment of the Luftwaffe), in the fall of 1938 the Commander in Chief, Luftwaffe, approved an air armament program designed to support the final stage of Luftwaffe development¹². This program, too, emphasized the importance of the offensive concept, but it was far from being completed by the time the Polish campaign began.

2) Organization

a) Command

The command organization of the German Luftwaffe had been subject to a number of alterations during the peacetime years. The last fundamental reorganization prior to the war took place in 1937, at which time the Air Fleets were established¹³, and had been undertaken on the basis of the following reasoning: It seemed advisable to establish a command organization which could handle both offensive and defensive operations, ground organization matters, and supply questions in a geographically limited

12 - See Appendix 4: The German Air Armament Program of 1938 in Comparison to Luftwaffe Strength as of the Start of the Polish Campaign in 1939 (based on information contained in the Concentrated Program of Aircraft Models).

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13 - See Appendix 5: The Command Organization of the German Luftwaffe
in 1939.

but relatively extensive area. For the accomplishment of offensive operations, the Air Fleet command staff had to be so thoroughly familiar with the situation of the enemy, especially the status of his air forces, with the potential effectiveness of its own offensive units, with the location and relative importance of the targets involved, with geographic and climatic conditions, with any special factors characterizing the potential area of operations, and with the missions to be accomplished in conjunction with the Army that the employment of available air units and the assignment of newly arrived reinforcements could be effected smoothly and without loss of valuable time. To this end the Air Fleets had air divisions -- later air corps as well -- of varying strength under their command. Even during peacetime these units were required to be prepared for action at all times, while carrying on their routine training activity at the same time. In general the Air Fleets were so organized that the First and the Fourth were to prepare and carry out the war against Poland, with the Fourth also participating in action in the southeast, the Second and the Third the war against France, and the Second the war against England. The offensive and defensive air units required for these operations, as well as the ground organization units needed for their maintenance were assigned to the individual Air Fleets, either at the beginning of the operations concerned or during periods of tension which might conceivably lead to such operations. In each case deployment and combat orders had been carefully prepared in advance, so that they could be implemented immediately upon receipt of a predetermined code word. The Air Fleet staffs were assigned to permanent headquarters during peacetime; mobile command posts were provided for in the event of war.

The tasks of air defense, ground organization administration, and supply activity were handled by the permanent Air District Commands

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(Luftgaukommandos). These had fighter aircraft and antiaircraft artillery units at their disposal for air defense purposes, and they were expected to provide air protection for those

military and industrial installations in all of Germany which were of vital importance to the successful conduct of the war. Careful study and an exact knowledge of local conditions were indispensable in the establishment of a priority listing for the installations to be protected; gunpowder and explosives factories, transport facilities, and the Luftwaffe ground organization were given top priority. Ground organization and supply installations had to be so carefully organized and so flexible in their functioning that they were able to meet all the demands of the offensive and defensive air units. The Air District staffs were located at permanent headquarters; in the event of war, previously organized advance Special Duty Air District Staffs (Luftgaustäbe z.b.V.) were to move into newly occupied territory to set up the necessary Luftwaffe service installations¹⁴.

Appropriate units from the Luftwaffe Signal Communications Forces were assigned to the Air Fleets to set up and administer signal communications and aircraft reporting services.

Thus, by virtue of concentrating all aspects of command under a single authority in each area, this organizational system seemed to guarantee, insofar as possible, the effective conduct of air warfare on the various fronts. In order to facilitate smooth coordination with the Army, the Air Fleet areas were organized to correspond with those of the Army Groups, and the cooperation between the two Wehrmacht branches was close and effective at this level. In addition, Luftwaffe aerial reconnaissance units were assigned to the Army for use in Army reconnaissance missions.

A special command staff had been set up to guide the coordination of Luftwaffe and Navy operations¹⁵; the work of this staff would be especially vital in

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14 - See Appendix 6: The Territorial Organization of 1939.

15 - See Appendix 7: The Coordination of Luftwaffe and Navy Operations
in the West from September 1939 on.

the event of a war against England. Aerial reconnaissance and ship-based air units were made directly subordinate to the Naval Operations Staff (Seekriegsleitung), and the bomber units of the 10th Air Division were ordered to work closely together with the Navy.

Moreover the entire Luftwaffe command organization was able to profit by the advantages of the "inner line"; rapid shifts of personnel and materiel from one front to another seemed to be adequately safeguarded by the thoroughly organized air defense system. To be sure, the form of organization selected precluded the establishment of centralized command staffs for the various Luftwaffe branches (such as a bomber command, fighter command, etc.); instead, the Air Fleet staffs were responsible for the employment of these various branches within the framework of operations in their individual areas. Nevertheless, this organizational system was eminently well suited to the methods of air warfare contemplated by Luftwaffe leaders.

b) The Flying Units

The form of organization was very nearly the same for all the Luftwaffe branches. In general, combat organization provided for a wing made up of three groups and a staff flight (Stabskette) of three aircraft. Each group consisted of three squadrons and staff flight, and each squadron numbered twelve aircraft. The aerial reconnaissance units never exceeded group strength.

One measure which increased the mobility of the offensive air units considerably and which therefore was bound to be extremely valuable in case of air warfare on several fronts was introduced in the spring of 1938 with a reorganization of the ground organization serving the bomber, dive-bomber, and twin-engine fighter units. While heretofore technical ~~xx~~ equipment and ground personnel

had been assigned to each group on a permanent basis, they were now organized into two motorized ~~air~~ airfield service companies (Flughafenbetriebskompanien) which were entirely independent of the groups themselves and thus available to twice as many groups as before. In this way it was possible to staff airfields and emergency landing fields on the various fronts with maintenance personnel in advance, so that they were ready and waiting to service the air units the moment the latter arrived. This meant that the flying units were free to move from one airfield to another under their own power without having to worry about their ground service personnel, and that they could maintain constant combat readiness. Only a few key maintenance workers -- usually one mechanic foreman, one chief mechanic, one aircraft armorer, one armorer-artificer, and one radio mechanic -- were permanently assigned to each unit and were moved by transport aircraft together with the unit. An arrangement of this sort was not necessary for the fighter forces, since the technical personnel belonging to each squadron could be moved in a single transport aircraft together with the unit in case of transfer.

No uniform system was ever worked out for handling aerial reconnaissance for the bomber forces during wartime. Theoretically, target reconnaissance was the responsibility of the staff squadron of each wing, but while it was the wings themselves which ordered this reconnaissance in the eastern theater of operations, in the west it was centrally administered through the air divisions.

3) Ground Organization and Supply

The establishment of the ground organization was also oriented towards the possibility of air warfare on a number of fronts. Inasmuch as it was absolutely imperative that the majority of the flying units be able to be transferred to any given front at any given time in order to

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establish a point of main effort, it was clear that a sufficient number of airfields had to be prepared on all fronts. The problem here was to

build these airfields as close to the border as possible in order to reduce to a minimum the length of the approach flight, the consumption of fuel, and the loss of time involved. In the event of containing operations along a front it was planned to distribute the air units over a large number of airfields, not only for their own protection but also to deceive the enemy. The order to abandon all peacetime airfields known to the enemy in the event of war and to provide new airfields in the interior for training purposes served to increase the demand for airfield construction. Thus, not only extensive areas along the eastern and western borders and along the coast, but also the interior of the Reich were covered with a dense network of airfields and emergency landing fields, and it was hoped that this would be sufficient to meet all possible demands.

The organization of the supply system was based on similar principles. During peacetime each airfield was stocked with three times as much aviation fuel, ammunition, bombs, oxygen, and aircraft equipment as was actually needed by the units slated for assignment there. Furthermore, the Air Fleets were to establish an overall mobilization reserve adequate for at least twelve missions by the maximum number of units slated for assignment and to make the necessary preparations for the smooth and rapid delivery of additional supplies as needed.

4) The Plan of Action

The Luftwaffe "Deployment and Combat Orders" (Aufmarsch- und Kampfanweisungen), revised and reissued yearly, were prepared on the basis of the directives issued by the Wehrmacht High Command and containing the missions and objectives for the Wehrmacht as a whole. During the build-up period, the greatest emphasis was placed on the defense of the Reich, which -- as far as the Luftwaffe was concerned -- meant air

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defense missions and retaliation raids by the bomber forces. But as early as the end of 1937 these missions underwent a fundamental

change in that offensive warfare, at least in one direction, came to the fore. Study GREEN (Studie Grün)¹⁶, for example, envisioned an attack on Czechoslovakia coupled with secondary defensive operations in the west, and Study WHITE (Studie Weiss)¹⁷ an attack on Poland with more intensive defense in the west to meet the increased likelihood of a war on two fronts; the increased strength needed for the defensive operations in the west could be provided by the activation of new units. During the period of relaxed tension between the settlement of the Sudeten question in the fall of 1938 and the decision to attack Poland, taken in the spring of 1939, the directives of the Wehrmacht High Command were restricted to defensive measures in the east as well as in the west (Study RED (Studie Rot)); the possibility of a war with England was treated in Study BLUE (Studie Blau).

In accordance with these principles outlined by Germany's Supreme Commander, the Luftwaffe High Command was to take the steps necessary to prepare for and to carry out air warfare in the east and west, giving special consideration to the instructions covering coordination with the Army and Navy, to the status of Luftwaffe build-up and equipment, to the technological and tactical performance of the air forces of Germany's potential enemies, to the results of target reconnaissance, etc. Effective planning in this connection required not only thorough familiarity with the potential performance of the Luftwaffe but also comprehensive knowledge of the enemy. The latter was obtained by means of careful reconnoitering of the military and economic strength of the enemy in general and of those targets which seemed particularly rewarding for an attack. In the east this intelligence activity, which had to be begun and carried out during peacetime,

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- 16 - The Supreme Commander of the Wehrmacht, Wehrmacht High Command, No. 42/38, Classified, L-I, dated 30 May 1938.
- 17 - Planning Study 1939, dated 1 May 1939.
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first concentrated on Czechoslovakia and Poland and later on the Soviet Union; in the west, its primary targets were France and England. The purpose of this extensive and thorough reconnaissance was to provide a complete picture of these nations' military situations, the status of their armament programs, and their presumable supply and economic situations in the event of war, in order to be able to determine their strengths and weaknesses as well as their most vulnerable points. The targets of reconnaissance were the enemy's war potential in its various forms, his armed forces and their installations, stationary fortifications, troop transport routes and deployment areas in the interior of the countries concerned and in the vicinity of the borders, sea routes, harbors and shipping, armament industries (especially those serving the air forces), power and fuel plants, etc. It was particularly important to gain accurate information concerning the location and stage of completion of enemy airfields, particularly those situated near the German border, as well as the number of units assigned to each one, since plans had been made for surprise attacks on the enemy air forces at the beginning of hostilities in order to destroy them immediately and thus establish air supremacy. All the intelligence gained concerning the various military, industrial, and other targets was organized in a target file containing all the necessary data for the carrying out of bombing attacks -- maps of different scales showing the location of the targets, aerial photographs, descriptions of the target indicating its key points, information regarding the most favorable time for an attack and the most promising method to be used, estimates of the number of aircraft and the amount of ammunition needed, information on the enemy defenses anticipated, etc. These details were worked out with the help of experts, when necessary. These voluminous data, constantly added to and revised on the basis of aerial reconnaissance reports, ultimately

permitted an overall assessment of the enemy from the point of view of air warfare. For example, German Luftwaffe leaders were convinced that Great Britain could be hit most effectively by air attacks on her harbors and overseas shipping and Russia by destruction of her transport network.

d. The Status Achieved in the Build-Up of the Luftwaffe by the Outbreak of the War

1) Strength and Standard of Training

When the war against Poland broke out on 2 September 1939, the Luftwaffe was considerably inferior to the combined air forces of Germany's enemies as far as numerical strength was concerned, as is indicated by the Strength Comparison contained in Appendix 8¹⁸. The actual combat strength of the Luftwaffe was even some 25% lower than the approximate total figure of 3,500 aircraft (plus 240 aircraft assigned to operations for the Navy and approximately 550 transport aircraft, most of which, however, had been requisitioned from the flight training schools and the Lufthansa), as will be explained in detail in Section 4, 1, a of the present study. On the other hand we can also assume with a fair degree of accuracy that the combat strength of the enemy air forces was probably just as much lower than the authorized strength as was the case with the Luftwaffe. From the technological standpoint, the German aircraft models were clearly superior, so that the enemy's numerical advantage was presumably completely compensated for. Moreover, by 1939 the Luftwaffe had succeeded in adjusting its personnel recruitment program to the pace of its materiel expansion. Careful selection of personnel, and orientation program which imbued them with high combat morale, and thorough professional training

18 - See Appendix 8: The Strength of the German Luftwaffe as of the Fall

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Footnote 18 (cont)

of 1939 in Comparison with That of the Enemy Air Forces (the figures for the Luftwaffe are based on the reports issued by the Quartermaster General, Luftwaffe, on 2 September 1939).

seemed to have created a certain superiority in favor of the Luftwaffe in terms of personnel. On the other hand it could not be denied that the frequent reorganizations and numerous new activations -- particularly the expansion ordered in the spring of 1939, to be accomplished by splitting the units and bringing each half unit up to full strength with new recruits -- were a heavy burden on the personnel recruitment program and also automatically meant a decrease in the standard of training. Nonetheless, the Luftwaffe High Command was justified in assuming that its Wehrmacht branch -- by virtue of its training standard, the excellence of its flying crews, its technological lead, and its superior leadership -- was fully capable of fighting a limited offensive war against Poland without at the same time neglecting the air defense of the Reich. It goes without saying, of course, that the Luftwaffe could bring about a decision only in coordination with the other two Wehrmacht branches, for in terms of strength, organization, technical performance, and equipment it was prepared exclusively for this limited mission as a part of the overall military team.

2) Weaknesses

Still, there was no denying that the German Luftwaffe had a good many weaknesses as of the fall of 1939. These were due in part to the excessively rapid pace maintained during the build-up period -- when the many new activations broke up units almost as soon as they were formed, leaving no time for thorough training or for the units to develop gradually into integral entities. Another result of this situation was the fact that all the well-trained personnel were assigned to the units, so that -- as Goering put it later on -- "the Luftwaffe went to war with its training cadres".¹⁹ Due to the continual "watering-down" of the units, their skill in bombardment techniques and in formation flying still left much to be

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desired.

19 - Interview with State Secretary (Staatssekretär) a.D. Paul Körner by
Professor Suchenwirth, 19 September 1955.

In the technological field, too, there were shortcomings, despite the fact that the German aircraft models were superior to those of the enemy. The Luftwaffe's bomb sight equipment, for example, did not yet meet the performance requirements set for it, and the Me-110 did not have sufficient flight range to permit its employment as an escort fighter.

But the most disastrous mistake in the technological field was to prove the elimination of the four-engine long-range bomber from the development program, its replacement by the twin-engine medium bomber (Ju-88), and -- in 1938 -- the hastily ordered resumption of development work on the completely unsuitable He-177. Although the two four-engine bomber test models, the Do-19 and the Ju-89, had already passed preliminary test flights with success and although it was common knowledge that other nations, especially the United States, were building long-range bombers with excellent performance characteristics, at the beginning of 1937 Goering -- doubtless influenced by important personalities in the Reichs Ministry of Aviation (Reichsluftfahrtministerium) -- decided to drop the long-range bomber from the aircraft program and even to forbid further testing and development of the two trial aircraft already available. To be sure, the "important personalities" mentioned above were no more than laymen in the field of Luftwaffe command -- Milch, Udet (who advocated the view that a medium bomber with short flight range and low bomb-carrying capacity but, thanks to its diving capability, all the greater bombing accuracy, was all that was needed for the coming conflicts²⁰), and Kesselring, who at that time had just left the field of Luftwaffe administration to take over the post of Chief of the General Staff. In any case, the experts who had been working on the long-range bomber were not even given a chance to present their views. Some of the reasons given for this fateful decision were the following: that it would take too long to build an adequate number of

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long-range bombers, that the same results could be achieved with twin-engine bombers, which possessed the added

20 - Heinkel, op. cit., page 411.

advantage of diving capability and thus increased bombing accuracy, that with the same number of engines twice as many twin-engine bombers could be built, and that if the Ju-88 production schedule was to be adhered to there was no industrial capacity to spare for the test models. This last reason was advanced by Milch and was surely only a pretext, motivated by the wish to be able to report the largest possible number of bombers to Hitler. Jeschonnek (at that time Commander in Chief of the Luftwaffe Training Wing), who was later to become Chief of the Luftwaffe General Staff, was indirectly at least partly responsible for Goering's decision, for on the basis of his practical experience in the Training Wing with the unsatisfactory results of horizontal bombing, he had set up the requirement that bombs should be released from a diving aircraft, i.e. pinpoint rather than area bombardment in order to guarantee full effectiveness. This, in turn, led to the construction of the single-engine dive-bomber, the Ju-87, and the twin-engine medium-range bomber, the Ju-88, with limited diving capability. The bomb-carrying capacity and, above all, the flight range of the Ju-88 failed to come up to expectations. Thus, in the end, the German Luftwaffe was left without a bomber whose flight range permitted its employment in the all-important struggle with England. Incomprehensible as it may seem, even after the war had begun Goering was still convinced that the Ju-88 was capable of employment against England and even against British shipping in the Irish Sea. In 1938, when developments once more made the construction of a four-engine long-range bomber seem advisable, German leaders hastily took recourse to the He-177, an aircraft which the Heinkel works were building for quite another purpose. The demand that the He-177, too, be made capable of diving led to a series of experiments with engines in tandem arrangement, which -- as should have been foreseen -- were totally unsuccessful, cost a good deal of time and effort, and

had to be abandoned in the end. And this is the reason -- looking ahead in our study -- why the German Luftwaffe did not succeed in putting an up-to-date four-engine bomber into the air throughout the entire course of the war. The repercussions of this failure will be dealt with in detail in a later section of the present study. This highly important decision was the first indication that ignorance and a lack of appreciation for the technological demands of a modern air force were motivating factors in the failure to carry out technologically an innovation which had been clearly recognized as appropriate and necessary to strategic air operations.

e. Evaluation of the German Luftwaffe as of the Fall of 1939 from the Standpoint of a Multiple-Front War

During the short space of time between 1933 and 1939 Germany's overall economic and armament situation, coupled with the need to arm the other two Wehrmacht branches at the same time, made the concurrent build-up of a tactical and a strategic Luftwaffe impossible. The accepted compromise, i.e. a single Luftwaffe capable of both tactical and strategic operations, represented a stop-gap solution, presumably the best that could be managed in view of the many bottlenecks and difficulties encountered in terms of materials, personnel, and last but very far from least the mental attitudes adopted by many influential military leaders. As a result, the necessary prerequisites for effective strategic air operations against England were completely lacking. Apart from the inadequate number and insufficient bomb-carrying capacity of the Ju-88 units, it must be remembered that London lay at the outermost limit of their operational range and that the major British industrial centers and vital supply harbors on the western coast were completely out of their reach. Thus it was fallacious on the part of the Commander in Chief, Luftwaffe, to believe that "the majority of the German Luftwaffe is capable of penetrating far into the heart

of enemy territory and of carrying out strategic air operations there".²¹ On the other hand, however, the Luftwaffe was eminently well prepared for tactical operations in coordination with the Army as well as for the limited strategic missions indirectly connected with Army support operations and for offensive operations against an enemy air force. For here the bombing accuracy of the dive-bomber units gave promise of success against the smaller targets involved. Consequently, Luftwaffe leaders were justified in believing that the Luftwaffe could be successfully committed against Poland and against France within the framework of a limited operation, especially since German home air defense forces were clearly more than a match for the relatively weak air forces of these enemies with their obsolete equipment.

On the basis of this overall picture, the Luftwaffe High Command could safely assume that the Luftwaffe would be capable of successfully carrying out a limited war on two fronts -- offensive operations against Poland in the east, and defensive operations against France and England in the west. At the same time Luftwaffe leaders had to realize that the Luftwaffe, in view of its numerical weakness, the lack of a long-range aircraft for offensive operations, and Germany's limited armament production capacity and personnel reserves, could not possibly hope to prevail in a longer-term war on a number of fronts against an enemy who was in a position to keep on increasing his personnel, technological, and industrial strength.

21 - Riegler, op. cit., pages 8/9.

Section 4: The German Luftwaffe during the War (up to the Outbreak of the Multiple-Front War)²²

a. The War on Two Fronts

1) The Campaign in Poland, 1939

It was at this stage, when the German Luftwaffe was fully capable of carrying out limited operations, that the war with Poland began. Within the framework of the overall Wehrmacht goal, namely the destruction of the Polish armed forces, the Luftwaffe was to fulfill the following missions: to prevent the Polish Air Force from interfering in German operations and to eliminate the danger of Polish air attacks on the territory of the Reich; to provide direct and indirect air support for the Army and to break down enemy resistance by intervention in ground operations; to prepare a large-scale concentrated air attack by all available bomber forces on the city of Warsaw; and to carry out effective air defense operations in the west. In compliance with these orders, the majority (approximately 60%) of the German air units were assigned to offensive operations under the First and Fourth Air Fleets in the east, while 25% were assigned to defensive operations under the Second and Third Air Fleets in the west, and the remaining 15% were distributed among the various Air Fleets for home air defense operations. Of the offensive air units (bombers, dive-bombers, twin-engine fighters), which comprised about 40%

22 - The following sources were consulted in the preparation of Section 4: S. Freiherr von Falkenstein, Draft for Study 178; P. Deichmann, "Mehrfrentluftkrieg 1939" (Multiple-Front Air Warfare in 1939) and Thoughts on the Subject of Air Warfare on Several Fronts; Colonel Mittmann, "Vorläufige Darstellung des Luftkriegs 1939-1945" (Tentative Account of the Air War, 1939-1945); Planning Study 1939, Part II; "Weisung Nr. 21: Fall Barbarossa" (Directive No. 21: Operation BARBAROSSA) (Wehrmacht High Command, Wehrmacht Operations Staff, Department Air (I), No. 33408, Classified, dated 18 December 1940); Report of the Quartermaster General, Luftwaffe, dated 2 September 1939, concerning aircraft

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Footnote 22 (cont)

strength; Study by Branch VIII, Luftwaffe High Command, "Überblick über die Luftkriegführung vom 21.9.44" (Survey of the Conduct of the Air War, 21 September 1944); Report by the representative of the Chief, Army Archives, in Holland on the activity of the Dutch Air Force from 10 to 17 May 1940; Computation of Luftwaffe Strength, 1 September 1939; Halder Diary, Volume IV; IMT, Volume IX, pages 382-388 and 694; H. H. Arnold, Global Mission; H. Conradis, Nerves, Heart, and Sliderule; E. Heinkel, A Stormy Life; A. Kesselring, "Soldat bis zum letzten Tag" (A Soldier's Record) and Thoughts on the Second World War; Dr. T. Weber, "Die Luftschlacht um Malta" (The Air Battle of Malta); C. Wilmot, "Der Kampf um Europa" (The Struggle for Europe); J. Priller, "Geschichte eines Jagdgeschwaders" (History of a Fighter Wing); K. v. Tippelskirch, History of the Second World War.

of the entire German Luftwaffe, approximately 75% were stationed on the eastern front and 25% on the western front²³. This distribution of strength meant that the Luftwaffe was clearly superior in every respect to the Polish Air Force, whose combat strength was only about 50% of its authorized strength of 800 aircraft, but considerably inferior to the air forces of the western enemies. On the other hand, it must be remembered that the French and British air forces were far behind in technology and in the percentage of total strength available for immediate employment and that about half the air units of both countries were stationed in the colonies. These facts served to alter the ratio of actual strength very definitely to the advantage of the Germans.

The air war against Poland was launched by a concentrated attack on the Polish Air Force, carried out by the majority of the offensive air units of the Luftwaffe. The Poles offered hardly any organized resistance, and the Polish Air Force had been completely eliminated for all practical purposes by the end of the second day of operations, leaving the Luftwaffe in undisputed mastery of the skies. Air supremacy established, the Luftwaffe next carried out concentrated attacks on targets whose bombardment contributed either directly or indirectly to the air support of Army operations; it must be admitted that the intervention of the Luftwaffe played a significant part in bringing the campaign to a rapid conclusion. On the whole the Luftwaffe proved itself superior to the enemy, both from the point of view of the number of aircraft available for immediate employment and in terms of the standard of training and the professional competence of the crews. Nevertheless, in spite of the overwhelming success achieved, there were also crises and setbacks, which made it clear that improvement was needed in certain fields. The Army showed marked interest in increased air support from the Luftwaffe.

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23 - See Appendix 9: The German Luftwaffe and the Enemy at the Beginning of the Polish Campaign (summary compiled from the "surveys" of the Karlsruhe Document Collection; based on the key figure of twelve aircraft per squadron).

In conclusion we must not forget that the Polish campaign -- thanks to the hesitation of the western enemies -- had remained a single-front war after all. The few British air attacks on German naval installations and on the naval air units were so ineffective and the nocturnal dropping of leaflets so insignificant that they had no influence whatsoever on Germany's conduct of operations. Thus, due to the inactivity of the Western Powers, a multiple-front war had been avoided for the time being and Hitler could point with pride to the fact that for the first time in sixty-seven years the danger of a war on more than one front had been eliminated -- something which German leaders had ardently desired ever since 1871, but which they had always considered impossible²⁴.

2) The Campaign in France in 1940 and the Battle of Britain

The occupation of Denmark and Norway in the spring of 1940 (the success of these operations, particularly the one in Norway, was primarily due to the German Luftwaffe, which had carried out the air transport of paratroopers, air landing forces, and supplies) and the offensive in France in May 1940 were also single-front wars. During the struggle against France and England it was even possible to commit the Luftwaffe as a concentrated force against a single enemy without having to release any forces to other fronts. The campaign in France involved the assignment of the Luftwaffe to the following missions: to destroy the French Air Force; to disrupt the strategic deployment of enemy forces by means of air attacks on transport facilities and routes; to provide air support for the Army at the focal points of the attack and to furnish air protection for important military and industrial installations in the Reich. These operations were in the charge of the Second and Third Air Fleets, which had almost all the air units of the Luftwaffe under their command for the duration of the action. As far as numbers were concerned, the combined air forces of France,

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England, Belgium, and Holland

24 - Hitler's speech of 23 November 1939 before the Commanders in Chief
and Commanding Generals of the three Wehrmacht branches.

were superior to the German Luftwaffe²⁵. But this advantage was largely offset by the fact that the Luftwaffe possessed better aircraft, better-trained personnel, and a higher degree of combat readiness. The combat readiness of the Allied air forces cannot be termed other than inadequate. As of 10 May 1940, the Dutch Air Force, for example, had only 118 aircraft (60 fighters, 9 (!) bombers, and 49 reconnaissance aircraft, 36 of which could be employed as light bombers) ready for immediate employment, in other words only about 40% of its authorized strength of 300 aircraft²⁶. The French and British air forces were weakened considerably by the absence of the air units assigned to the colonies.

As had been the case in the Polish campaign as well, the Luftwaffe succeeded -- in a surprise attack -- in striking a devastating blow at the enemy air forces both on the ground and in the air and in eliminating them from action altogether within a very short time. Air supremacy having been established, the majority of the offensive air units were freed for direct support actions on behalf of the Army; here the dive-bombers, especially, contributed a great deal to breaking the enemy's resistance. All the same, the Luftwaffe was not able to complete its mission of destroying the remainder of the British Army at Dunkirk and of preventing its escape to England. The weather and the not inconsiderable losses inflicted on the Luftwaffe by the British fighter aircraft made it impossible for the German air units to fulfill this mission.

On the whole, however, the campaign in the west had served to demonstrate once more the superiority of the German Luftwaffe, although it must be borne in mind that so far the Luftwaffe had been employed only in tactical or at best very limited strategic operations -- it had never yet participated in a really

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- 25 - See Appendix 10: The German Luftwaffe and the Enemy at the Beginning of the Campaign in France in 1940 (based on data from the office of the Quartermaster General, Luftwaffe, Branch VI, Luftwaffe General Staff).
- 26 - From a report by the representative of the Chief, Army Archives, in Holland on the activity of the Dutch Air Force during the period from 10 to 17 May 1940.
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large-scale strategic mission. This did not come about until Hitler decided to attack England, primarily from the air, in order to wear down the island kingdom and prepare it for a German landing. It was at this point that the Luftwaffe was to show whether or not it was capable of accomplishing a truly strategic mission.

It does not lie within the purview of the present study to investigate in detail the reasons why this operation, which has gone down in history as the Battle of Britain, ended in failure for the Germans. The overall picture was approximately the following: Owing to the occupation of Norway, Denmark, and the Dutch-Belgian-French portions of the Channel coast, the German Luftwaffe had obtained an improved base of operations against England, since the strip of German-occupied territory formed a semicircle around southeast England. Goering encouraged Hitler in his conviction that the Luftwaffe attacks on England would soon drive the British to the point where they would be willing to negotiate for peace. Thus, in Directive No. 17, dated 1 August 1940, Hitler issued the following instructions to the Luftwaffe²⁷: "Utilizing all the forces at its disposal, the Luftwaffe is to defeat the Royal Air Force as soon as possible. Attacks will be directed primarily against the enemy air units, their ground organization installations and supply system, further against the armament industry, including the factories producing antiaircraft artillery equipment. After local air superiority has been established, the air war will be extended to British harbors, particularly those contributing to the distribution of foodstuffs to the interior of the country."

Luftwaffe attacks having been restricted so far to fighter and fighter-bomber raids on the southeastern coast of England, the air campaign against England was launched on 8 August 1940 in compliance with Directive No. 17, with the offensive air units of the Second and Third

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27 - Von Tippelskirch, op. cit., page 118.

Air Fleets being concentrated against the Royal Air Force units and their ground organization installations. The actual German and British combat strength at the beginning of the Battle of Britain has not yet been accurately determined even today, but the sources used as a basis for official German and British publications on the subject can be assumed to be fairly reliable²⁸. The Luftwaffe's attempt to defeat the Royal Air Force was a failure, since the British soon began to use their advance airfields as take-off bases only, utilizing the ground organization installations lying in the interior of the country and thus beyond the range of the German bomber units. Moreover the hopes cherished by German military leaders -- that the mere appearance of the German fighters would be enough to entice the British fighters into aerial combat, thus permitting their decimation by virtue of the technical superiority of the German aircraft -- proved fallacious. British air leaders stubbornly refused to cooperate and consistently sent up their fighters only against the German bomber units.

Thus the Luftwaffe had no choice but to alter its method of combat, and on 7 September 1940 it shifted to combined large-scale attacks, especially on the city of London. This forced the British to employ their fighter units in aerial combat, which proved extremely costly for both sides. But the British fighters had the advantage here because they were able to exploit the full flight duration of their aircraft and because they could count on landing in their own territory in case their aircraft should be shot down (in the Battle of Britain the British lost a total of 915 fighter aircraft but only 412 fighter pilots), while the German pilots had to spend two-thirds of their flight time in the approach and return flights and -- when they were forced to bail out because their aircraft were hit -- were bound to be taken prisoner by the enemy, thus becoming unavailable for further employment. These disadvantages

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28 - See Appendix 11: A Comparison of Luftwaffe and Royal Air Force Strength at the Beginning of the Battle of Britain (based on a study by Branch VIII, Luftwaffe General Staff, dated 21 September 1944).

were further augmented by the extremely high losses sustained by the German twin-engine fighters and by the bombers employed without fighter escort against more remote targets -- in short the entire question of fighter escort was a tremendous problem because of the differences in aircraft speeds and operational ranges. Finally, in October 1940, the problem was more or less solved by shifting the bomber attacks from day to night. To be sure this move decreased German losses by a good deal, but by the same token it also decreased the degree of success achieved, for while the night attacks had fairly devastating effects over large areas, the bombers were unable to score direct hits on specific targets. In May 1941 the Battle of Britain was discontinued by the Luftwaffe, which had not succeeded in accomplishing its assigned mission.

The underlying reasons for this first major failure of the German Luftwaffe lay in the fact that it had been charged with a task for which it possessed neither the strength, the standard of training, nor the equipment. For this was strategic air warfare on a fairly large scale, to be carried out without the help of the other Wehrmacht branches, and the Luftwaffe was simply not prepared for it. Specifically, the reasons for the failure were the inadequate numerical strength of the Luftwaffe units, the lack of an efficient long-range bomber, the inadequate operational range of the available bombers, twin-engine, and single-engine fighters, the insufficient bomb-carrying capacity of the bombers, the occasional tactical mistakes made in the conduct of bomber operations and in the selection of bombardment targets, the lack of centralized command and the inadequate training and equipment of the air crews for this type of commitment, the inaccurate assessment of the effectiveness and the duration of a strategic air war and of the will to resist of the British government and the British people, the rapid reinforcement of the British fighter arm and its stubborn

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determination to succeed, the well-organized British air defenses and the radar system, the frequently very unfavorable weather conditions, etc.

At the end of the Battle of Britain the German Luftwaffe was numerically just as strong as at the beginning, but its striking power had been sharply reduced by the loss of so many of its best-qualified personnel. The hoped-for success had failed to materialize, because the demands made upon the Luftwaffe were incapable of fulfillment. Thus Hitler was all the more willing to abandon the plan for an invasion of the British Isles, which he had agreed to only half-heartedly from the beginning, and to turn his attention to his plans for Russia. There may well be a good deal of truth in Chester Wilmot's statement²⁹ to the effect that 1940, the year of Hitler's greatest triumph, was also the year of his first major setback, the repercussions of which ultimately overshadowed all his victories and -- coupled with Great Britain's refusal to consider his peace overtures -- drove him to his fatal course of action against the Soviet Union.

3) The War in the Mediterranean, 1940/41

Even while the Battle of Britain was still in progress, it proved necessary to assign Luftwaffe units to the support of the Italian Air Force. At the end of 1940 and the beginning of 1941 German air transport units had helped to ferry Italian forces to Albania, and this was soon followed by the assignment of the German X Air Corps, with approximately 150 bombers and dive-bombers, 50 single-engine and twin-engine fighters, as well as a number of torpedo and aerial mine aircraft, from Norway to Sicily with orders to establish air superiority in the Mediterranean and above all to eliminate the island of Malta as an enemy naval and air base and thus to secure the Italian supply lines to North Africa.

The air attacks on Malta, which at that time was defended by only a single British fighter group with approximately twenty-five aircraft, went on from January until May and did manage to eliminate the island as an effective military factor -- at least temporarily.

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29 - Wilmot, op. cit., page 4.

The elimination of Malta as well as the success of Luftwaffe attacks on British convoys, aircraft carriers, and (transport supply) ships finally forced the British to route all their convoys to Egypt and India via the Cape of Good Hope and to give up the practice of stationing large naval forces in the harbor of La Valette; thus Malta was, for the time being, deprived of its effectiveness as a naval and air base. The German Luftwaffe had actually succeeded -- to an even greater degree after the occupation of Crete -- in establishing air superiority in the Mediterranean and in securing the Italian supply line to North Africa. British sources are unanimous in stating that Malta could not have withstood a combined attack by land, air, and naval forces in the spring of 1941. And the definitive capture of Malta would have blocked British access via the Mediterranean to Egypt, to the oilfields of Iraq, ~~and~~ and to India, and would have improved the Axis air situation in the Mediterranean for a long time to come. Instead, at the beginning of June 1941, the X Air Corps was transferred to East Prussia, thus giving the enemy an opportunity to regain his lost position in the Mediterranean.

b. The Unleashing of a Multiple-Front War by the Attack on Soviet Russia, 1941

We have already mentioned that the lack of a decisive victory by the German Luftwaffe in the war against England and the refusal of the British government to enter peace negotiations with Germany were two of the main factors underlying Hitler's attack on the Soviet Union. Goering and the Luftwaffe High Command objected strenuously to Hitler's decision. So far the German Luftwaffe had proved itself superior to its enemies, and the war on two fronts had not proved disastrous because the Luftwaffe had always been able to concentrate its forces on the decisive front.

But the Battle of Britain had already demonstrated the limitations of the Luftwaffe. An extension of military operations to Soviet Russia meant not only a multiple-front war -- in the west, the east, and the south -- but was also bound to result in a dangerously wide dispersion of the available forces. To begin with, an attack in the east demanded the employment of the majority of the Luftwaffe in the eastern theater and thus the cessation of concentrated attacks on the British Isles. And this meant that the sacrifices made in the west so far had all been for nothing. The extensive plans to weaken England's position by occupying Gibraltar and Egypt had to be abandoned. Great Britain was granted a respite to reorganize and recover her strength.

But it was no easy task for Luftwaffe leaders to justify their objections to the Russian campaign in Hitler's eyes. They had to admit that the Battle of Britain could not be continued with any better prospects of success until the Luftwaffe had been thoroughly reorganized and reequipped, and this would not only take considerable time but would also require the assignment of another 500,000 personnel to the air armament industry and the allotment to the Luftwaffe of a considerable portion of the quota of Germany's armament potential assigned to the other Wehrmacht branches. Hitler countered with the premise that the continuation of the air war against Great Britain depended on Germany's undisputed possession of the Rumanian oilfields, which lay in Bessarabia, just 100 miles from the Soviet Russian border. And not until the Soviet threat could be eliminated, which would require the commitment of the entire German Wehrmacht, could the war against England be continued with any hope of achieving a decision. In order to eliminate the Soviet threat, the Russian armed forces would have to be destroyed or driven as far east as the middle and lower course of the Volga River so that the Soviet air forces could no longer attack the German Reich,

and the German Luftwaffe, on the other hand, could be employed to destroy the Russian armament industries in the Ural Mountains. On the basis of his evaluation of the Russian foe, Hitler was convinced that the campaign would be all but over in six weeks, and he placated Goering with the promise that then the German Luftwaffe could return in full force to the operations against England.

For the Luftwaffe, Hitler's decision to attack the Soviet Union meant the final irrevocable step towards a worldwide multiple-front war. Luftwaffe leaders advocated the view that, in spite of the campaign in Russia, the operations against England should be carried on at least in reduced scope in order to make certain of doing lasting damage to the British armament industry and supply system. Thus the Luftwaffe had three missions to fulfill concurrently -- extensive air support operations in the east, continuation of the attacks over English territory, and the furnishing of adequate air protection for the Reich, particularly for the industrial plants located in the western part of Germany. The Luftwaffe High Command was well aware that this complex of missions precluded its following the tried and tested principle of concentrating the majority of its forces on a single front when necessary, but it had no other alternative if the problem was to be solved at all. Inasmuch as the continuation of the operations against England demanded the retention of a substantial twin-engine bomber force in the west, Luftwaffe leaders decided to restrict their participation in the eastern campaign to the support of the Army and to refrain from the bombardment of Soviet industry. Thus Directive No. 21, issued by the Wehrmacht High Command after concurrence with the Luftwaffe High Command, contained the following guidelines for combat³⁰:

"The Luftwaffe will be expected to release such strong forces for support of the Army in the eastern campaign that ground operations

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can be brought to a rapid and successful conclusion, while at the same time guaranteeing sufficiently strong air defenses to keep damage to the eastern territory of the Reich to a minimum.

30 - Directive No. 21, Operation BARBAROSSA, excerpt.

"His concentration of forces in the east will be guided by the requirement that our entire operational area as well as the areas in which our armament industries are located must be adequately protected against enemy air attack and by the requirement that the operations against England, and particularly against British import activity, must not be allowed to bog down completely."

The Directive continues:

"It will be the mission of the Luftwaffe to paralyze and to eliminate insofar as possible the activity of the Russian Air Force and to provide whatever air support may be required by the Army at the focal points of its operations..... In order to permit the concentration of all air units in operations directed against the enemy air forces and those designed to provide direct air support for the Army, the Soviet armament industry will not be attacked during the main phase of the operation. Only when the initial mobile operations have been successfully concluded will such attacks be undertaken, and then primarily against industries located in the Urals."

To be sure, the direct support of Army operations under these circumstances involved air operations deep in the heart of enemy territory; all the same it did make the Luftwaffe dependent upon the method of operation selected by the Army -- and this to an extent which was not fully apparent in the beginning, but which was to prove more and more disadvantageous as operations progressed.

Practical preparations for the multiple-front war began in the fall of 1940. The units employed in operations against England were gradually withdrawn up to May 1941 and given training in combined Luftwaffe-Army operations to fit them for the campaign against the Soviet Union. A start was made in the systematic reconnaissance of the Soviet ground organization,

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transportation network, industrial plants, etc. Higher-level staffs were given their assignments and oriented in their coming missions. The Third Air Fleet remained in the west to carry on the air war against England,

while the air defense of the Reich was concentrated in the hands of the Luftwaffe Commander, Center (Luftwaffenbefehlshaber Mitte). At that time this posed no particular problem; to be sure, the territory to be defended had grown considerably as a result of the occupation of the North Sea and Channel coasts, but at the same time this meant that the enemy had been pushed further back from the industrial areas vital to Germany's war effort; besides, German air leaders were certain that there would be no appreciable increase in Great Britain's bomber arm until 1942 at the earliest. Since the "inner line" of defense was still firmly in German hands, it seemed certain that the retransfer of the German bomber units from the east to the west -- promised by Hitler for six weeks after the opening of the Russian campaign -- would encounter no difficulty. After the first six weeks, the Wehrmacht High Command believed that the operations of the eastern armies could be adequately supported by the dive-bomber ^w and close-support units alone.

On the industrial sector, the production of dive-bombers, which -- as a matter of fact -- had been slated for reduction, was increased. Apart from this, no attempt was made to expand the air armament program, since the Luftwaffe High Command relied implicitly on Hitler's assurance that from the autumn of 1941 on Germany's armament production capacities would be expanded considerably by the release from military service of several hundred thousand men and that a substantial part of the increased capacity would be devoted to armaments for use in the war against England. Admittedly, this meant the loss of a year in the arms race with England and the United States, but in view of the hoped-for elimination of the threat from the east on the one hand, and the still favorable military situation in the west, this disadvantage was accepted as a necessary risk.

German air leaders regarded the Russian Air Force as inferior to the

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Luftwaffe in respect to training, performance, technology, personnel, and equipment. Even its recognized numerical superiority -- the Luftwaffe High Command estimated the combat aircraft strength of European Russia at approximately 5,700 -- could not make up for these shortcomings.

It was on the basis of this evaluation that the distribution of German Luftwaffe strength was undertaken at the beginning of the campaign in the east³¹. The majority of the air units were assigned to the east, distributed among the First, Second, and Fourth Air Fleets, each one of which was assigned to work closely together with one of the Army Groups. But it cannot be denied that this plan of assignment in itself led to a dissipation of the available air strength. The retention of relatively strong forces on other fronts, especially in the west, meant a serious weakening of air strength in that theater of operations which was most important at the moment and shifted the ratio of strength in the east in favor of the enemy³². The recently concluded campaign in the Balkans, although it had provided useful experience for the Luftwaffe, had also resulted in relatively high losses, particularly among the air transport units during the occupation of Crete, losses which were soon to make themselves painfully felt on the training sector and in the replacement personnel program. Thus, while Luftwaffe leaders were still able to look ahead with confidence to the coming conflict in the east, there was no denying that the Luftwaffe's overall situation had undergone a change for the worse as a result of the extension of the war to additional fronts. The British, for example, -- and not entirely without ^t justification -- hailed the weakening of the German air front in the west as a "victory in the Battle of Britain". Until May 1941, the German Luftwaffe possessed indisputable air superiority in central Europe. This had been made possible by the tight concentration of all available air units on one front at a time, a method of operation for which the command organization, the personnel, and the equipment of the Luftwaffe were adequate in every respect. Whether or not this superiority could be maintained in a multiple-front air war, time alone could tell.

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- 31 - See Appendix 12: Employment of the German Luftwaffe at the Beginning of the Multiple-Front Air War on 22 June 1941 (based on investigations by H. Plocher and on a compilation of data from the Karlsruhe Document Collection).
- 32 - See Appendix 13: Luftwaffe Strength in the East as Compared with That on other Fronts and that of the Enemy as of 22 June 1941 (based on a compilation of data from the Karlsruhe Document Collection).
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Section 5: Multiple-Front Air War, its Problems and their Effects on the Conduct of Air Warfare by the German Luftwaffe³³

a. The Cardinal Problems of a Multiple-Front Air War

With the beginning of the campaign against Soviet Russia in 1941, Luftwaffe leaders were immediately confronted with the cardinal problems of an air war on a number of fronts. The questions of space and time, of strength and ratio of strength for attack and defense, of technology, armament, and economic strength, the necessity of considering the other Wehrmacht branches in the overall conduct of operations,

33 - The following sources were consulted in the preparation of Section 5: S. Freiherr von Falkenstein, Draft for Study 178; W. Grabmann, Study 164; W. Schwabedissen, Study 175; P. Deichmann, "Gedanken zur Studie 178" (Thoughts on Study 178), Thoughts on the Subject of Air Warfare on Several Fronts, and "Gedanken zur Frage der Bedeutung des Raumes für den Luftkrieg" (Thoughts on the Significance of Space in Air Warfare); F. Greffrath, "Luftschutz und Luftwaffenrüstung" (Air Defense and Air Armament); Directive No. 21 (Operation BARBAROSSA); Karlsruhe Document Collection -- "Die Wechselwirkungen zwischen Strategie und Rüstung 1939-1945" (The Interaction of Strategy and Armament, 1939-1945); "Die Ergebnisse der Wechselwirkungen zwischen Strategie, Rüstung, Taktik und Technik" (The Results of the Interaction of Strategy, Armament, Tactics, and Technology); Übersicht über die Entwicklung der Einsatzbereitschaft 1938-1944" (A Survey of the Development of Operational Readiness from 1938 to 1944); "Die Stärken der gegnerischen Luftwaffen August/September 1944" (The Strength of the Enemy Air Forces in August and September 1944); "Einsatzbereitschaft von Bombern, Zerstörern, Jägern und Nachtjägern" (The Combat Readiness of Bomber, Twin-Engine, Single-Engine, and Night Fighter Units), based on excerpts from reports issued by the Quartermaster General, Luftwaffe; "Gesamtflugzeugproduktion deutscher Flugzeuge 1939-1945" (Total German Aircraft Production, 1939-1945), based on reports by the Quartermaster General, Luftwaffe; ~~Währungslink~~ Survey of the Conduct of the Air War (study by Branch VIII, Luftwaffe General Staff, 21 September 1944); Report by the Luftwaffe Operations Staff, Intelligence Branch (LuFu Stab Ic/III), "Stärken der britischen, amerikanischen und französischen Fliegertruppe, Stand 1.10.43" (The Strength of the British, American, and French Air Forces as of 1 October 1943); Report by the Luftwaffe High Command, Operations Staff, Intelligence (OKL Fu Stab Ic), "Auf-

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Footnote 33 (cont)

marsch der alliierten Fliegertruppe am 28.2.45" (The Deployment of the Allied Air Forces as of 28 February 1945); The von Rohden Project, 1945 -- "Ursachen der deutschen Niederlage 1945" (Causes of Germany's Defeat in 1945); IMT, Volume XXXVII, pages 472-475, Volume XXXXI, pages 123/124; H. H. Arnold, Global Mission; C. von Clausewitz, "Vom Kriege" (On War); H. Conradis, "Nerves, Heart, and Sliderule"; W. Gaul, "Die deutsche Luftwaffe während der Invasion 1944" (The German Luftwaffe during the Invasion in 1944); A. Kesselring, Thoughts on the Second World War and A Soldier's Record; J. Priller, History of a Fighter Wing; H. Riegler, The World War 1939-1945, Part III; H. von Rohden, "Die Luftverteidigung des deutschen Reiches im Weltkrieg und ihre Lehren" (The Air Defense of the German Reich during World War II and the Lessons it Taught); H. Rumpf, "Deutsche und englische Luftstrategie im zweiten Weltkrieg" (German and British Air Strategy during World War II) and "Die Industrie im Bombenkrieg" (Industry during the War of Bombardment); K. von Tippelskirch, History of the Second World War; C. Wilmot, The Struggle for Europe; Dr. T. Weber, The Air Battle of Malta; S. Zantke, Strategic Air Operations by the German Bomber Units during the Final Stage of World War II.

the potential employment of personnel and materiel reserves, the questions of establishing points of main effort and of concentrating the available forces effectively in regard to the missions to be accomplished, the evaluation of the enemies' military and economic potential as well as the vulnerability of their resources -- all these questions had to be weighed in terms of their relative importance and reciprocal repercussions; at the same time they were questions whose solution was definitively limited by the factors of time, space, and people, i.e. the relative strength and determination on the part of a nation to fulfill the missions demanded of it during a multiple-front air war. In addition, depending upon the specific situation, the following factors played a role of greater or lesser significance: geographical position, climatic conditions, the standard of training and the potential capacity of the training program, supply, logistics, transport, etc.

The factor of space is bound to be of paramount importance in a multiple-front air war, and this importance was fully recognized by Hitler in 1943 when he made the following statement: "We are lost unless we are able to extend our area. Space is one of the most important military factors. You cannot carry out military operations effectively unless you have the space to do it in. Only a nation with ample space at its disposal can survive the wars of the future."³⁴ Economic strength also depended on the factor of space -- space in which to establish an armament industry, exploit raw material resources, and carry on production in relative security from enemy ground and air attack. From this point of view, Germany's endeavors to expand territorially were justified -- even in terms of the employment of the Luftwaffe in an air war on several fronts -- as long as the degree of expansion did not exceed the biological potential

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of the German people and the military and political resources of the Reich.

34 - Retranslation of the book, "Hitler Directs his War", page 25.

Apart from the ratio of strength, space and time were the factors which determined the form of war, both for the German Reich, fighting along the "inner line", and for the Allies, deployed along the "outer line". The German Luftwaffe was able to profit by the advantages of the inner line, especially the ability to achieve surprise concentration of superior forces on a single front when necessary -- as Clausewitz put it, "The best strategy is to be as strong as possible, in general to begin with, and at the decisive point in operations in particular"³⁵ -- as long as it was in a position to defeat its enemies in blitzkrieg fashion one after the other. After the spread of the air war to additional fronts, these advantages were gradually lost, especially since the limited operational range of the German aircraft precluded commitment on another front without previous deployment operations. In contrast, thanks to the greater range of his aircraft, the enemy -- on the outer line -- was able to assemble widely scattered air units without delay for concentration on a particular target or -- by moving his combat airfields from one theater to another, across borders and seas -- to alter the situation in his own favor and to tie down the enemy forces inside the inner line, while attacking at a different point with an unexpectedly strong force, thus saving himself from defeat. Only an extremely strong air force inside the inner line could have met such a strategy of assault and withdrawal without itself being destroyed by attrition, especially since the enemy continually increased the operational range of his aircraft, so that soon the inner line no longer afforded any haven to which the Luftwaffe units could withdraw in safety, while the enemy on the outer line was able to withdraw his units as well as his training activity to areas where they were entirely safe from German attack. Even the fact that the enemy aircraft could utilize different routes in approaching and leaving their targets in German terri-

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tory, thus dissipating German antiaircraft artillery defenses, was a great advantage.

35 - Von Clausewitz, op. cit., page 161.

Thus, as it turned out, the advantages belonged to the outer line rather than to the inner one in the multiple-front air war on which the Luftwaffe embarked in June 1941. This type of warfare made greater and more exacting demands on the Luftwaffe than on the Army, and it soon became apparent that air warfare on several fronts could be carried out effectively only if the overall air situation was secure.

In view of the fact that the advantages of the outer line were also augmented by a steady growth in the numerical and technical superiority of the enemy air forces, there could hardly be any doubt as to the final outcome of the struggle in the air.

b. The Unfavorable Effects of the Time Factor

During the blitzkrieg campaigns in Poland, Norway, and France the time factor had acted in favor of the German Luftwaffe and, coupled with its technological superiority and the factor of surprise, had brought about rapid and decisive victories. But even in the Battle of Britain the time factor began to work against the Luftwaffe, and its disadvantageous effects became all the more intense with the beginning of an air war on several fronts.

Despite the Wehrmacht's initial success in the east, the campaign in Soviet Russia soon exceeded the boundaries of a blitzkrieg; its demands on the Luftwaffe grew steadily and made it impossible to maintain adequate forces on other fronts, such as in the west. Thus the Western Allies gained the time they needed to carry out their extensive air armament programs without appreciable enemy interference and to complete the training of their air forces undisturbed. At the same time, the time factor was gradually wearing down the German Luftwaffe. Lack of time as well as the lack of military and economic resources made it impossible for Germany to tighten her armament effort, dissipated among too many different types of equipment,

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by concentrating on fewer items. As a result, the Luftwaffe was bound to lose the final struggle against an enemy whose forces were served by a well-organized, intensive program of arms production capable not only of maintaining, but also of increasing their strength constantly.

As the war progressed, more and more nations joined the ranks of Germany's foes, adding to their overall military potential and with this, of course, also to the strength of the enemy air forces. The maintenance of Germany's initial superiority in the air became more and more difficult, until ultimately this superiority turned into clear inferiority.

Thus time worked against Germany and for the Allies, a circumstance which had been accurately foreseen by German air leaders, but which they were powerless to change once the struggle had turned into a long-term air war of attrition on several fronts.

c. The Unfavorable Effects of the Space Factor

But the factor of space was to prove ~~an~~ even more disadvantageous than that of time for the German Luftwaffe in its multiple-front air war.

The expansion of the area of operations, which brought with it the necessity of employing Luftwaffe forces on various fronts at the same time, the variations in climatic conditions on the different fronts, the difficulties encountered in the transport of supplies, etc. -- all these created new problems and tasks, some of which developed slowly, while others made their appearance with disconcerting suddenness.

During the first phase of the multiple-front war, in which -- for military and economic reasons -- Germany continually extended her territory (the occupation of the Crimea and the efforts to capture the Caucasus Mountains in order to secure the Rumanian oilfields and thus to broaden the fundament of the German fuel industry), the additional space devoured the Luftwaffe and led to a dissipation of its forces. During the period of the Reich's greatest expansion³⁶, the Luftwaffe was no longer able to

36 - See Appendix 14: The Expansion of the German Sphere of Influence, 1938 to 1942.

cover this area adequately, in terms of either offensive or defensive air operations. The increasing need for air transport capacity led to the indiscriminate requisitioning of Ju-52's and instruction crews from the flight schools, a measure which seriously weakened the training program. Because she was fighting on the inner line, Germany was forced to extend her territory in all directions, in order to assure herself of adequate protection against enemy air attack. This, in turn, necessitated the establishment of an adequate ground organization network, well stocked with supplies and spare parts and ready for use at all times, over the entire area, and this naturally required the deviation of too much of Germany's available equipment to the supply depots. The territorial expansion inherent in the seizure of areas vital to the German economy and to the strengthening of Germany's military situation finally led to an extension of her front lines which far exceeded existing German military potential as well as the ability of the Luftwaffe to cover these lines adequately.

During the second phase of the multiple-front war, when the general retreat began and the individual theaters of operations gradually shrank more and more³⁷, the factor of space played an even more unfavorable role than before as far as the German Luftwaffe was concerned. For the space available had now become so limited that the Luftwaffe no longer had enough room for development of its strength, for its training program, or for the rest and rehabilitation of its units. The enemy approach routes grew steadily shorter; the heavily concentrated and almost continuous enemy bombardment raids hindered production and disrupted armament activity, delayed supply transports, led finally to a complete disorganization of transport activity and made the systematic transfer of Army and Luftwaffe elements and the concentration of German fighter forces against an individual enemy bomber stream completely impossible.

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37 - See Appendix 15: Germany's Situation as of 20 July 1944.

In this way the factor of space gradually developed into an extremely unfavorable one for the German Luftwaffe, forced, as it was, to fight on the inner line, and one might well say that it influenced the entire outcome of the war in a decidedly unfavorable fashion. By the time of Germany's capitulation in 1945, the area of the Reich had shrunk to almost nothing³⁸.

d. The Unfavorable Development of the Strength/Space Ratio for the German Luftwaffe

1) General

The longer the multiple-front war lasted, the more unfavorable was the development of the ratio of Luftwaffe strength to the space to be covered. Forced into commitment in a number of operational areas at the same time, the Luftwaffe units found their combat strength dwindling on the individual fronts, which made the establishment of an effective point of main effort out of the question. This situation began to be apparent as early as the beginning of the campaign in Soviet Russia. The bomber units withdrawn from employment against England -- the units which in Hitler's opinion could be transferred back to the west at the end of six weeks -- remained in the east and even had to be reinforced by the withdrawal of additional units from the west. Likewise, the contemplated release of several hundred thousand men from the Army for assignment to the air armament industry, in order to prepare for the renewal of intensive air operations against England, proved to be impossible. On the contrary, as it turned out, the Army, too, needed additional forces and some of these had to be requisitioned from the air armament factories. Nevertheless, until the summer of 1942 the Luftwaffe managed to concentrate its strength against one single enemy at a time and thus to maintain its air superiority. But from this point on, and especially after the tremendously high losses suf-

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ferred at Stalingrad, German Luftwaffe strength decreased steadily, while the strength of the enemy air forces just as steadily increased. To be sure,

38 - See Appendix 16: Germany's Situation at the Time of Her Capitulation.

enemy numerical superiority had existed even in 1941; but at that time the greater experience and better technological equipment of the German Luftwaffe had made up for it. While the enemy air forces, particularly from 1943 on, steadily increased their numbers and at the same time achieved superiority in the technological field, it was only ~~ix~~ with the greatest difficulty that the German Luftwaffe was able to maintain the status it had had in 1942³⁹. Not even the huge increase in German air armament production, which -- thanks to an all-out effort -- reached its peak in 1944, was enough to increase the actual strength and the combat readiness of the Luftwaffe to any appreciable extent. The losses suffered on the front and at home used up almost all the production⁴⁰. The constant transfers and losses, coupled with the fact that there was never a lull in operations in which the units could rest and be brought up to strength, made themselves felt in a sharp drop in combat readiness, which -- on the average -- was from 60 to 65% of the actual strength, naturally a great deal lower than the authorized strength. After the Russian campaign in 1941, the combat readiness of the German Luftwaffe even sank to 44% as a result of the high losses suffered during ground support operations⁴¹.

After the Allied landing in North Africa and the fall of Stalingrad, it became painfully obvious that the multiple-front war had confronted the Luftwaffe with an insoluble problem. Its strength was simply not sufficient to permit it to meet -- even in part -- the demands made upon it in the various theaters of operations. Attempts to increase air strength on one front automatically resulted in setbacks on others. Transport aircraft, for example,

39 - See Appendix 17: A Comparison of the Actual Strength of the German Luftwaffe with that of the Enemy Air Forces, 1941-1945 (based on data issued by Branch VIII, Luftwaffe General Staff, on 21 September

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Footnote 39 (cont)

1944 and by the Luftwaffe High Command, Operations Staff, Intelligence Section).

- 40 - See Appendix 18: The Relationship between Production, Actual Strength, and Combat Readiness in the Luftwaffe, 1939-1944 (based on "The Results of the Interaction of Strategy, Armament, Tactics, and Technology").
- 41 - See Appendix 19: The Ratio of Combat Readiness to Actual Strength in the Luftwaffe from September 1939 to December 1944 (based on "A Survey of the Development of Operational Readiness from 1938 to 1944").
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which were urgently needed for air supply operations to the North African theater in 1942, were simply not available later on for the much more urgent supply operations to Stalingrad. The extension of its services over all of Europe to North Africa had forced the Luftwaffe to spread its forces too thinly. Thus, for all practical purposes, the war against England must be viewed as having been discontinued with the beginning of the campaign in Soviet Russia.

While the German Luftwaffe, from the summer of 1941 to the spring of 1943, was tied down in Russia and Africa, distributed over a vast territory and subject to a dangerously high degree of attrition, in the west and the south the catastrophe which was destined to turn German air superiority in central Europe into air inferiority was beginning to take shape. The Anglo-American air forces, undisturbed by the enemy, had built up an offensive air arm which began to be effective from mid-1943 on. In connection with the shrinking of the area dominated by the German Reich as a result of the landings in Sicily and later in Italy (1943), of the Russian advance towards the eastern borders of Germany (1943/44), and of the invasion in France (1944), the Allied air forces succeeded in eliminating German air superiority in central Europe and in gradually establishing their own air superiority -- which, thanks to their overwhelming numerical superiority, finally developed into air supremacy over the entire territory of the German Reich.

The situation in the Mediterranean and particularly the growing threat to the Reich forced Luftwaffe leaders to accelerate the build-up of the air defense forces and to assign top priority to the production of fighter aircraft. This trend grew rapidly in importance and, in 1944, led to the disbanding of a large number of bomber units

in favor of the activation of new fighter units and the bringing of existing units up to strength. In reality this meant Germany's renunciation of offensive air warfare and her acceptance of the doctrine of air defense, a basic shift which was not altered by the few sporadic air attacks which followed later on. Whereas the bomber and fighter units were about equal in strength in 1939 and 1940, and from 1941 through 1943 bomber strength ranged from 50 to 75% of the fighter strength, in 1944 the ratio of bombers to fighters sank to about 1:7.5⁴². From 1943 on, the actual strength of the bomber and twin-engine fighter forces decreased, at first gradually and then more and more rapidly, while the actual strength of the single-engine and night fighter forces increased considerably during the same period⁴³. But neither the deactivation of the bomber units nor the greatly increased production of fighter aircraft was able to bring about a change in the air situation. The overwhelmingly superior Allied air forces and the shrinking of the German area of operations sealed the fate of the German Luftwaffe.

The unfavorable development of the space/strength ratio had become evident during the first phase of the multiple-front air war in the fact that the area to be covered by the Luftwaffe was too vast for its relatively weak numerical strength, leading inevitably to a dissipation of this strength; during the second phase the area had become too small, and it was this fact -- in combination with the overwhelming air superiority of the enemy -- which led to the defeat of the Luftwaffe. This is illustrated again and again in the subsequent account of developments in the various theaters of operations.

42 - See Appendix 20: Relative Strength within the German Luftwaffe from 1939 to 1944 (based on "The Results of the Interaction of Strategy, Armament, Tactics, and Technology").

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43 - See Appendix 21: The Actual Strength of the Bomber, Twin-Engine Fighter, Single-Engine Fighter, and Night Fighter Forces from June 1941 through December 1944 (based on excerpts from the reports issued by the Quartermaster General, Luftwaffe, concerning the combat readiness of the flying units).

2) The Dwindling Strength on the Eastern Front

The surprise attacks of the German Luftwaffe during the summer of 1941 had succeeded in eliminating the Soviet Air Force almost entirely, and German air superiority seemed assured. But the effects of the German victories were not lasting, and by the fall of 1941 Luftwaffe strength was already inadequate to the successful accomplishment of strategic air attacks on Moscow. The early advent of an unexpectedly severe winter, the almost inexhaustible reserves of Soviet personnel, and the fact that the Russian air armament industries had been damaged hardly at all combined to give the Soviet Air Force time and the facilities it needed to reorganize. The attrition of the German Luftwaffe in the constant, exhausting winter operations, during which the twin-engine bombers had to be employed with the dive-bombers and close-support aircraft in ground support operations, was extremely high since there was absolutely no chance for the units to rest and recover their strength. The results were a drop in their standard of performance and a dangerously sharp decrease in combat readiness. The transfer of the Second Air Fleet to the Mediterranean in November and December 1941 led to a further weakening of Luftwaffe strength on the eastern front, for which not even the assignment of additional units from the west could compensate. To be sure, by the beginning of the summer offensive of 1942 the Luftwaffe forces in the east had again been brought up to the strength level of the summer of 1941. On the other hand, the new offensive in the east meant the abandonment of the planned air armament program for the air war against England; the orders issued in this connection in September and October 1941 were rescinded in December 1941 and January 1942. Moreover, the decision to launch a renewed offensive in the east meant increased production of the air equipment needed in ground support operations and -- as a result of the vast territories

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covered by Army operations -- a not inconsiderable dissipation of the
Luftwaffe forces.

The air units were further dissipated by the assignment of Luftwaffe elements to the Arctic Sea front, where they were needed for operations directed against Allied ocean convoys destined for Russian ports, and to the Mediterranean theater, where supply operations to the German and Italian forces in North Africa were becoming increasingly difficult. In comparison with all this, the air war against England seemed less and less urgent. German Wehrmacht and Luftwaffe leaders were of the opinion -- which, incidentally, they continued to advocate throughout the entire course of the war -- that the Soviet Union represented the chief threat to Germany's security and that this threat had to be eliminated first, while all other problems were of no more than secondary importance.

And these were the circumstances attendant upon the opening of the German summer offensive in the east in 1942. True, the Luftwaffe was able to maintain air superiority at the focal points of the Army operations and to provide systematic and successful support for the Army, but no attempt was made to concentrate the available air units at the point of main effort established by Army Group South. The wide dispersal of the air units forced the Luftwaffe -- including the bomber forces -- into a position of even greater dependence on the Army; the plan of releasing the bomber forces to resume operations against England had long since been abandoned. The German Luftwaffe used up its strength in the east in uninterrupted operations on behalf of the Army and suffered its first serious setbacks during the winter of 1942/43. The battle of Stalingrad cost the Luftwaffe approximately 1,000 of its best-qualified flying personnel and more than 500 aircraft, the loss of which did much to jeopardize the later effectiveness of the training program. The Luftwaffe forces stationed in the east never really recovered from this blow, and from that time on their combat strength never exceeded 1,600 to 1,800 aircraft.

The Soviet Air Force, on the other hand, slowly but surely gained in strength. Admittedly it remained inferior to the Luftwaffe as far as combat effectiveness was concerned, but it made steady progress in terms of numerical strength and technological standards. The Soviet air armament industries lay beyond the range of the German bomber units and thus could function undisturbed. In addition, Allied military aid, particularly on the aircraft sector, was generous. Up to 1 January 1944, approximately 10,000 aircraft had been received from the Allies -- 6,000 fighters, 2,600 bombers, 400 transport aircraft, and 1,000 training aircraft.

The year 1943 marked the decisive turning-point in the east, with the final shift of the initiative from the German Wehrmacht to the Russian armed forces and the first large-scale retreats of the German troops from Russian territory. During these operations the Luftwaffe was inextricably tied to the Army, which meant its complete tactical dissipation. Those air units which happened to be available at a given time were employed -- often without being adequately prepared -- at the focal points of ground operations. As a result, the air attacks lost their force and achieved no more than indifferent success; in most cases, to be sure, the desired relief for the ground forces could be provided, but the air missions were primarily defensive in character and no longer forceful enough to aid the ground forces in a shift to the offensive. Furthermore, in order to bolster the relatively weak home air defense system, it was necessary to withdraw a considerable number of fighters from the eastern front, in consequence of which the effectiveness of the remaining bomber, dive-bomber, close-support, and even aerial reconnaissance units -- now forced to operate with fewer escort fighters -- decreased noticeably. In the meantime, the Soviet Air Force was growing steadily stronger and more efficient, and by 1943 it had at its disposal some 10,000 combat aircraft, as compared with

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an average Luftwaffe strength of 1,600 for the year⁴⁴. Nevertheless, the German Luftwaffe was still qualitatively superior and almost always gained the upper hand in individual instances of aerial combat.

44 - See Appendix 22: Comparison of Air Strength on the Eastern Front from 1941 to 1945 (the German figures are based on the reports of the Quartermaster General, Luftwaffe, and on British sources; the Soviet figures are based on Study 17 5).

The trend which began in 1943 continued at an accelerated pace during 1944 and 1945. The Russian front was still the chief concern of German military leaders, who continued -- until the very end -- to do everything in their power to avert a catastrophe, realizing that a Soviet breakthrough into German territory would mean the beginning of the end. In 1944, although German fighter aircraft strength had sunk to only 22% of overall Luftwaffe strength, as compared with 43% in 1942, the Luftwaffe still managed to hold its own against a Soviet Air Force whose numbers had grown to 13,000 aircraft -- later even to 17,000 aircraft. But when the Army began to disintegrate, in the summer of 1944, a disintegration which the Luftwaffe was powerless to prevent, the Luftwaffe was also drawn into the hastily-organized retreat operations and sustained high losses as a result. Neither the fighters, the bombers, the dive-bombers, nor the close-support aircraft were sufficiently strong to provide effective support, quite apart from the constant handicap represented by the critical fuel shortage. A concentration of air power in large-scale operations was no longer feasible; local relief actions were all that could be managed. The air war disintegrated into individual combat, in which the German flying crews held out to the bitter end with exemplary courage and determination.

In summary, the campaign in the east showed that the German Luftwaffe had been worn down in tactical missions carried out in support of Army ground operations. With the exception of a few attacks on Soviet industry in 1943 and on the American bomber ~~and~~ fighter forces arriving in the Soviet Union in 1944, the Luftwaffe had not been committed in strategic air operations. And despite the success of these few attacks, they played hardly any role in the overall campaign. In coordinated operations with the Army,

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whose need for Luftwaffe support had grown steadily throughout the campaign, the German air units achieved a high degree of success as long as the Soviet Air Force remained inferior.

Then, however, with the stiffening of Russian resistance both on the ground and in the air and the simultaneous weakening of German strength, a new balance of air power developed, a balance which shifted gradually in favor of the Russians as their military potential grew. This development finally forced the German Luftwaffe -- and the German armies as well -- to shift to the defensive. The growing strength of the enemy and the inability of the German Wehrmacht to hold and secure the territory it had won with the weak force at its disposal were surely the main reasons for Germany's defeat in the war in the east.

3) The Increasing Insignificance of the Air War in the Mediterranean

The air war in the Mediterranean, which remained pretty much in the background in the beginning, later proved to be extremely costly for the Luftwaffe, particularly during the campaigns to occupy the island of Malta and North Africa.

After the withdrawal of the X Air Corps from Sicily in the early summer of 1941, the German-Italian supply lines to North Africa were once again so gravely threatened -- with Malta as a British air and naval base -- that in December 1941 German Luftwaffe leaders had no alternative but to transfer the Second Air Fleet, with about 450-500 aircraft (300-350 of them bombers and dive-bombers), from the east to Sicily for operations against Malta. The bombardment attacks of the Air Fleet, beginning in February and increasing steadily until the end of April 1942, were effective in nearly eliminating the island as an air and naval base and in reducing Axis shipping losses in the Mediterranean to almost nothing⁴⁵. Unfortunately Hitler -- with the concurrence

45 - See Appendix 23: German-Italian Shipping Losses in the Mediterranean

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Footnote 15 (cont)

during 1942, Correlated with the Activity of the Luftwaffe (based on Dr. T. Weber, "The Air Battle of Malta").

of the Naval Operations Staff -- yielded to Rommel's urging that the capture of the island, ordered for 18 July 1942, be postponed in favor of an attack on the Suez Canal. When this attack then bogged down and used up the forces slated for the Malta operation, it was too late. Subsequently the British developed the island into an invulnerable air base, so that the renewed German attacks of July and October 1942 ended in heavy losses for the Luftwaffe. The air attacks were thereupon discontinued, and by the end of 1942 Italian shipping losses had once again climbed to 75-80%. Malta became the Allies' main air base in the Mediterranean; it not only played an important part in the protection of Allied and the destruction of enemy shipping, but was also of paramount significance for the later invasions of Sicily and southern Italy (in June 1943 Malta served as a base ~~for~~ for 650 Allied aircraft). The loss of 600 German and 400 Italian aircraft in the battle of Malta had not paid off for the Axis partners, while the sacrifice of 518 British pilots and 844 fighter aircraft had been eminently worthwhile for the Allies. The failure of German and Italian air leaders to insist upon the capture of Malta was a determining factor in the outcome of the campaign in North Africa.

After the attacks on Malta had been abandoned at the end of April and most of the forces of the II Air Corps transferred to the east, from mid-1942 on the air superiority hitherto maintained by the Luftwaffe in the Mediterranean gradually gave way to Allied air superiority. After the British breakthrough at El Alamein and the Allied landing in North Africa in November 1942, the German Luftwaffe was able to hold its own against the Anglo-American air forces only sporadically,

despite the fact that reinforcements from the east had raised the number of combat aircraft to over 1,000, so that almost 25% of Luftwaffe strength was stationed in the Mediterranean theater as compared with 8% in the spring of 1941. The heavy demands on air transport space in Tunisia during the winter of 1942/43 had a direct and detrimental effect on the battle of Stalingrad. The intensification of the Anglo-American air attacks on Axis supply lines in the Mediterranean and North Africa, on the Italian harbors, and on the airfields in Sicily and North Africa as well as the steady reinforcement of the Allied air forces stationed in the Mediterranean theater gradually forced the Axis air units onto the defensive. The German bomber units fought with courage and determination and were so weakened by the loss of their best crews that their striking power was blunted. After the loss of approximately 770 aircraft in this theater during October and November 1942 alone, Luftwaffe strength was down to about 450 aircraft, confronted in the spring of 1943 by an enemy force ten times as strong. With the loss of North Africa in the spring of 1943 and Sicily in the summer of the same year, which was later followed by the Allied landing in southern Italy, Luftwaffe strength sank even lower, ~~which~~ while that of the Anglo-American air forces continued to increase. By the end of 1944, approximately 200 German aircraft were left to face an Allied force of 5,000. Having captured the airfields of Sicily and southern Italy, the enemy was now in a position to shift over to large-scale air attacks on southern Germany and to the procedure known as "shuttle bombing", i.e. take-off from England, bombardment of targets in Germany, and landing in Italy, or vice versa.

At the beginning of 1944 the Mediterranean became a secondary theater of operations for the German Luftwaffe. The weak German fighter force was no longer able to hold its own even sporadically, and this meant an

automatic reduction in the number of missions flown and the degree of success achieved by the bomber and dive-bomber forces. Thus the Allies very soon acquired uncontested air supremacy in the Mediterranean theater, since German air leaders had neither the intention nor the means to alter the air situation in the southern theater of operations in any way. Here, too, the ratio of space to strength had worked to the disadvantage of the German Luftwaffe.

4) The Hopelessness of the Struggle on the Western Front

On the whole there was a lull in operations on the western front after the cessation of the German air attacks on England in the spring of 1941. Not until the end of 1943 was the fighting resumed on this sector, when Luftwaffe leaders planned a retaliation raid in answer to the increase in Allied air attacks on the German Reich. For this purpose the Third Air Fleet had about 400 bomber aircraft at its disposal at the beginning of 1944; within a very short time their combat strength had decreased to 100-140 aircraft. The ineffectiveness of their attacks, usually carried out during the night, on harbors and industrial areas, particularly in England, was questionable, especially since the bomb-carrying capacity of the bombers employed -- mostly Ju-88's -- was inadequate. No attempt was made to concentrate these attacks on enemy shipping capacity or on the preparations going on for the invasion.

In the meantime the enemy had gone over to the offensive. Relentless day and night attacks by 2,000-3,000 aircraft -- even more at night -- were carried out on German transport facilities in Belgium and northern France, on the launching bases of the V-weapons and their supply depots, and on the Luftwaffe ground organization. In stubborn pursuit of their objective, the Allied air forces succeeded in creating the necessary pre-

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requisites for the invasion and in paralyzing almost completely the German transport and supply systems as well as the Luftwaffe ground organization. The German fighter defenses left in the west --

six single-engine day fighter and three night fighter groups -- were hopelessly inadequate in the face of such an onslaught and the assignment of reinforcements from the Reich was out of the question due to the desperate situation of the home air defense system itself. Thus, even before the invasion began, the enemy possessed absolute air supremacy over the Channel area and, with it, held the key to the successful outcome of the operation in his hand.

The landing, which began in the early morning hours of 6 June 1944, was carried out under an air umbrella of unprecedented strength, rendered even more effective by the fact that the strategic air forces of the Allies were also employed on the invasion front during the first phase of the operation. With a strength ratio of approximately 1:20 or more⁴⁶, it was clear that the German Luftwaffe, despite its costly and courageous efforts, was completely incapable of influencing developments in the landing area, but was forced to limit itself, during the weeks which followed as well, to occasional operations to secure the German supply routes.

Many of the reinforcements now finally forthcoming -- from the Reich and from other fronts -- (of the 1,000 jet fighters which Hitler had promised for the western front in the event of an invasion, all of two were available for employment!) were destroyed by the enemy either in transit or immediately after their arrival at the front airfields. Of approximately 1,000 fighter aircraft, for example, only about a third were actually available for employment on the Channel front. Thus the Third Air Fleet was able to maintain the strength it had had at the beginning of the invasion only with difficulty. By 24 June the enemy had already established twenty-three airfields in the landing area. The German Army units and all their movements were helplessly

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46 - See Appendix 24: Survey of Air Strength in the Area of the Third Air Fleet on 6 June 1944 (based on reports of the Third Air Fleet, the von Rohden Project, the "Draft for Study 178", and von Tippelskirch, op. cit., pages 472/473).

vulnerable to attack by the enemy air forces, without being able to expect any assistance from the Luftwaffe, while the Allied landing force was effectively supported by the Tactical Air Force in both offensive and defensive operations. For example, the counterattack mounted by the German tank forces on 6 August 1944 was brought to a halt by the Allied air forces alone. From the very beginning of operations, the force of the Allied air attacks frustrated all German planning. Thus there can hardly be any doubt that the success of the invasion was due in large part to the absolute air supremacy enjoyed by the Anglo-American air forces in the landing area, and that the course ^{of developments} would presumably have been quite different if Germany's defensive air force had been a match for the enemy.

With the extension of the Anglo-American operational area to Normandy and the breakthrough on the German defense front, the situation became even more critical for the German Luftwaffe. The attempt to employ fighter aircraft as fighter-bombers was a failure and had to be abandoned to free the fighters to clear the skies of enemy aircraft at least temporarily and in certain limited areas. Allied air supremacy extended over the entire area, to a depth of 125 miles and more, and the German fighter bases had to be withdrawn so far behind the front that the long approach and return routes left the aircraft little time for action over their targets.

In August 1944, when the entire front began to move and a second Allied landing came in southern France -- where there were about 220 German aircraft to face an enemy force of 5,000 -- not only did the withdrawal operations cost the Luftwaffe fairly high losses in the units and at the airfields, but as a result of the shortsighted orders to stand firm at all costs a good deal of irreplaceable aircraft equipment, materiel, and supply stores were lost.

During the last months of 1944 and the spring of 1945 the fate of the German Luftwaffe irrevocably took shape on the western front, and not even the courageous determination of the crews and the sporadic missions they were able to carry out were able to change the situation. In December 1944 the Ardennes offensive consumed a large part of the fighter forces badly needed for the air defense of the Reich and thus weakened irreparably the already desperate situation of the home air defense forces. The last German air offensive, an attack by 900 fighter aircraft on the Anglo-American ground organization in Belgium and northern France on 1 January 1945, was a surprise success and led to the destruction of 800 enemy aircraft -- but also to the loss of 300 German fighters and a large number of unit leaders and some of the Luftwaffe's best-qualified flying personnel. In view of their overwhelming superiority, the enemy air forces recovered quickly from this blow, while for the much weaker Luftwaffe the loss of 300 fighter pilots was an irreplaceable one. The last months of the war on the western front were characterized by absolute and uncontested Allied air superiority.

To an even greater extent than in the east, the overwhelming strength of the enemy air forces and the shrinking of the theater of operations in the west had combined to bring about the defeat of the German Luftwaffe.

5) The Helplessness of the Home Air Defense Forces

While home air defense had played only a secondary role during the first years of the war, from mid-1942 on -- and even more intensively from mid-1943 on -- it began to come to the fore. As a fourth front, in addition to the western, eastern, and southern fronts, the territory of the Reich proper moved into first place in the multiple-front war during the last two years of the conflict.

(from April 1941 on the air defense of the Reich was organized under the direction of the Luftwaffe Commander Center, and from the end of 1943 on under the Air Fleet Reich). Although the later importance of home air defenses should have been foreseen, German leaders took no steps to increase either their strength or their effectiveness, and this sin of omission was to avenge itself bitterly as far as the Luftwaffe was concerned.

Until the summer of 1942 the Royal Air Force carried out the air war against the Reich alone and with indifferent success. In the beginning, German night fighter defenses were sufficient to meet these attacks, most of which came at night; but the very first large-scale night attack, on the city of Cologne in May 1942, revealed the inadequacy of these defenses, which managed to bring down only thirty-nine of the 800-1,000 aircraft making up the attacking force. In spite of this no attempt was made to strengthen or reorganize the night fighter forces. Even so, by the end of 1942 approximately 60% of the twin-engine and 33% of the single-engine fighter aircraft were assigned to home air defense operations; this was not sufficient, however, to establish a really effective defense system.

At the Casablanca conference of January 1943, the goal of Anglo-American air strategy against Germany was defined as follows: "Germany's military, economic, and industrial structure must be so battered and destroyed and the morale of the German nation so undermined that Germany will lose all power of military resistance." In the meantime, free from any German interference, a huge Anglo-American offensive air force had been organized and trained for the accomplishment of this task, and the time had come for it to launch its large-scale offensive on the Reich.

To be sure, the breakdown of German morale by means of terror raids was never achieved, but the effects of the Allied attacks from the military, transport-technical, and economic points of view gradually assumed such proportions that they finally brought about the collapse of Germany's defenses.

In the face of this threatening danger, at first no attempt at all was made to reinforce German air defenses in any way, and later attempts were relatively ineffective. Prior to 1941 there were no new activations of single-engine fighter units; from 1942 to 1944 the seven original wings were augmented by another eight; in addition, in 1944 the fighter units were further strengthened by an increase of one-third in their authorized strength. But the continual losses, the lack of rest and a chance to recover strength and the constant overburdening which this involved, the exaggeration of the importance of the eastern theater of operations, the adherence to the practice of assigning top priority to the production of bombers, and the steadily increasing technological superiority of the Allied air forces all combined to lead slowly but surely to a reduction in the strength and effectiveness of German home air defenses.

In 1943 the air war over Germany entered its decisive stage, which was characterized by two factors in particular, apart from the growing numerical and technical superiority of the Allied air forces: 1) the strong fighter escorts accompanying the enemy bombers and 2) large-scale nightly attacks by streams of enemy bombers. The German defenses were no match for either of ~~their~~ these developments. The German day fighters, numerically hopelessly inferior, were unable to break through the enemy fighter escort to attack the bombers. It was only when the distance involved was so great that the bombers had to fly without fighter escort

that the German air defenses were fairly successful -- as, for example, in the attacks on Schweinfurt and Kassel in the summer and fall of 1943. But after mid-1944 the operational range of the Allied escort fighters was long enough to cover almost the entire territory of the Reich⁴⁷, and beginning in the summer of 1943 the Allies also utilized the southern front as a base of air operations against Germany, which was thus being attacked from two sides by the strategic air forces of the Allies. These two factors meant that the German day fighter defenses were doomed to total insignificance for all practical purposes. The ratio of losses for the defenders as compared with the attackers was -- under the very best of circumstances -- 1:1, and later on mounted to 3:1 -- losses which the attackers could make up easily but which the defenders were unable to absorb in the long run. The impossibility of assuring adequate defense against the large-scale nightly attacks by the enemy bomber streams was due less to the numerical inferiority of the German night fighter forces than to the inadequacy of German radar equipment in offensive and defensive operations. Enemy developments in the field of radar made it possible for the Allied bomber units to attack their targets from above the cloud cover, thus assuring the devastating effectiveness of the nightly carpet bombing. The hopelessness of the situation was aggravated by the fact that the enemy high-altitude bombers (Mosquitos) flew outside the range of the German fighters.

Under pressure of the successes achieved by the Allied bomber units in their attacks on the territory of the Reich -- successes which soon assumed catastrophic proportions -- from the fall of 1943 on Luftwaffe leaders began to concentrate all efforts on the build-up of an effective air defense system instead of on the expansion of the offensive air units.

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The territory of the Reich had become the main theater of operations in the multiple-front air war.

47 - See Appendix 25: The Operational Range of the Allied Escort Fighters.

In the interests of home air defense, the other fronts, especially the east, were weakened more and more and their single-engine fighter aircraft assigned primarily to the protection of the territory of the Reich⁴⁸; the same was true of the night fighters and twin-engine fighters⁴⁹. Thus, by the beginning of 1944, 58% of the day fighters and 85% of the night and twin-engine fighters were being employed in home air defense operations. The main emphasis in aircraft production was shifted to the fighters, thus bringing about a shift within the Luftwaffe in favor of the fighter units⁵⁰. In this way the authorized strength and the combat readiness of the day and night fighter units were increased considerably, both in general during the course of the war as a whole⁵¹, and in particular in the field of home air defense from 1943 to 1945⁵².

But these measures were unable to avert the catastrophe. The Luftwaffe no longer had the means to counter the numerical and technological superiority of the Anglo-American air forces. As soon as the enemy had broken through the coastal line of defense, the heart of the Reich was exposed to heavy air attack and was almost without protection. The force of the American daytime attacks and the British night raids, as well as the average number of armor-plated and well-armed bomber aircraft employed increased from

48 - See Appendix 26: The Distribution of the German Single-Engine Fighter Forces over the Various Fronts from 17 August 1942 to 8 May 1945.

49 - See Appendix 27: The Distribution of the German Night and Twin-Engine Fighter Forces over the Various Fronts from 17 August 1942 to 8 May 1945.

50 - See Appendices 20 and 21.

51 - See Appendix 28: The Authorized Strength and Combat Readiness of the German Single-Engine, Twin-Engine, and Night Fighter Units from 2 September 1939 to 31 December 1944 (based on data issued by the Quartermaster General, Luftwaffe, Branch VI).

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52 - See Appendix 29: The Authorized Strength and Combat Readiness of the German Single-Engine, Twin-Engine, and Night Fighter Units in Home Air Defense Operations from 1943 to 1945 (based on a summary compiled by General a.D. Grabmann and on H. von Rohden, "The Air Defense of the German Reich during World War II and the Lessons it Taught", page 818).

November 1943 to May 1944 from 300 to 900⁵³. There were rarely more than 200-250 German fighters available to meet an enemy force consisting of 1,000 American bombers and an equal number of American escort fighters, and due to the inadequacy of their operational range, the German fighters could not be very effective in any case. An attempt to employ the twin-engine night fighters in daytime air defense operations resulted in extremely high losses because of the technological inadequacy of the aircraft and the overburdening of personnel and materiel. The withdrawal of the single-engine fighter forces from the advance areas and their concentration in the Reich itself, carried out in April 1944, was not successful, and neither was the concentration of all the day fighters in a single area in the fall of 1944; the available numbers were simply too few to permit an effective concentration of air defenses. The disbandment of a number of bomber units in 1944 and the assignment of their flying personnel to the fighter forces did not make itself felt until later and even then only to a very small degree. In 1944 General of the Fighter Forces (General der Jagdflieger) Galland was eager to build up a strong reserve of fighter pilots in order to be able to stage a surprise attack later on with the Me-109 units on the enemy escort fighters and with the more heavily armed ~~Fw-190~~ Fw-190 units on the enemy bombers. But Galland's plan proved incapable of realization, since the reserves were always assigned somewhere else almost as soon as they were established -- to the invasion front, for example, to the Ardennes offensive, and to the attack on the Anglo-American ground organization on 1 January 1945. In the meantime the fuel shortage occasioned by the Allied bombardment of the hydrogenation plants, the lack of space for effective training activity, and the high degree of effectiveness achieved by the enemy large-scale fighter-bomber attacks

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which began in September 1944 had made it almost impossible to carry out

53 - See Appendix 30: Employment Figures for the Allied Four-Engine Bombers from November 1943 to May 1944 (Based on H. von Rohden, op. cit., page 824).

the fighter training program with any degree of effectiveness. Thus the final stage of the war was characterized by the circumstance that fighter production was more than adequate, while the necessary pilot personnel and, above all, the necessary aviation fuel, were sadly lacking.

The timely commitment of the Me-262 jet fighter might have brought about a change in the situation. This fighter was ready for employment at the front in 1943 and was far superior to all other fighter aircraft at that time. If it could have been employed in sufficient quantity, it presumably would have been able to reduce the scope of enemy bombardment attacks to a tolerable minimum. Unfortunately Hitler, who was still convinced that offensive air units ought to have top priority, ordered the Me-262 converted into a super-speed bomber. This resulted in the loss of valuable time, for in the end the order, tactically unjustified in any case, proved incapable of accomplishment, and by the time the aircraft was finally released for production as a fighter, at the end of 1944, it was too late. Production and employment figures were too small to do any good, and the conspicuously long runways required for jet aircraft were all too vulnerable to Allied air attack in the already shrunken territory of the Reich. The record number of available Me-262's, attained in March 1945, was 240, 120 of which were capable of immediate employment. Thus the original fighter models had to bear the brunt of air defense operations throughout the end of the war, and although they had been developed further, they were clearly not able to meet the demands made upon them. Germany's fighter forces were worn down by the almost continual attacks on their airfields, by their premature involvement in aerial combat, by the losses inflicted by enemy fighters during their assembly maneuvers, and by their vulnerability to enemy attack during their return flights.

In the meantime the air war had continued along its inexorable course for the German Luftwaffe, and by the end of 1944 all hope of organized German resistance had to be abandoned. The systematic Anglo-American attacks on Germany's military and economic potential began to make themselves more and more painfully felt. Above all, the destruction of the hydrogenation plants and aircraft assembly plants, coupled with the almost complete paralysis of the transport network during the final stages of the war, contributed to the final and thorough defeat of the German Reich once the Allies had established unlimited air supremacy over the Reich. To an even greater extent than on the other fronts, the unfavorable effects of the factors of strength and space had led to the collapse of the German Luftwaffe on the home air defense sector.

6) The Decline of Production and Armament Activity

While Soviet air leaders restricted themselves to employing their air units primarily in the support of ground operations, the Anglo-American air forces were deliberately committed as a strategic instrument for the destruction of German production and armament activity. Allied air leaders accomplished this purpose in two ways: 1) terror raids and area bombardment, usually at night, against the larger population centers and the most important industrial cities and 2) daytime attacks, usually limited to pinpoint bombardment, on production centers and industrial installations. The night attacks were carried out almost exclusively by the Royal Air Force, and the daytime attacks by the American Air Force. Although, out of a total of approximately 995,000 tons of bombs, only 143,500 tons were dropped on industry targets (98,000 tons on hydrogenation plants, 26,000 tons on aircraft factories, and 19,500 tons on other key industries) and more than 430,000 tons on German cities⁵⁴,

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54 - H. Rumpf, "Industry during the War of Bombardment" (official British data).

by 1943 the Allied air forces had still not succeeded in either breaking the will to resist of the German people or seriously disrupting production and armament activity. On the contrary -- the terror raids served to intensify the nation's will to resist, and early 1944 marked a record peak in Germany's war production.

It was not until the summer of 1943, when the American Air Force began its systematic daytime attacks on key German industries, that Germany's war economy suffered a serious blow. The almost complete destruction of the twelve plants engaged in the manufacture of synthetic fuels (as a result of the air attacks of May 1944, their average monthly production had dropped from 180,000 to only 9,000 tons, and not until August could it be raised -- with considerable difficulty -- to 40,000 tons⁵⁵), the heavy damage inflicted on the ball-bearing, aircraft, and aircraft engine industries, and above all the continuing paralysis of Germany's transport network had led, by the end of 1944, to a sharp drop in production and to a state of disorganization in her wartime economy. Consequently, in the words of Albert Speer, Reichs Minister of Armament and Ammunition (Reichsminister für Bewaffnung und Munition), from the standpoints of industrial production and the economic situation the war was already lost in the autumn of 1944.

Even during 1943, systematic Allied bombardment of fourteen aircraft plants put them out of operation temporarily and resulted in time-consuming measures to establish at least part of the air armament industry in subterranean factories, but production itself was not appreciably affected. As a matter of fact, in 1944 the aircraft industry reached its highest production record with

55 - Riegler, op. cit., page 56.

approximately 40,000 aircraft (the highest monthly figure⁵⁶ for fighter aircraft was 3,031, in September 1944⁵⁶), although renewed enemy air attacks during the spring of 1944 had put a number of plants out of operation. True, Allied air activity made it impossible to build up the reserve stocks German air leaders had hoped to establish. The shortage of aviation fuel, aggravated by the loss of the Rumanian oilfields, the lack of training facilities, and the increasing difficulties encountered in the fields of transport and aircraft assembly finally resulted in a situation in which the number of aircraft produced could no longer be utilized at the front.

While the German armament industry, in consequence of the enemy air attacks and the gradual shrinking of German-occupied territory, was hard put to find any place which it could withdraw to in safety, and practically all attempts to disperse only resulted in new concentration in a different area, the Allied armament production program, completely undisturbed by enemy activity, progressed at a rapid pace. After all, it was backed by the economic potential of almost the entire world! In the field of aircraft production alone, Anglo-American output was three to four times as large as that of German industry during the period from 1942 to 1944; and this does not take Soviet air armament into account⁵⁷. From 1939 to 1945, Germany produced approximately 53,700 fighter aircraft and 18,200 bombers, while the United States produced approximately 100,000 fighters and 98,000 bombers from 1941 to 1945; Germany produced about 1,400 four-engine bombers, while American production amounted to a total of 35,700⁵⁸.

56 - See Appendix 31: Total German Aircraft Production during the Period from 1939 to 1945 (based on figures issued by the Quartermaster General, Luftwaffe, Branch VI).

57 - See Appendix 32: Aircraft Production during World War II (United

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Footnote 57 (cont)

States, Great Britain, Germany, Japan) (based on data published in the "Wehrwissenschaftlicher Rundschau" (Military Science Review), 1953, No. 4).

58 - Priller, op. cit., page 31.

The economic, technological, personnel, and -- above all -- numerical superiority characterizing the Allied air armament program, coupled with Germany's inferiority in all these respects and with the shrinking of German-occupied territory, represented a further contribution to the ultimate defeat of the German Luftwaffe.

e. Germany's Failure to Coordinate Technological Advances with the Air Armament Program

At the beginning of the war, the German Luftwaffe had been undeniably superior to its enemies from the technological point of view, and this was still the case in the Russian campaign during the summer of 1941. The blitzkrieg campaigns, feasible as long as the war remained restricted to the Continent, seemed to substantiate the accuracy of Germany's views regarding air technology and air armament. But with the development of a longer-term war, and above all when the war spread beyond the limits of the Continent, it soon became clear that Germany's air armament program and air technology were no longer adequate. In addition, German Luftwaffe leaders failed to realize in time that the enemy, especially ~~Engal~~ England and the United States, had at their disposal not only an instrument capable of fulfilling their aims but also almost unlimited sources of future strength.

The frequent changes in the priority assigned to the various armament programs, the changes in opinion regarding the technological requirements and the overall aims to be met by the development program, the frequent turnover among high-level employees, the delay in deciding whether offensive or defensive weapons should be emphasized, the overrating of Germany's technological superiority -- all of these factors contributed to a stagnation in technological development and progress during the war; as a result, the Luftwaffe units were forced to get along as best they could

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with improvisations.

The German fighter forces, for example, were flying the same model (albeit a considerably improved version of it) at the end of the war as at the beginning. To be sure, the technological improvements of the fighter aircraft, particularly in terms of high-altitude performance,

were satisfactory, but in view of the numerical superiority and the strong air armaments of the Anglo-American air forces, this was no longer of any importance. For reasons which we have already discussed, the extremely promising jet fighter did not reach the front until it was too late; its success provided ample evidence of how much could have been gained if it could have been employed in time and in adequate quantity. The German Luftwaffe had no long-range fighter aircraft at its disposal, and its lack was one of the reasons for the Luftwaffe's failure in the Battle of Britain and for the final defeat in home air defense operations.

Technological development was even less satisfactory in the case of the German bomber aircraft. In all its various forms, the Ju-88 was no more than a hybrid -- neither a bomber nor a dive-bomber -- with inadequate operational range, bomb-carrying capacity, and effectiveness. The four-engine bomber, the He-177, was a mistake which, after using up a good deal of time and effort, was finally scrapped. Its development cost the industry precious time which could no longer be made up. Thus the ancient He-111 was left as Germany's bomb-carrying aircraft -- a model which could no longer be employed by day, either in the east or in the west.

The dive-bomber, the Ju-87, which had never really been suited for employment as a substitute bomber, had been demoted to a close-support aircraft, used exclusively in coordination with Army support operations, as a result of its inadequate operational range.

The twin-engine fighter, the Me-110, possessed neither sufficient operational range nor sufficient fighting power for daytime commitment. It proved satisfactory for a long time, however, as the Luftwaffe's standard night fighter aircraft.

The indecisiveness and the lack of imagination displayed by Luftwaffe leaders in the field of air technology, which were bound to have their

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effect on the air armament program, led to a serious crisis in that they were responsible for the excessive delay in shifting from bomber to

fighter production. The shift ought to have been made in 1942; by the fall of 1943 it was already too late. German leaders, particularly Hitler, clung too long to the concept of a primarily offensive Luftwaffe. In a conference on 23 May 1943 with seven leading designers from a number of German aircraft factories, called to discuss the question of whether offense or defense was more appropriate at the current stage of the air war, Hitler talked the problem over with each individual industry representative without calling in a single Luftwaffe officer to participate in the conference. The Supreme Commander was intransigent and refused even to listen to the well-founded objections presented -- let alone to be convinced by them -- and adhered stubbornly to his opinion that what Germany needed was a strong offensive air arm⁵⁹. The fighter production program, finally undertaken at the end of 1943 under the pressure of military developments, did -- to be sure -- bring about a very respectable increase in the output of fighter aircraft but, for the reasons already mentioned, was no longer able to effect a change in the air situation -- the air forces of the Western Powers were simply too strong. Under the circumstances a turning-point could have been achieved only if the Luftwaffe had been decisively superior to the enemy on the technological sector. Nevertheless, as a result of the new program, fighter production moved into first place in the overall German aircraft production program covering the period from 1939 to 1945⁶⁰.

Owing to the slowdown of German progress in the fields of air technology and air armament after 1942, the superiority enjoyed by the German Luftwaffe during the first years of the war gradually declined into downright inferiority. In contrast, Anglo-American development in these fields went ahead so fast that, coupled with the numerical and personnel superiority of the Allied air forces, it was able to assure ultimate victory over the

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German Reich. The German Luftwaffe was not to be given the opportunity to compensate for its numerical inferiority by maintaining its original head start in the fields of air technology and air armament.

59 - H. Conradis, op. cit., pages 245-248.

60 - See Appendix 33: German Aircraft Production from 1939 to 1945, Broken Down into Aircraft Types (based on data issued by the Quartermaster General, Luftwaffe, Branch VI).

f. Secondary Problems of the Multiple-Front Air War

1) Supply and Ground Organization

In addition to the main problems of a multiple-front air war (the factors of space and time, the ratio of space to strength, armament activity, technology, the methods of employment and the striking power of the enemy, etc), which we have already discussed, there are a number of secondary problems which may not be so decisive as the aforementioned, but which, under certain circumstances, may be of considerable and far-reaching importance. The supply system and the ground organization represent two of these secondary problems.

The smooth functioning of the Luftwaffe system of supply and logistics was dependent above all on the factors represented by space, transport facilities, status of production, and adequate organization. In order to obviate the necessity of stockpiling extensive stores at the supply depots, every effort was made to assure that the supply line from the producer to the "consumer" at the front was kept as short as possible. But the steadily increasing demand for reserve engines and spare parts of all kinds, the plethora of different aircraft models, production series, and special constructions, the rapid transfers of the flying units from one front to another during the war very soon led to supply bottlenecks, to confusion in the routing of supply shipments, and to the concentration of extensive stocks at the supply depots. In March 1943, for example, 20% of the available DB-601 engines were tied up in supply channels and were thus unavailable to the aircraft assembly plants, where they were urgently needed for installation in completed fuselages. As a result of this situation, it was often necessary for the Quartermaster General, Luftwaffe, to intervene in supply operations in order to effect the necessary transfer of materiel and to relieve existing supply bottlenecks. This was not only

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true in the case of aircraft equipment, but also in the field of motor vehicles and motor vehicle equipment. On the other hand, in consequence of the

highly mobile conduct of operations, it was not always possible to make certain that the necessary spare parts were delivered to the troops without delay through the usual supply channels. Thus a certain amount of improvisation was often necessary, for example front personnel often had to be released to pick up urgently needed supplies in the Reich, which naturally resulted in an undesirable weakening of the front.

The establishment of large repair-shops in available industrial plants in the German-occupied territories facilitated the maintenance of Luftwaffe equipment, the overhauling of aircraft and aircraft engines, and thus led to a considerable saving in distance and time in the repair and maintenance of air equipment for the front. The employment of foreign laborers under the supervision of German personnel proved eminently satisfactory in this connection, as did the establishment of routine rail service between the supply depots in the Reich and the repair-shops at the front. There was regular train service, for example, between Germany and Naples, Athens, Budapest, Lemberg, Warsaw, Riga, etc. The transport of supplies to the North African theater was usually accomplished by air, since Axis shipping in the Mediterranean had suffered such high losses.

On the whole, the supply transport system serving the German Luftwaffe functioned quite smoothly until its facilities were destroyed by the increasing force of the enemy air attacks; by the end of the war the system had bogged down completely.

All in all, the Luftwaffe ground organization proved able to meet the demands made upon it during the course of the war. The importance of maintaining a relatively large number of airfield service units and of establishing an adequate number of emergency landing areas grew in proportion to the reduction in the number of flying units and to the resultant need to assure the establishment of points of main air effort by means of

increased mobility and more rapid transfers of the available air units from one front to another. On the whole no difficulty was encountered in adjusting to the new situation. It must be admitted, however, that Luftwaffe ground organization personnel, particularly those in key positions, were not always able to fulfill their missions satisfactorily as a result of the increased difficulties encountered in the control of air traffic and in the coordination of the activity of the air traffic control, air weather, and air safety services, and this situation not infrequently led to friction between the flying units and the ground organization service personnel. In the beginning, ground organization personnel demonstrated a good deal of skill and a talent for improvisation in repairing the damage inflicted on runways and other airfield installations by enemy air attack; during the final stages of the war, however, the sheer force of the almost uninterrupted Allied bombardment activity made such attempts at repair quite pointless.

Flight

2) The Fighter Training Program

During the course of the war it soon became obvious that flight training would have to be made more versatile in view of the various theaters of operation to be considered. On the other hand, it was quite impossible for the branch schools (fighter, bomber, etc.) to do justice to the highly differentiated experience gathered at the various fronts (in Russia, in the west, in the Far North, and in Africa), quite apart from the fact that this experience was usually not made available to them in time. Thus the only alternative was to provide advanced training for the flying personnel in the individual theaters of operation themselves. This training was carried out behind the front lines, in the personnel replacement groups set up by each wing. Experienced wing personnel were assigned temporarily to these groups, with the task of pre-

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paring the youthful crews recently released from the flight schools for commitment at the front. The two to three months required by this advanced training was more than compensated for by the increased standard of training it guaranteed. In addition, there were specialized courses designed to introduce the troops to new methods of combat, new equipment, new weapons, etc.; in Italy, for example, such courses were held in the handling of aerial mines and aerial torpedos, and in Russia in the operation of aircraft cannon and rockets in antitank operations.

Air units which had been assigned to a specific front for a very long time and were used to operating under the special conditions characterizing that front naturally encountered difficulties when they were transferred to other fronts, unless they were given comprehensive orientation in the new conditions they might expect. This was especially true of the fighter pilots who were transferred from the eastern theater of operations to home air defense operations or to the invasion front, where they were confronted with an entirely different method of operation. Unless they were given intensive additional training before their employment on the new front, they were bound to suffer high losses in action.

Apart from the usual difficulties besetting a training program in wartime, flight training in the German Luftwaffe had to contend with two special factors which jeopardized the program. The first was the fact that both training aircraft, especially the Ju-52's, and instructional personnel were frequently requisitioned from the flight schools for commitment as air transport forces at the front. The losses suffered -- particularly in the Mediterranean and during the battle of Stalingrad -- were so high, in terms of both personnel and materiel, that the training program was bound to be adversely affected. The second was the disruption of training activity by the shrinking of German-occupied territory and the growing air superiority of the Allied air forces over the Reich; the resultant air raid alarms and the later Allied attacks on the training airfields and on training aircraft in the air were bound to interfere with training activity. Allied attacks on training aircraft in the air were by no means rare. And finally, when the training program had to be further curtailed in consequence of the shortage in aviation fuels, the inevitable result was that inexperienced and inadequately trained flying personnel had to be sent up against the enemy. These young air crews had little prospect

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of success -- or even of survival, for their lack of experience and training increased the dangers threatening them in aerial combat, in operations during unfavorable weather conditions, etc.

In contrast, both the Allied air forces and the Soviet air force were able to pursue their systematic flight training programs, completely safe from enemy interference of any kind, and to prepare their flying personnel for effective commitment at the front.

3) Geographical Factors

Geographical factors, too, such as mountains and oceans (the Alps, the North Sea, the Arctic Sea, the Mediterranean), also had an effect on the conduct of the multiple-front air war.

This is illustrated, for example, by the necessity of establishing a sea rescue service for the naval theaters of operations, an ice rescue service in the Far North, and a desert rescue service for crews forced to crash-land in the Mediterranean or in the desert in the North African theater. These rescue services, of course, presupposed the availability of specialized equipment, such as life jackets, collapsible life boats provided with parachutes, etc. as well as specialized supplies such as tents, mosquito netting, drinking water, etc. for the desert.

In the beginning the air route across the Alps claimed such high losses that special orientation stations had to be established -- Munich-Riem in the north and Milan in the south -- and all air crews ordered to report to them prior to undertaking trans-alpine flights. These stations granted permission for take-off only when the crews were able to prove that their standard of training and the equipment of their aircraft (radio equipment, etc.) were adequate to assure successful completion of the flight.

We have already mentioned the role played by the Mediterranean Sea in the Axis supply transports to North Africa. The more Italian shipping losses rose and the less able the Luftwaffe was to maintain its original air superiority in the Mediterranean, the more unfavorable was the part played by the Mediterranean -- from the geographic standpoint -- in the supply operations carried out to serve the North African theater of operations.

In a good many respects, geographical conditions were more favorable for the enemy. This was especially apparent in the fact that the enemy strategic bomber units, when weather conditions in England were so unfavorable that a take-off was just barely possible but a landing out of the question, were able to land on their Italian airfields after their return flight from German targets.

4) Climatic Conditions

The influence of weather conditions on the conduct of the multiple-front air war was often correlated with geographic conditions, as is illustrated by the above statement. Otherwise the factor of climate took effect in the form of the severe winters encountered in Russia and in the Arctic and ^{the} in/tropical heat of the African deserts; both extremes, of course, took their toll of the effectiveness of personnel and materiel.

During the first winter campaign in Russia, for which the German Luftwaffe was not adequately prepared, valuable experience was gained at the expense of high personnel and materiel losses. Technological defects in the aircraft and the effects of sub-zero weather put countless machines out of action and led to a sharp drop in the combat readiness of the units. The equipment designed to facilitate the cold start of the aircraft proved inadequate, and the necessity of gunning the engines until they were warm enough to start increased the wear and tear on aircraft parts; this situation remained unchanged until the introduction of the cold-start method. The transport of equipment to the advance supply depots in the east was almost impossible, in view of the fact that neither trains, motor vehicles, nor aircraft could function effectively in the sub-zero temperatures, snowstorms, and snow flurries characteristic of the Russian winter. Further supply requirements for the Far North were snow landing skids, winter camouflage paint, winter uniforms, and special foodstuffs.

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In addition, in June 1941, steps were taken to prepare three bomber wings, three dive-bomber wings, and one single-engine fighter wing -- a total of approximately 840 aircraft -- for operations in the Far North.

Conditions in Africa were diametrically opposed to those in Russia and the Arctic. Sandstorms and dust storms reaching up to almost 10,000 feet frequently made it impossible for aircraft to land and made operations, in the air and on the ground, extremely difficult. The fine desert sand, often carried to high altitudes by storm winds, penetrated into the aircraft engines and necessitated the installation of special sand-filters. The heat, mounting to 158° Fahrenheit in the aircraft cabins, was often unbearable. Tropical equipment, desert camouflage paint, special clothing and food were absolutely necessary for the war in the desert. In June 1941 the German Luftwaffe demanded "tropical equipment" for three bomber wings, two dive-bomber wings, one twin-engine fighter wing, one single-engine fighter wing, one air transport wing, one aerial reconnaissance group, and ten Army reconnaissance squadrons -- in other words, for a total of approximately 1,100 aircraft. This meant that the aircraft involved had to be converted to permit the installation of sand-filters, high-pressure valves in the cooling system, and adequate cooling equipment.

It was clear that the transfer of air units from or to either one of these theaters of operations involved a certain loss of time until the aircraft could be converted to their new missions, and even then the differences in climate often resulted in physical discomfort and even illness among the crews, which in turn necessitated special measures in the medical field.

All in all, we should be ill-advised if we were to underestimate the significance of climatic factors in a multiple-front air war.

g. Summary

The foregoing accounts of developments in the multiple-front air war have shown clearly how the German Luftwaffe gradually forfeited its air superiority, originally uncontested in the airspace over central

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Europe, and how its undeniable inferiority to the Allied air forces
at the end of the war contributed to the final defeat of the German
Wehrmacht as a whole.

This fateful development was determined primarily by the fact that the problems posed by an air war on a number of fronts were simply too much for Luftwaffe leaders to solve with the means at their disposal. In the east as in the west, in the north as in the south, and above all in the air defense of the Reich itself, the longer the war lasted the more unfavorable were the effects of the time and space factors, the decline in Luftwaffe strength and the simultaneous increase in the effectiveness of the enemy air forces, Germany's lack of progress in the fields of air technology and air ~~xx~~ armament, etc. Employed on a number of widely scattered fronts and incapable of establishing on any one of these fronts the point of main effort which might have lead to success, the Luftwaffe was worn down to an ever increasing degree in its operations against a greatly superior enemy. The fact that German air leaders refused to make the shift from bomber to fighter production in time, and the resultant inferiority of Germany's home air defense forces, contributed greatly to accelerating the advent of catastrophe for the German Luftwaffe. From 1944 on, the German economy and transport system as well as the defensive power of the German Wehrmacht gradually gave way under the blows delivered by an overwhelmingly superior enemy air force. The interaction of all the nation's resources -- the secret of success in any war -- was made impossible by the enemy onslaught, and the fault, at least in part, lay with German air leaders for having failed to solve the problems of the multiple-front air war.

Section 6: A Critical Examination of the Attempts Made by German Air Leaders to Solve the Problems of the Multiple-Front Air War⁶¹

a. The Command Organization and the Organization of the Luftwaffe as a Whole

In the account of the developments of the multiple-front air war and its problems contained in the foregoing Section, mention has been made of the measures taken by Luftwaffe leaders to surmount the difficulties which confronted them. The present Section will be devoted to a critical appraisal of the way in which Luftwaffe leaders tried to solve the problems of multiple-front air warfare and to a survey of the other approaches which they might have selected.

In this context, our attention must first be directed to the Luftwaffe command apparatus and the organization of the Luftwaffe as a whole.

61 - The following sources were consulted in the preparation of Section (: S. Freiherr von Falkenstein, "Draft for Study 178"; P. Deichmann, "Die Luftwaffe im Mehrfrontluftkrieg" (The Luftwaffe in the Multiple-Front Air War) (excerpt) and excerpts from the study "Heeresunterstützung" (Army Support Operations); F. Greffrath, "Air Defense and Air Armament"; Karlsruhe Document Collection -- "The Interaction of Strategy and Armament", "Die Luftwaffe in der Reichsverteidigung 1944" (The Luftwaffe in Home Air Defense Operations during 1944) (in an evaluation of the conduct of the war, Study No. 14 by Branch VIII, Luftwaffe General Staff, dated 21 August 1944); "Die Auflösung von Bomberverbänden zu Gunsten von Jagdverbänden" (The Disbandment of the Bomber Units in Favor of the Fighter Units) (based on information provided by General der Flieger Koller, 1944); "Bedarf der Luftwaffe an Bomberverbänden auf Grund des Dreifrontkrieges" (The Luftwaffe's Need for Bomber Units as a Result of the War on Three Fronts) (General der Kampfflieger, in the article "Bombenplanung" (Bombardment Planning), 5 October 1943); Excerpt from the report of the Chief, Luftwaffe Operations Staff, Operations Officer, No. 4532/44, Classified, dated 1 July 1944; The von Rohden Project, 1945 -- "Causes of Germany's Defeat in 1945"; C. von Clausewitz, "On War"; H. Conradis, "Nerves, Heart, and Sliderule"; E. Heinkel,

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Footnote 61 (cont)

"A Stormy Life"; A. Kesselring, "Thoughts on the Second World War";
K. Strölin, "Verräter oder Patrioten" (Traitors of Patriots); K.
von Tippelskirch, "History of the Second World War".

During the campaigns in Poland, Norway, and in the west (1940), the peacetime organization of the German Luftwaffe, with four Air Fleets -- each with Air Corps and Air Divisions at its disposal -- responsible for conducting air operations in close coordination with the Army Groups, proved to be entirely satisfactory. Or perhaps it would be more accurate to say that the shortcomings of this organizational system were not yet apparent during the campaigns mentioned above.

The basic system was retained without any fundamental changes throughout the entire course of the war, being augmented by the establishment of the Fifth Air Fleet (in Norway) and the Sixth Air Fleet (in the middle sector of the eastern front) as well as the Air Fleet Reich (for the air defense of the territory of the Reich). In those areas which were temporarily unimportant from the military point of view or which required special treatment for one reason or another, Luftwaffe Commands (Luftwaffenkommandos) were set up as necessary; in reality these Luftwaffe Commands were no less than miniature Air Fleets. In addition, whenever necessary, special command staffs were set up, such as the Air Commander Africa (Fliegerführer Afrika), during the campaign in North Africa, and the various Naval Air Commanders (Fliegerführer See), established to supervise the accomplishment of aerial reconnaissance activity over water and whatever naval air operations might be required. In the case of large-scale air operations, the bomber units were sometimes concentrated under centralized command, usually carried out by the wing staffs.

This organizational system was characterized by two main shortcomings, both of which were to play an important role in developments as the war progressed. The first of these was the impossibility of concentrating the available air units, either as uniform branch or in a given area, in order to form a point of main effort, and the fact that all available

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air units were dependent, to a greater or lesser degree, on the Army. The
distribution of the bomber units,

dive-bomber units, single-engine fighter units, twin-engine fighter units, etc. among the various Air Fleets was inconsistent with the tenets of effective air employment and was bound to result, in the long run, in a dissipation of the available forces and, in consequence, in an unnecessarily high degree of attrition. From the viewpoint of the Air Fleets it was quite understandable that they did their best to utilize as many of the available air units as possible, and in this they were supported by the Army Groups with all the means of persuasion legally -- and sometimes not so legally -- at the latter's disposal. As a result of this situation, it was extremely difficult to withdraw an air unit from its assignment to a particular Air Fleet, which, of course, jeopardized the mobility of the Luftwaffe and its ability to establish a point of main effort at short notice. The close coordination existing between the Air Fleets and the Army Groups often led to utilization of the bomber units in ground support operations, a dissipation of forces which deprived Luftwaffe leaders of the striking force needed elsewhere.

In view of the above-mentioned facts, it seems clear that the Luftwaffe command system ought to have been reorganized with the beginning of the campaign in Russia, and certainly by the winter of 1941/42 at the latest. It was of the utmost importance that the bomber units be withdrawn from the command of the Air Fleets and made subordinate to a centralized bomber command which could employ them effectively where they were needed in accordance with the overall instructions of the Luftwaffe High Command. A command organization of this sort could also have planned and carried out ground support operations more effectively; admittedly this would have required a number of changes in the overall organization of the Wehrmacht. The fact that the Air Fleets on all fronts were directly subordinate to the Commander in Chief, Luftwaffe, and the Army Groups to

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the Army High Command or the Wehrmacht High Command proved to be a disadvantage. One possible solution might have been the appointment of a Wehrmacht Commander for each theater of operations, to be assisted by a Commander, Tactical Air Units (Führer der taktischen Luftwaffe). In this way the assignment of a tactical Luftwaffe group, consisting primarily of aerial reconnaissance and close-support units,

to each Army Group would have been adequate to meet the needs of the Army. Furthermore the Luftwaffe commanders in each individual theater of operations would have had the authority to support the Army points of main effort more effectively by transferring air units from more quiet sectors of the front or by assigning their own air units as reinforcements. An organizational system of this kind would doubtless have been advantageous on the eastern front, for prior to 1944 the Russians usually attacked in full force on one sector of the front at a time, and a command organization of the sort described would have been better able to avoid the dissipation and resultant attrition of the available Luftwaffe units. That the concentration of air units of the same type under centralized command was extremely successful was demonstrated at least to a limited extent by the missions carried out over England under the "Assault Leader, England" (Angriffsführer England) in the autumn of 1943 and by the operations of the IV Air Corps in the east during the summers of 1943 and 1944.

It was only in the case of the fighter aircraft employed in home air defense operations that an attempt at concentration by aircraft type was undertaken, when the day and night fighter units were organized under the XII Air Corps (later the I Single-Engine Fighter Corps). The organizational system was good, but the inadequate strength of the fighter units precluded its being able to fulfill its purpose.

In retrospect it seems clear that the Luftwaffe command apparatus and the organization of the Luftwaffe as a whole ought to have been revised during the war in favor of more intensive concentration by unit type under centralized command -- as is indicated in Appendix 34⁶². The fact that German air leaders failed to recognize the need for reorganization led to heavy losses for the Luftwaffe and thus to a sharp reduction

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in its striking power.

62 - See Appendix 34: Suggested Reorganization of the Luftwaffe Command Apparatus in World War II (Flying Units).

b. Air Attack and Air Defense

The question of whether the Luftwaffe should be employed primarily as an offensive or defensive instrument, i.e. whether the main emphasis should be placed on the development of a strong bomber force or a strong fighter force, and the question of just when was the proper time to make the shift from one to the other, were probably the most decisive questions posed by the multiple-front air war. As we have already seen in the foregoing account of military developments, German air leaders did not succeed in finding satisfactory answers to these two questions.

Not only Hitler, but also Goering and the Luftwaffe General Staff were imbued with the conviction that offensive air operations -- as the more forceful form of air warfare -- were to be preferred as a matter of principle, and they continued to hold this view until 1944. As late as October 1943, for example, the General of the Bomber Forces (General der Kampfgeschwader), basing his request on Goering's well-known views that the air war could not be won by means of defensive operations, asked that the number of bomber wings be increased to twenty-four; this would have involved approximately 3,000 aircraft for employment at the front, 1,500 for the bomber training program, and about 950 replacement aircraft per month⁶³. And in ~~September~~ the late summer of 1944, General Koller, at that time Chief of the Luftwaffe General Staff and an ardent champion of offensive air operations, stated that he needed a bomber fleet of at least forty groups, "the absolute minimum needed for offensive air operations under the present circumstances"⁶⁴. The subsequent disbandment of fifteen bomber groups did not bring about a reduction in the number of bomber aircraft or crews,

63 - General of the Bomber Forces, Memorandum dated 5 October 1943 and

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Footnote 63 (cont)

dealing with the Luftwaffe's requirements in bomber units on the basis of the war on three fronts.

- 64 - Based on the notes made by General der Flieger Koller in 1944 concerning the disbandment of bomber units in favor of the activation of new fighter units.
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since the actual equipment strength of approximately 1,400 aircraft was required to make up the authorized strength of the forty bomber groups. Koller refused to approve a reduction in the number of bomber groups to twenty-six or twenty-eight, insisting that more were needed; at the same time he urged that the development of the jet bomber be accelerated as much as possible. This attitude on the part of the Chief of the Luftwaffe General Staff shows how strong the concept of offensive air operations still was as late as 1944. It must be remembered that during 1943 the actual strength of the bomber units had increased from 1,300 aircraft as of 1 January to no more than about 1,600 aircraft as of 31 December, despite the fact that bomber production for the year had amounted to 4,200 machines. In other words, during 1943 the German bomber forces had been completely reequipped three times. In view of the scope of Allied air superiority in 1944, and the heavy losses which would surely occur in the event of a renewal of German air operations against England, it seemed more than doubtful that the German aircraft industry would be capable of maintaining the contemplated forty bomber groups at an adequate level of operational readiness, thus guaranteeing a reasonable basis for the resumption of the Battle of Britain. Moreover, the German bomber models available in 1943 and 1944 were obsolete and no longer capable of commitment against England; nor did the Luftwaffe have any prospect of acquiring a sufficient number of modern bomber aircraft in the near future. The most ardent champion of the concept of attack, however, was Hitler himself; we have already mentioned his fateful order of 1943 to the effect that the Me-262, ideal as a fighter aircraft, should be turned into a super-speed bomber. In the summer of 1944, the threatening collapse of Germany's aviation fuel supply system automatically led to the discontinuation of bombardment attacks and the with-

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drawal of the He-177 from employment.

Although the majority of Luftwaffe leaders refused to give up the thought of offensive air operations, there were officers who warned of the urgency of establishing an adequate home air defense system and of switching to

to the construction of fighter aircraft. It was, above all, the commanders assigned to home air defense operations, the Luftwaffe Commander Center, the Commanding General and the division commanders of the fighter forces, and the General of the Fighter Forces, supported by a few farsighted representatives from industry⁶⁵, who advocated these views and who emphasized again and again the need for strengthening the air defense forces. The Battle of Britain had already shown that the British air armament industry could not be hit with the aircraft available to the Luftwaffe -- let alone the American air armament industry. German leaders were well aware that these nations were bound to develop strong strategic air arms and that there was no way of stopping them. And since the development of an air defense force capable of meeting the anticipated Allied onslaught was bound to take years, it was imperative that the decision to begin work on it be made in plenty of time. The proper moment for such a decision would have been in 1941, after the setback suffered by the Luftwaffe in the Battle of Britain, or -- at the very latest -- in the winter of 1941/42, after the Russian campaign had bogged down. Instead, the shift from attack to defense was not begun until 1943 -- with the reduction of bomber in favor of fighter production, the intensification of the fighter training program, the acceleration of developments in the fields of night fighter operations and radar -- and the highly important "fighter program" was not even begun until the spring of 1944, by which time it was already too late.

In summary, it cannot be denied that German Luftwaffe leaders were indeed aware -- and in time -- of the danger represented by the Anglo-American strategic air forces, but that they made no attempt to meet this danger by taking, in time, the necessary farsighted measures.

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65 - Letter from Professor Tank to Generalfeldmarschall Milch dated 7
July 1941; quoted in Conradis, op. cit., pages 248/249.

These measures would have presupposed a thoroughgoing shift in air strategy from the offensive to the defensive, but at the same time the development of offensive equipment would have had to continue in order that the Luftwaffe might be prepared for a resumption of the offensive later on. The reluctance of German military leaders to face this issue was due in part to their basic attitudes towards the problem of offense versus defense and in part to the fact that they considered ^{it} more important to ward off a Soviet Russian invasion of German territory than to prepare their defenses against the Anglo-American air attacks. And this explains Hitler's insistence that he could not get along without an offensive Luftwaffe.

The employment of strong offensive air units in the support of ground operations was absolutely necessary, especially since experience had shown time and again that during withdrawal maneuvers in particular the Luftwaffe was the only means of providing fast and effective relief for the ground forces in critical situations.

In the deliberations concerning the strength of the necessary air defense forces, Luftwaffe leaders may have failed to realize that an air defensive requires a higher ratio of strength between the air forces of the defender and those of the attacker than a defensive operation on the ground. In ground operations, even an inferior force is sometimes able to achieve success in defensive action; in the air, however, this was not possible in the long run in view of the size of the area involved, the technical difficulties encountered by the defenders, weather conditions, etc.

If German military leaders had taken advantage of the years 1941 and 1942 to establish a strong air defense system, if they had followed an overall policy of air strategy better suited to the coming developments, and if the jet fighter could have been employed in time and in adequate

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quantity (and this would certainly have been possible), then the German Luftwaffe might well have been in a position in 1943 to contest the air superiority of the enemy in those areas that mattered,

and the air war would surely have turned out differently. In view of the overwhelming resources at the disposal of the enemy, however, it is very doubtful that the defeat of the Luftwaffe could have been avoided in the long run. Nevertheless we cannot discount the possibility that the Allies, if they had suffered heavy losses in the employment of their strategic air units and if they had failed to achieve the successes they hoped for, might perhaps have revised their evaluation of the overall military situation and come to the conclusion that the war with Germany could be settled on some other basis than unconditional surrender.

c. Strategic and Tactical Air Warfare

The problem of whether strategic or tactical air warfare should be accorded priority is closely connected with the problem of air attack versus air defense, discussed in the foregoing subsection. It has already been pointed out at the beginning of the present study that the decision to develop the Luftwaffe into a strategic and tactical instrument at the same time represented a compromise solution. As it turned out, apart from its role in the Battle of Britain, in World War II the Luftwaffe was employed almost exclusively in tactical missions. As a result of the wide gulf between what German military leaders wanted to accomplish and what they were able to accomplish, strategic air warfare was destined to remain an improvisation, born of the wishful thinking of Luftwaffe leaders. Even the Battle of Britain proved conclusively that the Luftwaffe was numerically too weak to be employed in strategic air operations, and one of the main reasons was the lack of a long-range bomber and a long-range fighter aircraft. Successful strategic air warfare, as the later Allied air attacks on Germany clearly demonstrated, demands resources which the Luftwaffe simply did not have at its disposal; Germany's military potential was too weak to provide them. The occasional smaller-scale

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strategic air missions later flown by the German Luftwaffe in the eastern theater of operations and against England did nothing to alter this fundamental fact.

In the field of air armament as well, Germany neglected the further development of the aircraft models needed for strategic air operations.

Thus, even before the beginning of the multiple-front air war, the decision in favor of tactical air operations had been made for the German Luftwaffe. And the campaign in Soviet Russia provided definitive reaffirmation of this decision. Since German military leaders -- as well as the German nation as a whole -- regarded the Soviet Union as the chief threat to Germany's security, since conditions in the east demanded that the main emphasis be placed on the conduct of tactical operations both on the ground and in the air, and since the performance potential of the German Luftwaffe seemed adequate to the demands likely to be made by tactical commitment, it was probably quite right, and possibly inevitable, that the Luftwaffe should have been utilized for tactical air operations -- with a very few exceptions -- during the balance of the war. And in the eastern theater, despite the steadily growing and finally overwhelming numerical superiority of the enemy air forces, the Luftwaffe almost always managed to hold its own and to provide the support so badly needed by the Army in its struggle to defend its territorial gains. That the Luftwaffe succeeded, at least at specific times and in specific areas, was due to the greater experience of its air crews, to their courage and determination, and to the lead the Luftwaffe enjoyed in the technological field.

The effective air support provided for Army ground operations, and also the fact that the majority of the Luftwaffe participated in the Army's decision-seeking actions on the ground, were justified in principle, inasmuch as the success achieved by the German armies was chiefly due to Luftwaffe support. But the arbitrary assignment of the Luftwaffe units to the Air Fleets and thus, in the last analysis, to the Army Groups was a mistake, and one which resulted in unnecessary losses. Instead,

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the point of main effort in air operations ought to have been adjusted much more carefully to the progress of Army operations, even if this had meant leaving other sectors of the front without air support temporarily. And this, in turn, would have required

a concentration of the close-support air units at the focal point of the ground operations, something which could have been achieved only with the help of a centralized command organization for the air units concerned. As it was, however, the arbitrary distribution of the air units among the Air Fleets fostered the tendency to employ them only in their assigned areas, and as a result they were frequently committed in fairly pointless missions during periods of calm and at relatively quiet sectors of the front. Consequently, they were never given a chance to rest and recover their strength; there can be no doubt that their performance after a rest period would have been a good deal better. Nor was any attempt made to take advantage of any lulls in operations to bombard the sources of the enemy's military potential or to carry on the struggle for air supremacy; instead the opportunity was wasted. Thus the attrition of the air crews continued at a rapid pace -- the bomber pilots were kept busy in close-support missions and the fighter pilots exhausted in ground intervention actions.

It was presumably appropriate and necessary that the German Luftwaffe was employed primarily in tactical operations during World War II, in view of the prevailing conditions and within the framework of the available potentialities. Yet there is no denying that Luftwaffe leaders occasionally failed to display the requisite degree of understanding for the possibilities inherent in this type of commitment and for the most effective methods of committing air units in tactical operations.

d. Air Armament and Air Technology

As far as air armament and air technology were concerned, the German Luftwaffe was adequately prepared for a rapid, short-term war limited to the European Continent -- not, however, for an exhausting, long-term conflict on a number of fronts. Prior to the beginning of the cam-

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paign in France, it was still possible to carry out the rehabilitation of the units and the production of the air armament industry on a systematic basis, although even at that time technological development was no longer being supported by top-level command agencies but was being left more or less up to the initiative of technical offices maintained by each Luftwaffe branch and of industry.

After the successful conclusion of the campaigns in Poland, Norway, and France, Hitler (convinced that his method of waging war was ideal and invulnerable to defeat) and Goering (with his firm belief in the invincibility of the Luftwaffe as a military instrument) saw no reason to intensify their efforts in the field of air armament development, especially since the shortage in aluminum and nonferrous metals was beginning to make itself felt. It was this attitude which prompted Hitler to issue his disastrous order of July 1940, to the effect that developmental work on all equipment which could not be made ready for employment on the front within eight months was to be discontinued. This decision, which gave evidence of an almost incomprehensible lack of appreciation of the military potential and industrial possibilities of England and the United States, was one of the main reasons for the later inferiority of Germany's air armament and air technology programs. It was also the reason why the German air armament industry, throughout the entire course of the war, concentrated on the further development of a few already existing aircraft models (with a very few exceptions) while otherwise remaining at the same stage of technological development as in 1939⁶⁶. The fact that the German air armament program was assigned to seventh place on the priority list is an additional indication of the failure of German military leaders to realize the need for a strong air arm. Thus valuable years were wasted, years during which industrial capacity could have been increased, the development of up-to-date aircraft models systematically furthered, and -- above all -- a large-scale fighter production program put into effect, all measures which might have been able to rescue the German Luftwaffe from its position of inferiority.

The realization that their previous air armament programs had been inadequate to the demands of an air war capable of assuring mastery of

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of the European area finally prompted Luftwaffe leaders, in the fall of 1943, to shift the emphasis to the production of fighter aircraft of all types

66 - Von Tippelskirch, op. cit., pages 578/579.

and to expand the air armament industry; simultaneously orders were given to transfer the major percentage of aircraft and aircraft engine plants to new subterranean locations. This project led to the organization of all German construction personnel and facilities under the centralized command of the Organization Todt; by the fall of 1944 the Organization Todt was to have 10,760,000 square feet of subterranean space ready for the Luftwaffe of the 53,800,000 square feet ultimately needed (34,432,000 square feet for the aircraft industry and 18,292,000 square feet for the aircraft engine industry). But this project, like the fighter production program begun in March 1944, came too late to be effective. To be sure, air armament activity was increased tremendously, but as a result of the aforementioned developments in the overall military situation, it no longer had a chance to make itself felt. The comments made by General Koller, Chief of the Luftwaffe Operations Staff and later Chief of the Luftwaffe General Staff -- that "German air armament has remained at the same level of development for years and, apart from a certain increase in capability, has never really brought about any appreciable strengthening of our forces" and that "the strengths and weaknesses of the German Luftwaffe will be one of the most important factors to decide the final outcome of the war" -- were just as accurate as his warning that "numerically inferior forces are capable of carrying out successful air warfare only if their numerical weakness can be compensated for by superior performance, and all the technological resources at our command ought to be pressed into service to assure this superior performance".⁶⁷ But Koller's remarks were made at a time when it was already too late to turn his theories into effective practice.

67 - Comments made by General Koller during a conference with the Chief

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Footnote 57 (cont)

of Luftwaffe Supply and Procurement (Generalluftzeugmeister der Luftwaffe) on 15 May 1944 ("The Interaction of Strategy and Armament, 1939-1944").

In conclusion, there would seem to be no doubt that German military leaders failed to recognize and develop, in time, the potentialities inherent in the fields of air armament and air technology; by virtue of this sin of omission, they contributed a great deal to the subsequent irrevocable air inferiority of the German Wehrmacht.

e. Summary

We have attempted to describe the way in which the leaders of the German Luftwaffe approached the major problems of multiple-front air warfare -- the organization of the command function, the question of offense or defense, the problem of strategic as opposed to tactical air operations, the question of air armament and air technology --, the thinking which prompted them to take certain measures and to ignore others, and the mistakes which they^{may} have made in this connection.

In addition to the major problems of multiple-front air warfare, of course, Luftwaffe leaders were also faced with a number of secondary problems, most of which, however, were connected in one way or another with the major problems outlined above.

One problem which did not have its direct origin in the multiple-front air war, but which was of decisive significance for the conduct of this war by the German Luftwaffe, was the handling of personnel matters in the high-level command agencies of the Luftwaffe. It must, unfortunately, be admitted that the personnel policies followed by top-level Luftwaffe leaders were not always ideal. The practice of transferring officers inclined to criticize, especially older officers, to positions of insignificance resulted in an unhealthy rise in personnel turnover. The principle prevailing during the last years of the war, namely that bravery in action was sufficient recommendation for a key position, regardless of the mental capabilities of the applicant and of his comprehension of the complexities

involved in the conduct of air operations, was neither very appropriate nor very successful. Moreover the measures taken by top-level Luftwaffe leaders, who were loath to delegate responsibility, made it impossible for their subordinates -- even those in higher-level positions -- to work with any degree of independence and initiative. Thus the Commander in Chief of the Air Fleet Reich, Generaloberst Stumpff, for example, found it necessary in July 1944 to complain to the Chief of the Luftwaffe General Staff that he found it utterly impossible to issue an order on his own initiative -- he was not even permitted to move an antiaircraft artillery piece on his own⁶⁸.

The course of the multiple-front air war has provided ample evidence of the fact that German Luftwaffe leaders were not always successful in their handling of the problems of this new type of military commitment, and that, on some occasions, they failed completely. On the other hand, whatever criticism is voiced today, from the vantage point of the German failures and the ultimate defeat of the Reich, is all too apt to overlook the fact that a good many of the developments during the course of the war were inevitable in view of the prevailing conditions, that even as late as 1943 the will to resist of the German nation had not yet been broken, and that even at that time there still seemed to be some prospect of an ultimate victory. Those few farsighted individuals who were no longer able to believe that Germany could win the war were confronted by a vast majority of equally intelligent individuals who were able to point, and not entirely without justification, to the progress of developments which might well be able to bring about a more favorable ~~at~~ settlement of the air situation. And, as a matter of fact, there was some justification for this optimism -- the increase in fighter aircraft production, the continuation of the air armament program in the face of the disruptions

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caused by enemy air attacks, the hopes placed on the performance of the jet fighter, and the expectation that the employment of the V-rockets would bring some measure of relief in the air war.

68 - Excerpt from the Daily Report kept by the Operations Officer, Luftwaffe Operations Staff.

Accordingly, even though there can be no doubt that German Luftwaffe leaders did make mistakes in their handling of the problems of the multiple-front air war, from the historical point of view it is probably still too early to make a definitive statement as to their guilt or lack of same. Nevertheless, the foregoing account of events may well contribute to a final clarification of the matter.

Section 7: Concluding Summary of the Multiple-Front Air War, 1941-1945⁶⁹

The conduct of the multiple-front air war was based on entirely different principles for the German Luftwaffe and the Allies.

The Allies (i.e. in this context the British and the Americans), having been forced onto the defensive in the beginning and having, in the meantime, carefully examined the methods of employment utilized by the German Luftwaffe during 1939 and 1940, concluded that a strong air force would be the key to success in this particular war and decided to concentrate their air armament activity on the establishment of a mighty strategic air force. The almost unlimited military and economic resources at their disposal, the fact that their production and air training programs were free from interference by the enemy, and the fact that they had the necessary time at their disposal all combined to make it possible for the Allies to carry out their plans with success. A carefully-planned, highly effective system of command enabled the Allies to increase steadily the effectiveness of their strategic bombardment attacks -- especially after the American Air Force had begun its daytime raids under fighter escort -- and at the same time to provide valuable tactical support for their other armed forces branches. Thus the Western Powers gradually acquired local air superiority in western and southern Europe, which ultimately developed into complete mastery of the skies over all of central Europe and provided the foundation for the final victory over the German Reich. This development clearly demonstrated the superiority of the far-reaching policies of strategic air operation followed by the Allies over the primarily tactical thinking of German Luftwaffe leaders.

69 - The following sources have been consulted in the preparation of Section 7: S. Freiherr von Falkenstein, "Draft for Study 178"; S. Eggenberger, "Die taktische Verwendung der Luftwaffe im zweiten

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Footnote 69 (cont)

Weltkrieg" (The Tactical Employment of the German Luftwaffe in World War II); J. Priller, "History of a Fighter Wing"; H. Riegler, "The World War 1939-1945", Part III; H. von Rohden, "The Air Defense of the German Reich during World War II and the Lessons it Taught"; H. Rumpf, "German and British Air Strategy during World War II"; K. von Tippelskirch, "History of the Second World War".

Germany's Supreme Commander did not regard the air war with the same degree of importance as Allied military leaders. All in all, after its initial success in the blitzkrieg campaigns and after the setback it suffered during the Battle of Britain, the German Luftwaffe had been forced to shift to the defensive. The Luftwaffe High Command, without for a moment giving up its views on the priority of offensive air operations, resigned itself to the necessity of conducting tactical air operations but failed completely to take advantage of the available air armament potential of the Reich or to make any attempt to break enemy air superiority by the timely establishment of a strong air defense system. These two failures turned out to be decisive for, in the last analysis, they brought about the final defeat of the German Luftwaffe.

In spite of the above, any attempt at a definitive evaluation of the multiple-front air war must certainly admit that the reasons for the collapse of the Luftwaffe are not to be sought exclusively -- and, as a matter of fact, perhaps not even primarily -- in the way in which German Luftwaffe leaders conducted the air war. In all fields of military activity, both at the front and at home, the exhaustion of the Wehrmacht's personnel and materiel strength was the factor which led to one setback after the other. The functioning of the Army and the Luftwaffe, of the air technology and air armament programs, of the economy and the transport network, of the home area and the front -- all were inextricably connected with one another, so that a setback in any one of them was bound to lead to reduced efficiency in the others. The underlying reason for Germany's defeat must be sought in the fact that it is impossible (as was revealed in World War I) for a small Central European country, with a few captured raw material sources at its disposal, to offer effective resistance in the long run to the combined strength of two continents, particularly in-

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cluding the economic strength and armament potential of a nation such as the United States. Neither the successes or failures of individual personalities, neither the Luftwaffe alone nor the Luftwaffe together with the other two branches of the Wehrmacht, could be expected to have any influence on the final outcome dictated by the overall situation. Thus any attempt at a definitive evaluation

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must take into account the fact that a nation located on another continent, remote and invulnerable, was arming itself at top speed for the encounter with Germany and that there was no way in the world to make up for the disparity of strength which was bound to ensue. The demands made on the German Luftwaffe in operational theaters extending from the Atlantic to the Volga, from the Arctic Sea to ~~Lybia~~ Libya, and including the heart of the Reich itself, simply exceeded the capabilities of its personnel and materiel. The German Luftwaffe had never been strong enough to withstand the requirements posed by an international war of attrition; it could hardly be expected to be strong enough to prevail in such a conflict! In the last analysis, it was almost irrelevant whether the air war was conducted on an offensive or defensive basis, whether certain technological innovations were made at an earlier or later date, whether the air units were employed in accordance with this method or that -- even whether Luftwaffe leaders made mistakes or not. For in the long run the overwhelming superiority of the enemy air forces was bound to triumph even over the very best of command apparatuses, the very best of equipment, and the highest possible degree of courage and determination on the part of the troops. This should not be construed to mean that, if the mistakes discussed in the present study had been avoided and if the German Luftwaffe had been employed more effectively, there might not have been a chance to alter the situation in favor of the Reich, but rather that it is quite impossible to prove that other methods would definitely have been capable of leading to ^{its} goal!