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GERMAN AIR FORCE OPERATIONS
IN SUPPORT OF THE ARMY

by

General der Flieger a. D. Paul Deichmann

June 1962

USAF HISTORICAL DIVISION
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General der Flieger a. D. Paul Deichmann

Edited by DR. LITTLETON B. ATKINSON
of the USAF Historical Division
of RESEARCH STUDIES INSTITUTE,
Air University, United States Air Force
BRIG. GEN. NOEL F. PARRISH, USAF
Director, Research Studies Institute
DR. ALBERT F. SIMPSON, AIR FORCE HISTORIAN

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FOREWORD

German Air Force Operations in Support of the Army, by General der Flieger a. D. Paul Deichmann, is one of a series of historical studies written by, or based on information supplied by, former key officers of the German Air Force for the United States Air Force Historical Division.

The overall purpose of the series is threefold: 1) To provide the United States Air Force with a comprehensive and, insofar as possible, authoritative history of a major air force which suffered defeat in World War II; 2) to provide a history of that air force as prepared by many of its principal and responsible leaders; 3) to provide a firsthand account of that air force's unique combat in a major war with the forces of the Soviet Union. This series of studies therefore covers in large part virtually all phases of the Luftwaffe's operations and organization, from its camouflaged origin in the Reichswehr, during the period of secret German rearmament following World War I, through its participation in the Spanish Civil War and its massive operations and final defeat in World War II.

The German Air Force Historical Project (referred to hereinafter by its shorter and current title, "The GAF Monograph Project") has generated this and other especially prepared volumes which comprise, in one form or another, a total of more than 40 separate studies, some of them in multi-volume form. The project, which was conceived and developed by the USAF Historical Division, was, upon recommendation of Headquarters Air University late in 1952, approved and funded by Headquarters USAF in early 1953. General supervision was assigned to the USAF Historical Division by Headquarters USAF, which continued principal funding of the project through 30 June 1958. Within the Historical Division Dr. Albert F. Simpson and Mr. Joseph W. Angell, Jr., respectively, Chief and Assistant Chief of the Division, exercised overall supervision of the project. The first steps towards its initiation were taken in the fall of 1952 following a staff visit by Mr. Angell to the Historical Division, Headquarters United States Army, Europe, at Karlsruhe, Germany. There, the Army was conducting a somewhat similar historical project covering matters and operations largely of primary interest to that service. Whereas the Army's project had produced or was producing a multiplicity of studies of varying length and significance (more than 2,000 have been prepared

by the Army project thus far), it was early decided that the Air Force should request a radically smaller number (less than fifty) which should be very carefully planned initially and rather closely integrated. Thirteen narrative histories of GAF combat operations, by theater areas, and 27 monographic studies dealing with areas of particular interest to the United States Air Force were recommended to and approved by Headquarters USAF in the initial project proposal of late 1952. (A list of the histories and studies appears at the end of this volume.)

By early 1953 the actual work of preparing the studies was begun. Colonel Wendell A. Hammer, USAF, was assigned as Project Officer, with duty station at the USAREUR Historical Division in Karlsruhe. General der Flieger a. D. Paul Deichmann was appointed and served continuously as Control Officer for the research and writing phases of the project; he also had duty station at the USAREUR Historical Division. Generalleutnant a. D. Hermann Plocher served as Assistant Control Officer until his recall to duty with the new German Air Force in the spring of 1957. These two widely experienced and high-ranking officers of the former Luftwaffe secured as principal authors, or "topic leaders," former officers of the Luftwaffe, each of whom, by virtue of his experience in World War II, was especially qualified to write on one of the topics approved for study. These "topic leaders" were, in turn, assisted by "home workers"--for the most part former general and field-grade officers with either specialized operational or technical experience. The contributions of these "home workers," then, form the basic material of most of the studies. In writing his narrative, the "topic leader" has put these contributions into their proper perspective.

In their authors' personal knowledge and experience these studies find their principal authority. Thus, they are neither unbiased nor are they "histories" in the ordinary sense of that word. Instead, they constitute a vital part of the story without which the final history of Germany's role in World War II cannot be written.

In preparing these studies, however, the authors have not depended on their memories alone. For their personal knowledge has been augmented by a collection of Luftwaffe documents which has come to be known as the Karlsruhe Document Collection and which is now housed in the Archives Branch of the USAF Historical Division. This collection consists of directives, situation reports, war diaries,

personal diaries, strength reports, minutes of meetings, aerial photographs, and various other materials derived, chiefly, from three sources: the Captured German Documents Section of The Adjutant General in Alexandria, Virginia; the Air Ministry in London; and private German collections donated to the project by its participating authors and contributors. In addition, the collection includes the contributions of the "home workers." Thus, the interested researcher can test the conclusions of the "topic leaders" against the basic documents or secure additional information on most of the subjects mentioned in the studies.

The authors have also made use of such materials as the records of the Nuremberg Trials, the manuscripts prepared by the Foreign Military Studies Branch of the USAREUR Historical Division, the official military histories of the United States and the United Kingdom, and the wealth of literature concerning World War II, both in German and English, which has appeared in book form or in military journals since 1945.

With the completion of the research and writing phases in 1958, the operations at Karlsruhe were closed out. At that time the project was moved to the Air University, Maxwell Air Force Base, Alabama, where the process of editing and publishing was begun under the editorship of Mr. Edwin P. Kennedy, Jr., with the overall supervision of Dr. Simpson.

The complexity of the GAF Monograph Project and the variety of participation which it has required can easily be deduced from the acknowledgments which follow. On the German side: General Deichmann, who, as Chief Control Officer, became the moving force behind the entire project, and his assistant, General Plocher; General Josef Kammhuber, a contributor to the project, who heads the new German Air Force, and who has consistently supported the project; Generaloberst a. D. Franz Halder, Chief of the German Army General Staff from 1938 to 1942, whose sympathetic assistance to the Project Officer, the Project Editor, and the German Control Group was of the greatest value; the late Generalfeldmarschall Albert Kesselring, who contributed to several of the studies and who also, because of his prestige and popularity in German military circles, was able to encourage many others to contribute to the project; and all of the German "topic leaders" and "home workers" who are too numerous to mention here, but whose

names can be found in the prefaces and footnotes to the individual studies.

In Germany, Colonel Hammer served as Project Officer from early in 1953 until June 1957. Colonel Hammer's considerable diplomatic and administrative skills helped greatly towards assuring the project's success. Col. William S. Nye, USA, was Chief of the USAREUR Historical Division at the project's inception. His strong support provided an enviable example of interservice cooperation and set the pattern which his several successors followed.

In England, Mr. L. A. Jackets, Head of Air Historical Branch, British Air Ministry, gave invaluable assistance with captured Luftwaffe documents.

At the Air University, a number of people, both military and civilian, have given strong and expert support to the project. The several Commanders of Air University during the life of the project in Karlsruhe (1952-1958) without exception were interested in the project and gave it their full backing. Other personnel at Headquarters Air University who have given freely of their time and experience include: the several Directors of the Research Studies Institute since 1952; Dr. James C. Shelburne, Educational Advisor to the Commander; Mr. J. S. Vann, Chief of Special Projects Branch, DCS/Operations; and Mr. Arthur F. Irwin, Chief, Budget Division, DCS/Comptroller.

The project is grateful to Lt. Col. Leonard C. Hoffmann, former Assistant Air Attache to Germany, who gave indispensable aid during the project's last year in Germany. Also in Germany, Mr. Joseph P. Tustin, former Chief Historian of Headquarters, United States Air Forces in Europe, ably assisted the project by solving a variety of logistical and administrative problems.

Miss Sara E. Venable deserves special thanks for her expert typing of the manuscript.

The project is indebted to all of the members of the USAREUR Historical Division, the Office of the Chief of Military History, and the USAF Historical Division who, through direct assistance and advice, helped the project to achieve its goals.

Dr. Littleton B. Atkinson, who succeeded Mr. Kennedy as Project Editor in 1961, edited the manuscript for publication.

PREFACE

The several major components of the German Air Force were the flying forces, proper, the antiaircraft artillery forces, the Air Signal Corps, the paratrooper and other air-carried forces, the air transport units, and the civilian air defense units. In this study, however, attention has been limited to the flying forces and their role of air support for the army.

Other facets of the Luftwaffe organization and operations have been dealt with in separate monographs. For example, the operations of the paratrooper and other air-carried forces will be presented in the manuscripts "Die Luftlandeunternehmung in Belgien und den Niederlanden (The Airborne Operation in Belgium and the Netherlands)," and "Die Eroberung der Insel Kreta aus der Luft (The Capture of the Island of Crete in an Airborne Operation)."^{*} Employment of air transport units in missions of support for the army has been dealt with in "Die Lufttransportunternehmungen der deutschen Luftwaffe (Air Transport Operations of the German Air Force)."[†] The subject of the commitment of units of the civilian air defense services, which in part also took place in the army zones of operations, has been dealt with in the manuscript "Der deutsche Luftschutz (German Air Defense)."^{††}

* Editor's Note: To be published in the German Historical Monograph Series at a later date.

† Editor's Note: Published by the USAF Historical Division, Research Studies Institute, in 1961 as USAF Historical Study No. 167.

†† Editor's Note: To be published at a later date.

ABOUT THE AUTHOR

General der Flieger a. D. Paul Deichmann was born in the ancient and famous abbatial and episcopal city of Fulda on 27 August 1898. Early in 1916 he entered the Imperial Army as a cadet in the 86th Regiment of Fusiliers, and was commissioned a lieutenant a week prior to his eighteenth birthday. In the following August he began service with flying units as an observer, and continued this duty to the end of the war. Toward the end of 1920, he was transferred to the 3rd Prussian Infantry Regiment, and in April 1925 he was promoted to Oberleutnant (First Lieutenant). Having been temporarily released from the Army in 1928, he returned to active duty in 1931 with the 1st Infantry Regiment, and was promoted to Captain in 1933. With the official establishment of the German Air Force in 1934, he entered the Reich Air Ministry, and in April 1935 was posted to the Luftwaffe General Staff, where in August of that year he received his majority. In 1937 he received a unit command: the II Gruppe of the 253rd Bomber Wing, and in 1938 he was promoted to Lieutenant Colonel.

The fatal year 1939 found him in the field of Luftwaffe training, but by August 1940 he was Chief of Staff of II Air Corps. Two years later he had attained the rank of Generalmajor (Brigadier General) as Chief of Staff to the Air Officer Commander in Chief, South (Field Marshal Albert Kesselring). By February 1943 he was Chief of Staff of Second Air Fleet, while June of that year found him commanding the 1st Air Division. On the first day of 1944 he was promoted to Generalleutnant (Major General), and was decorated with the Knight's Cross on 26 March. War's end found General Deichmann in charge of Luftwaffe Command 4.

General Deichmann's contribution to the USAF German Air Force Historical Project has been outstanding. In addition to the present monograph (and several supporting papers), he has also written monographs on the Luftwaffe systems of target analysis and weapons selection (both as yet unpublished). As if this were not enough, especial recognition is due General Deichmann for his outstanding contribution to the Project in his capacity as Control Officer from the inception of the program in 1953 to the termination of the writing phase of the Project in 1958. General Deichmann is at present the head of the Studiengruppe Luftwaffe, Führungsakademie der Bundeswehr.

PART I

THE BASES FOR ARMY SUPPORT OPERATIONS

Chapter 1

THE RECORD OF GERMAN EXPERIENCE
WITH AIR SUPPORT BEFORE WORLD WAR IIOperational Experience in World War I¹

The Use of Aircraft in Reconnaissance. In Germany, aircraft had produced good reconnaissance results and had proved their value for the command and troops as early as 1911, during the Kaiser maneuvers and during maneuvers held by the XVIII Corps. By the outbreak of World War I in 1914 this experience had led to the establishment of 33 field air battalions (each comprising 6 aircraft) and 10 fortifications air battalions. By the end of World War I the reconnaissance strength of the German Army had grown to include: a) 31 air battalions, with a total authorized strength of 90 Type C aircraft;* b) 99 Type A air battalions (also suitable for artillery reconnaissance), including 5 air photography battalions, with a total authorized strength of 705 Type C aircraft; and c) 6 Pascha air battalions (Nos. 300-305), committed in Turkey, with an authorized strength totalling 36 Type C aircraft. Thus, the aggregate total of all aircraft available for normal and artillery reconnaissance numbered 831.

By 1917 certain concepts had evolved on the employment of air reconnaissance units. Generally speaking, strategic (or long-range) and tactical (or close-range) reconnaissance missions were to be flown by single planes. Air units were to fly systematic reconnaissance patrols in the far enemy rear to furnish data for timely and effective counter action against the enemy or for the execution of plans prepared by their own command. The mission here was to furnish information on the following points: a) All enemy movements in the enemy rear; b) the forward movement and assembly of enemy reserves, tanks, other armored units, and large cavalry forces; c) the disposition of enemy artillery; d) the movement of attack troops into jump-off or assault trenches; e) the placing and effectiveness of friendly artillery fire; and f) the location of friendly front lines. All reconnaissance information thus furnished was to

* Editor's Note: Aircraft with observer's seat behind the pilot.

be substantiated by air photos.

The Use of Aircraft in Air Combat. As early as the winter of 1914-15 the French commenced using aircraft armed with machine guns to combat German reconnaissance planes, which were armed only with rifles and pistols, to prevent the execution of reconnaissance missions. German air units suffered heavy losses as a result, and were no match for French aircraft in air-air combat.

A captured French fighter plane developed specifically for air-air combat was to provide the starting point for the establishment of a completely new air arm. Inspired by the captured plane, the German side constructed a single-seater fighter plane, the Fokker fighter, armed with a machine gun rigidly mounted to fire through its propeller in the line of flight.* This development created a new mission for the air force, that of offensive combat action in the air to achieve air superiority.

The new branch of air combat grew from about 40 aircraft in December 1915 to some 58 fighter squadrons in 1917. And by war's end there were 81 fighter squadrons with an authorized strength of between 1,134 and 1,926 aircraft. Some of these squadrons were consolidated in wings, the most famous of which (there were only two such wings) was named after Freiherr Manfred von Richthofen, the most successful German fighter pilot of those days.

When current circumstances required, fighters operated in unit formation, organized in flights of two or three planes, squadrons of nine or ten planes, and wings comprising a number of squadrons. Air battles were fought with machine guns. The advantage in combat

*Editor's Note: The captured French plane was a Morane-Saulnier "N" scout, with a Lewis gun mounted so as to fire through the propeller. In order to prevent bullets damaging the propeller, triangular metal deflector plates were fastened to each blade. Faced with a revolution in air warfare as represented by this simple but effective French device, the German authorities called in Anthony Fokker to design a similar device. From the French improvisation Fokker conceived the idea of a machine gun synchronized to fire through the propeller, thus eliminating the deflector plates. Henri Hegener, Fokker - The Man and the Aircraft (Letchworth, Herts, England, Harleyford Pubs., 1961) pp. 24-25.

was with the airman who succeeded in attacking his opponent from above in the rear and from as close a range as possible. Beginning in unit formation, air battles usually broke up into individual actions. The mission of the squadron leader or wing commander was to keep his aircraft together if at all possible and, above all, to carry out the approach and home flight in closed formation.

The Use of Aircraft for Attack Against Ground Targets in Rear Areas. Tests had been carried out in 1914, even prior to the outbreak of World War I, to determine the possibility of air attack with bombs against ground targets. In some cases test models of bomb sighting instruments had even been tried out. At that time, however, it was still not possible to apply air bombing systematically and in any sizable scope as a means of warfare.

In November 1914 the first unit intended specifically for bombing missions was activated under the cover designation of Carrier Pigeon Battalion Ostende (Brieftaubenabteilung Ostende) and placed under direct control of the Army High Command. The unit was formed from the best air pilots available and particularly well qualified airborne observers. Plans provided for each lead plane during operations to take along an observer; all other planes were to carry a corresponding load in bombs. By March 1915 the new bomber wing of the Army High Command had already grown to the size of six squadrons of six planes each. Soon thereafter another wing, Carrier Pigeon Battalion Metz, was formed after the same pattern, followed soon by three further wings of the same type and six independent squadrons. The new units now were designated Bomber Wings of the Army High Command, Numbers 1-5. In order to secure to these units the greatest possible measure of flexibility in operations, so that they could be employed wherever needed in current areas of main effort, they were assigned special railway trains, some to serve as quarters for personnel, others for the transportation of their equipment. The mission of the units was to wage long-range air warfare in the enemy rear, in the form of attacks against enemy airfields, ports, and rail junctions.

Plans to employ the first of these bomber wings, Carrier Pigeon Battalion Ostende, against Britain never materialized because of the failure to gain control of the Channel coast at Calais. Thereupon the wing was transferred late in April 1915 to Krakow, Poland. Based on airfields near that city the 20 planes which the

wing comprised supported the German offensive in Russia with resounding success by attacking targets in the enemy rear.

However, the first real successes were achieved by the new arm in 1916, when some elements of the bomber wing received large twin-engine planes, and the first squadrons received what were called giant aircraft in those days. From 1916 on these units constituted the hard core of German air armament. On 13 June 1917 the 3d GHQ Bomber Wing succeeded for the first time in carrying out a bombing attack against London. This operation was followed by numerous attacks against other targets in Britain. Shortly before the end of the war a large-scale attack against London was planned, in which several hundred thousand 2, 2-pound electron incendiary bombs* of a completely new type were to be delivered on the target for the purpose of starting major conflagrations. The attack was disapproved by the Army High Command since it could have produced no change in the military situation, which meanwhile had become extremely unfavorable for Germany.

After several organizational modifications carried out in the last two years of the war, the German Army High Command at the end of the war had available 8 bomber wings, totalling 27 squadrons, with a total authorized strength of 162 large aircraft, and 2 super-large air battalions (Nos. 500 and 501) with an actual strength of 6 giant aircraft.

The bomber forces constituted an arm developed exclusively in line with the basic principles governing air warfare. This arm was under direct control of the Army High Command, which at the same time was the highest authority for the conduct of air warfare.

Initially the arm was employed altogether in strategic missions, for example, against Britain. It was in no way directly connected with military operations on the ground or, if related to ground operations, was used against targets distant from the actual field of battle. The ability to move quickly made it possible to concentrate the units at points of main issue as the current military situation required. Current techniques of employment provided that

* Editor's Note: This incendiary bomb was named after a German trade name, Elektron.

bomber wings would attack their assigned targets either in compact wing formation or in a sequence of squadrons. If circumstances required, individual bombers could also be dispatched on attack missions, but, in general, bombing was to take place by squadron at set intervals.

Participation of Aircraft in Combat on the Ground. After the change introduced in 1915, in which the reconnaissance aircraft generally in use at the time were provided with a light, air-cooled engine, efforts were successful in the summer of 1916 in producing adequate numbers of reconnaissance aircraft suitable for combat employment which were armed with two machine guns. One gun was rigidly mounted with a forward line of fire, the other being placed on a swivel mount for rearward and flank fire by the air observer. With this new development it gradually became habitual for aircraft flying over enemy terrain at a low altitude to attack ground targets with weapons fire. Good results were obtained in such action on some occasions. However, it was to be some time before complete units were committed in missions of this type.

On 10 July 1917, during a German attack in the coastal areas of Flanders in the zone of the German Fourth Army, a complete bomber squadron from one of the GHQ bomber wings had been committed in close support of the infantry during the actual assault. The results, both in the form of the effects of weapons fire and in that of the impact on the enemy morale, were so impressive that the German Command took an important step in this new field. It was decided to adapt the escort squadrons, established in 1916 to provide protection for reconnaissance units, as ground support squadrons. The mission of these units was to operate together with infantry forces in attack, supporting the infantry by action against the enemy artillery batteries, bases, and reserves both with bombs and with weapons fire.

On 1 November 1918 the German Air Force had more than 38 ground-support squadrons in service, with a total authorized strength of 228 aircraft. Some of these squadrons were consolidated in wings.

Since the mission of the ground-support air forces was to participate in ground combat, they were to go into action the moment the infantry forces left their trenches, bringing movement into what was otherwise positional warfare. This was the time when the

majority of the enemy machine guns, which could prove a threat to low-flying aircraft, would be occupied in delivering fire against the attack on the ground. The ground-attack air forces were to attack in squadron-size waves, striking successively at all points of resistance to the infantry advance on the ground. If at all possible, all other types of aircraft also participated in such attacks--including fighter squadrons, individual planes, and infantry and artillery air reconnaissance units. The basic principle here was that in battle all air forces would participate with bombs and machine guns, either in attack or to provide protection for the infantry on the ground against enemy air attack.

The following maxim, which was in force in 1916, gives the best description of cooperation between the air forces and the army forces in World War II as well as World War I: No battle must be fought on the ground without the Air Force making its honorable contribution.

Command Control of the Air Force in World War I. Although the air forces and anti-aircraft artillery forces at that time were organic to the Army, it became evident even in World War I that a separate command organization was necessary to control these forces in coordinating their operations with those of the normal army forces. Without going into details on the evolution of the system or the various initial and subsequent intermediary solutions tried out, it is desirable at least to depict the principal organizational arrangement which obtained at the end of the war.

In a Cabinet Order dated 8 October 1916, responsibility for the "uniform development, readying, and employment" of all German means of air combat and defense in the field and in the zone of interior was assigned to a Commanding General of Air Forces. This officer was placed under direct control of the Chief of The Army General Staff with Troops (Chef des Generalstabes des Feldheeres). In each field army headquarters a staff was organized under a Commander of Tactical Support Air Units (Kommandeur der Flieger), with the appropriate tactical command authority over the air forces committed within the command zone of the army concerned. In major segments of the front air group commanders were attached to the appropriate corps headquarters operating in the areas of main effort. Air liaison officers were attached to other corps headquarters, and to divisions operating in the areas of main effort.

Recommendations to Establish the Air Force as a Separate Service. Early in 1916 the Field Air Commander--a position which later developed into that of a Commanding General of Air Forces--submitted to the Chief of the Army General Staff plans calling for consolidation of all air forces intended for counterair action and for air action against targets on the ground, both in the field and within the zone of interior, to form what was to be called the Imperial Air Forces. This was to give the air forces one single highest command agency controlling the combat forces, their organization, training, administration, and operations, and was to make the air forces a third and separate branch of the military forces beside the Army and the Navy. General von Falkenhayn, at the time Chief of the Army General Staff with Troops, approved the recommendations and supported the plan wholeheartedly.

Realization of the plan was prevented, however, by the various German States, each of which had its own contingent of air forces, because of their fear that an infringement of sovereign rights would take place. The only thing which could be achieved was the establishment of a uniform operational control by a Commanding General of Air Forces, as previously described, on 8 October 1916.

On 1 April 1918 Britain established her Royal Air Force, but eighteen years were to pass before Germany adopted the system which had long been recognized as the only appropriate organization.

Impact of the Treaty of Versailles on the German Air Forces. When the Armistice ending hostilities after World War I was signed on 11 November 1918 the German air forces comprised 290 squadrons (battalions as they were called at the time), with a total authorized strength of 2,709 aircraft of all types. This force was manned by 4,500 flight personnel--including officers, noncommissioned officers, and men--as air pilots, observers, gunners, radio operators, and mechanics. Events in the war had proved the extreme importance of the air forces for the Army, so that it was a severe blow when the treaty of Versailles permitted the maintenance of an army with a strength of 100,000 officers and men, but denied this army any aircraft at all. This reduced the combat value of the army to a minimum.

The Chief of the German Army Command at the time, nevertheless, ordered that a number of particularly well qualified air

officers be enrolled in officer assignments in the new 100,000-man army. This wise precaution was later to have an excellent influence on cooperation between the Army and air forces.*

Provisions in the New Army for Future
Establishment of an Air Component

Preparatory Planning, 1926-33. Even during the period in which the new German Army had no aircraft at all, the armed forces gave attention to a study of the problems of air warfare. The initial point for all new planning had to be the basic concepts of the missions which would be assigned to an air force, and the nature of its employment, in the event of armed conflict. As early as 1926 the General Troops Office of the Reichswehrministerium, as the ministerial department for military affairs was called, issued an appropriate memorandum on the subject under the heading "Directives for the Conduct of Operational Air Warfare." Since the German military forces were not permitted to have aircraft, the memorandum for reasons of concealment had the subtitle: "Compiled from Publications of Foreign Air Forces." But in reality the memorandum represented for the German military forces the currently valid views on doctrines governing the employment of a modern air force.

A few years later this memorandum was supplemented by the addition of individual pamphlets on the various missions of those air elements required to cooperate directly with ground forces, stapled in a firm cover permitting the removal and exchange of the pamphlets, and issued to the troops. Since the cover and the individual pamphlets were green, and because of its long title, it was generally referred to by the troops as the "Green Mail" (Gruene Post), a title similar to the official title of a weekly paper published on agricultural matters. The whole purpose of these publications continued to be concealed by the statement that the contents were from publications by foreign

* Editor's Note: The number of experienced air officers was insufficient, however, for the needs of the Luftwaffe when it was re-established in the 1930's. Albert Kesselring, Kesselring, A Soldier's Record (New York, 1954), p. 23. See also Richard Suchenwirth, Historical Turning Points in the German Air Force War Effort, USAF Historical Studies No. 89, pp. 1-2, 15-16.

air forces.

Pursuant to instructions from the newly established Air Ministry in 1934, a special staff under General Helmuth Wilberg* prepared the field manual known as "The Conduct of Air Operations" (Luftkriegfuehrung), Air Field Manual No. 16, which was first issued in 1935.† With minor modifications, the new field manual was the established doctrine governing the conduct of air operations in the Luftwaffe at the outbreak of war in 1939. It contained all the basic concepts on the subject of cooperation of the air forces with the Army.

Above all, it should be emphasized that the principles expounded in this field manual were the ruling factors in the organization of the new German Air Force.

Missions for the Planned New German Air Force. Air Field Manual No. 16 envisaged the following missions for the Luftwaffe:

- a) Combat action to secure and maintain air superiority. This was considered a continuing mission even at times when the Luftwaffe was required to devote its attention to the other missions.
- b) Combat and other air action in support of the army forces on the ground.
- c) Combat and other action in support of the Navy or the conduct of independent air warfare at sea.
- d) Action to interdict routes of communication, such as rail, waterway, and road routes, leading to or from the front areas or used in the movement of imports or supplies for industrial

* Editor's Note: Lieutenant General (General der Flieger) Wilberg was killed in an accident in 1941. He had served in World War I as Chief of Tactical Air Command, German Fourth Army, which was committed in the area of main effort in the western theater.

† Editor's Note: Hereinafter referred to as Air Field Manual No. 16.

installations.

e) Strategic operations against hostile sources of military power.

f) Attacks against targets located within large cities as centers of government and administration, and as centers of military control and training; in certain circumstances attacks for retaliatory purposes.

From the above it can be seen that the requirement to furnish air support to the Army was only one of several missions envisioned for the Luftwaffe. A point that should not be lost sight of here, however, is that the Luftwaffe would support Army operations, even if only indirectly, through the accomplishment of some of its other missions, such as action to secure and maintain air superiority or the conduct of operations against the rear communications of an enemy and against hostile sources of military power.

Army Support as a Mission of Airpower. It is only natural that the Army expected maximum air support, the nature and scope of which was expected not to be smaller than in World War I. Commensurate with the increased combat capabilities of aircraft it was expected, rather, that the effectiveness of such support would be far greater. To the Army, aircraft appeared to be a particularly suitable vehicle of transportation for observers and for combat personnel from all arms in the execution of certain types of missions. For such purposes it was considered superior to any other form of transportation. With the good opportunities for observation from aircraft, it was possible to take up observers and cameras for the purpose of securing reconnaissance data. Likewise, the weapons with which aircraft were armed could be used to attack fast moving and particularly small targets, which otherwise could only be attacked by observed or aimed weapons fire from the ground. Because of the great speed at which they could travel, aircraft could be used to move weapons in order to develop concentrations at particularly critical points. The relatively long range of aircraft made possible the speedy transportation of weapons into far rear areas for use against targets invulnerable to the limited range of ground weapons fire. The large carrying capacities of aircraft furthermore made it possible to transport troops and supplies speedily over long distances, and also made them highly suitable for

the movement of personnel and materiel as courier planes.

As World War I had shown, certain of the features mentioned above also contributed to make certain types of aircraft a weapon equally or more effective than other weapons for combat action against hostile aircraft. Support by fighter aircraft made it possible to prevent enemy air reconnaissance, and thus protect friendly ground forces against the harmful results of such reconnaissance; it also held out prospects of success in combat against enemy aircraft in preventing action against friendly ground forces. The feeling of security against enemy air attack stimulated the combat efficiency of troops on the ground and of an army as a whole quite considerably. Furthermore, the visible support given by aircraft to troops in combat action on the ground greatly improved combat morale in a manner unachievable by any other means and often far exceeding the actual material results achieved by air combat action.

In summary, the following missions evolved for air power in support of the Army: 1) The conduct of air reconnaissance; 2) action to protect army forces and installations against enemy air reconnaissance and enemy air attack; 3) support of Army ground forces through attacks against targets on the ground; and 4) air transportation and liaison and courier services. Of these missions, the first two were deemed to be continuing tasks of the air forces, whereas the two latter missions were considered as tasks to be performed from case to case as required.

Thus the essential problem involved in future development becomes evident. In any reestablishment of a German Air Force it would be essential, through a synthesis of past experience and existing and envisaged future capabilities, to find a solution which would enable the renascent force to accomplish its numerous missions and, if required, to render the Army maximum support.

Chapter 2

PRACTICAL IMPLEMENTATION OF
ORGANIZATIONAL, METHODOLOGICAL, AND TRAINING THEORYAn Independent Luftwaffe and Its Relations with the Army

Designing the Mission of the Luftwaffe. In establishing the new German Air Force in 1934, the German command followed a course similar to that suggested by the Field Air Commander in 1916 to "consolidate all elements operating in the air against the enemy, and so create an Air Force as a third branch of the Armed Forces." No evidence has been found, however, which connects the planning which took place in 1916 with the realization of those ideas in 1934. It can be assumed, nevertheless, that persons such as Thomsen,* who served as an advisor in the development of the new Luftwaffe, Wilberg, and Goering,† still had the plans of 1916 in mind. The new plans went a step further, however, by including in the Air Force the antiaircraft artillery forces designed "for action against targets in the air."

In spite of the impact of the much-discussed theories of Douhet on general lines of thought, those who defined the missions and the required strength of the new Luftwaffe recognized properly the existing capabilities of airpower and its technical limitations. Consequently, they did not go so far as to require that the new and independent Luftwaffe alone should be assigned the mission of bringing about a decision through offensive action in war, while the Army and Navy were assigned only defensive missions.

On the contrary, the idea was to have a Joint Armed Forces High Command, under which the operations of the Army, the Navy,

* Editor's Note: Lieutenant General (General der Flieger) Hermann Thomsen died in 1942.

† Editor's Note: Hermann Goering, World War I commander of the famous Richthofen Fighter Wing and future Reichsmarschall, was Reichs Minister of Aviation in 1934.

and the Luftwaffe were to be so coordinated that they would serve one common purpose "to break the combat power of the hostile military forces." The basic regulations contained in Air Field Manual No. 16 established certain principles in this field in paragraphs 9, 10, and 30:

The mission of the Armed Forces in war is to break the will of the enemy.

The will of a nation finds its strongest expression in that nation's military forces. Defeat of the enemy military forces is the primary objective in war.

The mission of the Luftwaffe is to serve this purpose by conducting air warfare as part of the overall pattern for the conduct of the war.

Decision in war can be brought about only through the combined efforts of all three branches of the military forces.

By coordinating the operations of the Army, the Navy, and the Luftwaffe, and through appropriate shifts of emphasis within the military forces as a whole, the Supreme Command endeavors to achieve maximum overall effectiveness.

From the above it can be deduced that the Luftwaffe, in its organization and strength, was designed and prepared only for the execution of this circumscribed mission within the whole team of military forces. Had the intention been that the Luftwaffe alone, without support from the other two branches of the military forces, was to bring about a decision in war, it would have had to be given far greater strength. Because of the limited resources available to Germany, this could only have been done at the expense of the Army and the Navy.

It was foreseen, however, that a situation might develop during war in which a change in the balance of forces might be the only possible means to bring about a final decision. The measures necessary to bring about such a change could not have been taken, however, without complications arising. Raw materials, manpower, and machine tools would have been required on a large scale. The

training program would have had to be expanded and adapted to the new requirements. All of this would have taken a number of years. Air Field Manual No. 16 mentioned, in paragraph 31, possibilities of this type which might arise under certain circumstances:

In addition, if operations should come to a standstill on the ground, the Luftwaffe might be the only weapon capable of preventing the ground forces from being bled white, and the only means to bring about a decision.

In such a case the primary condition of success would be a complete shift of emphasis to the conduct of air warfare, at the expense of all other means of warfare.

Such a complete change in the conduct of warfare requires time. As a precaution, preparations must be made in advance.

It is worthy of note here that towards the end of the 1940 campaign in France, Hitler toyed for a short while with the idea of disbanding twenty Army divisions and putting the personnel to work in the aircraft industry in order to enable the Luftwaffe alone to decide the issue in the war against Britain. However, these intentions were not put into effect. Probably Hitler had second thoughts in view of the time required to reequip the Luftwaffe appropriately, and therefore decided on war against Soviet Russia instead.

Airpower as a Unified Weapon at the Point of Main Effort. It was only natural that responsible circles in the Army and Navy demanded that these two branches of the military should have their own air forces, separate from the operational air forces of the Luftwaffe. Limited resources in raw materials, manpower, and funds available, however, led the highest command authorities to establish only one uniformly controlled air force, and to make other arrangements regulating air support for the Army and Navy.

In addition, past experience had shown that the system of subdividing the air force, particularly the combat elements, had resulted unavoidably in a dispersion of effort in operations, thus canceling out the important advantages of high flexibility, mobility, and the capability of swift development of power concentrations so characteristic of airpower.

The most important advantages of airpower could be exploited only through a firm concentration of all air elements suitable for combat action, so as to be able to develop power concentrations successively in areas widely separated and in accordance with the requirements of current situations. Only through a firm consolidation would it be possible, when the occasion required, to commit the large bulk of all available forces of the Luftwaffe in support of individual armies in order to force a decision in battle or to protect the ground forces against threatened destruction.

Development of the Command Organization

Wehrmacht High Command as the Highest Command Authority. Since neither the Army nor the Navy were to have air units of their own, but would rely on the Luftwaffe for air support, and since the Luftwaffe would have numerous missions to execute, it was necessary to have an impartial command authority at a level higher than all three branches of the armed forces. This headquarters would have to decide from case to case on the type, scope, and duration of the support the Luftwaffe would be required to give the two other branches. Air Field Manual No. 16 provided for this contingency in paragraph 11: "How the most effective results can be obtained towards a decision in warfare, and which missions must receive current priority, can be decided only within the overall pattern of the existing military situation. After a careful consideration of all military, political, and economic factors involved, it must be decided which is the currently most important target." The supreme command organization necessary for this purpose was available to the German military forces in the form of the Wehrmacht High Command (Oberkommando der Wehrmacht), usually referred to as OKW. On the subject of the responsibilities of the Wehrmacht High Command, Air Field Manual No. 16 observed: "In such case the Commander in Chief of the Wehrmacht will coordinate the desires of the Army with the other missions of the Luftwaffe and thereby will determine the size of the Luftwaffe forces to be committed in support of operations on the ground."^{*}

* The Luftwaffe included not only the air units, but the anti-aircraft artillery forces as well.

In line with directives from the Wehrmacht High Command that the Luftwaffe was to support the Army, it was necessary to have a centralized command authority of the Luftwaffe to issue the necessary directives to the higher levels of the Luftwaffe field commands, regulating the type and scope of the support to be given, and determining the forces to be assigned for the purpose. This was a responsibility of the Luftwaffe High Command, which also was required to effect the necessary arrangements and agreements with the Army High Command.

Higher Luftwaffe Field Commands Required to Render Army Support. Under the Luftwaffe High Command two types of Luftwaffe headquarters existed for the purpose of securing action in support of the Army.

1. The Luftwaffe headquarters assigned under Army commands. These headquarters controlled only those air and antiaircraft artillery units allocated to them and which were under tactical control by the Army.

The assignment of Luftwaffe commands to the Army was in line with the organizational setup of World War I, under which the following posts had existed: 1) A Luftwaffe General Attached to The Commander in Chief of the Army; 2) a Commander of Tactical Air Support Forces assigned each army group and army level headquarters; and 3) air liaison teams or air liaison officers attached to Army corps or divisions operating in areas of main effort. These headquarters and officers set forth above served as advisors to the appropriate Army commands to which they were attached and exercised administrative and disciplinary control over the Luftwaffe units allocated to the Army.

In contrast with the Army, which considered aircraft nothing but a means of transportation serving to move observers, cameras, or weapons to enemy territory, the Luftwaffe held the view that the use of aircraft was subject to special conditions and circumstances which could not be compared with those of other arms.

The differing technical capabilities of the various types of aircraft, differences in the training of aircraft crews in accordance with the aircraft types involved, the influences of weather conditions

on the conduct of air operations, the quick changes to which the air situation was subject, the special signal communications service required, the measures needed to secure air traffic safety, and the technical qualifications required necessitated that appropriately trained officers of the Luftwaffe should be the persons who directed the operations of air units.

For the above reasons even those units of the Luftwaffe which were assigned to permanent support missions with the Army were placed under headquarters staffed by Luftwaffe personnel. The requirements for this arrangement could be met through the organization previously described.

Under this arrangement, the Luftwaffe units were assigned to the Army only to the extent that the appropriate army headquarters assigned them their missions, prescribing what task they wanted performed, or what purpose the desired action was to serve. Execution of the air mission was then an exclusive responsibility of the Luftwaffe headquarters or air units concerned.

In 1942 the Luftwaffe headquarters assigned under army commands were deactivated, and their mission was taken over by the headquarters of the operational air forces, in addition to their other responsibilities. The purpose of this measure was to economize in staffs and manpower. Cooperation between the various headquarters of the operational air forces and the various Army commands had in the meantime become so close (and the Luftwaffe commands had adapted themselves so well to the organizational setup of the Army) that it was thought this step could be taken without harmful effects. The various air fleets now attached air liaison teams to the headquarters of the army group and army headquarters concerned.

2. The higher level headquarters of the operational air forces. These headquarters, whenever necessary, were required to furnish temporary support to the Army concurrently with the execution of their other missions.

In order to insure that, if the occasion required, only one Luftwaffe headquarters would be involved currently in cooperation with any one army headquarters, the arrangement was to establish the boundaries of air fleets in war with those of the army groups in

such a manner that one air fleet headquarters would be assigned to cooperate with each army group.

At the level of the field army, it was not possible to adapt zones for air operations permanently to the zones of the individual armies. This would have resulted in too many staffs and in a dispersion of the forces of the Luftwaffe, and thus would have been contrary to the basic principle of air operations, namely, the use of airpower in power concentrations. For this reason, the individual unit commanders of the air units assigned to an air fleet had to be assigned to cooperate with and support the individual armies of the army group concerned. Such missions were assigned to air corps, air divisions, or lower air commands temporarily as the situation required.

Luftwaffe Forces Allocated Permanently to the Army

Air support, in accordance with directives from the Wehrmacht High Command, was to be a responsibility primarily of the operational air forces. As we have seen, however, it was thought necessary up to 1942 to assign the Army a certain number of air units permanently, at least during war. Air Field Manual No. 16 provided for this in paragraph 121:

Direct cooperation with and direct support of the Army are missions primarily of those units of the Luftwaffe which are allocated to and assigned under the Army for reconnaissance and air defense purposes. The type of forces in question include reconnaissance, antiaircraft artillery, aircraft reporting, and, if the current situation on the ground requires and the overall situation permits, fighter forces.

Accordingly, a certain number of long- and close-range reconnaissance units and antiaircraft artillery and aircraft reporting companies were assigned under army command. No fighter units were thus assigned, as will be discussed later while on the subject of fighter forces.

As previously pointed out, the system of assigning units to the Army and placing them under Army control was discontinued in

1942. All such units were from then on assigned to the operational air force commands and employed by them as in the past in support of the Army.

Development, Production, and Utilization of Tactical Reconnaissance Aircraft. At the outbreak of war thirty tactical, or close-range, air reconnaissance squadrons were available to the Army. This meant that the Army had enough such units to assign one to each of its corps for purposes of normal tactical and battle reconnaissance, and for use as artillery spotting planes.

Up to the beginning of the Russian campaign in 1941 there were 36 of these tactical air reconnaissance squadrons in existence, although each contained only 7 aircraft, in addition to 20 squadrons of 6 aircraft each intended for assignment to major armored units for reconnaissance. In succeeding years, the number of squadrons was relatively stable, with a monthly average of 29 in 1942, 32 in 1943, and 30 in 1944.*

In view of the rapid build-up of the Luftwaffe it is only natural that use was made of every available type of aircraft that could be used in any way for military purposes. Among the military aircraft developed by the Reichsheer (Germany's post-World War I 100,000-man army) under the difficult conditions resulting from the necessity to circumvent the terms of the Diktat of Versailles (which prohibited the construction of military aircraft) were the Heinkel 45 (He-45) and Heinkel 46 (He-46) reconnaissance models.† In 1939, most of the squadrons had three He-45's and six He-46's, plus another three He-46's in reserve. That they were still in use by front line units in 1939 and participated in the Polish campaign is all the more surprising in that all other branches of the air forces, such as long-range reconnaissance, bomber, and fighter units had aircraft models

* Editor's Note: Statistics showing monthly figures are available in the original manuscript and the translated draft of USAF Historical Study No. 163. Karlsruhe Document Collection.

† Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection

by the outbreak of war which were at least equal to and in some cases superior to those of the enemy.

In addition, each squadron had three Fieseler 156 (Fi-156) (Storch) liaison planes and one Junkers W-34 or other appropriate type of transport plane.

The He-46 had been developed in 1930 according to specifications established by the General Staff of the Reichsheer under the difficult conditions imposed by clauses of the Treaty of Versailles prohibiting German construction of military aircraft. Development had reached the production stage in 1933. The speed, operating range, and operating maximum altitude of this plane were inadequate for tactical reconnaissance missions. The plane was extremely sensitive to weapons fire, and its armament with a rearward field of fire was too weak. Its lack of armor plating limited its usability as a battle reconnaissance plane and was to result in heavy losses as early as the Polish campaign. The plane also lacked the essential features for blind or instrument navigation and was therefore unsuitable for bad weather or night operations. Owing to all of these weak points, the He-46 could only be used within strict limitations for tactical reconnaissance purposes. On the other hand its rugged construction made the plane highly suitable for operations from provisionally prepared field airstrips. As a semi-high-wing plane it also had a good forward field of vision. On the whole, however, this model was obsolete by the time the war began, so far as its technical capacities were concerned, and it was almost an irresponsible act to commit it in combat action.

The He-45 was also a model designed according to 1930 specifications of the General Staff of the Reichsheer as a combination long-range reconnaissance plane and light bomber. It was ready to go into production in 1933. Since the striking range of the plane was no longer adequate for cooperation with mobile ground forces, all planes of this type were transferred in 1935 to the tactical reconnaissance squadrons, each squadron receiving three. As a tactical reconnaissance plane the He-45 was barely adequate for requirements in the Polish campaign, but its usefulness for tactical missions was very limited because it was not suitable for blind or instrument navigation. It was also extremely vulnerable to weapons fire, and its own

rear firepower was too weak.*

The Henschel 126 (Hs-126),[†] designed and developed in accordance with Luftwaffe specifications and intended to replace the He-46, was ready to go into production in 1938. Only enough of these planes were available by the outbreak of war partially to equip the tactical reconnaissance squadrons with them for the Polish campaign. It was only prior to the 1940 campaign in the west that enough of these new aircraft were available to equip all squadrons.

The Hs-126 was an all-metal high-wing plane, and, in contrast with the He-45 and He-46 (which were of mixed steel-wood-fabric construction), it had the advantage of being weather-resistant. This obviated the necessity for protective tents to be carried along and facilitated camouflage in open terrain.

In point of technical capabilities, particularly in respect of speed performances at medium and high altitudes and climbing ability, the Hs-126 was a great improvement over the He-45 and He-46 models. It required only a short take-off and landing runway, and its flight properties were normal. The new plane was also far less vulnerable to weapons fire, since its fuel tank was protected with armor. During the Polish campaign armor plate protection was also installed for the pilot's seat and for the fourth section of the fuselage (where the observer was seated) against weapons fire from the rear. But there was no protection against ground fire. Its weapons were the same as the former models, and rearward fire was inadequate. In addition, there was a conditional capability for blind flight, that is, after the necessary navigational and radio equipment had been installed. With all the above features, the Hs-126 was thus a rugged, weatherproof plane, reliable for use in tactical and battle reconnaissance. It met

* A new model, the Hs-122, developed by the firm of Henschel on its own initiative in 1935 and offered to the Luftwaffe as a close reconnaissance plane, was not placed in serial production by the Reich Air Ministry because its performance was not much better than the He-45 or He-46.

[†] Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

all requirements in the Polish and Balkan campaigns and in the 1940 campaign in France. But from mid-1941 on it was no longer suitable for commitment against the more modern types of fighter aircraft introduced in the meanwhile.

That the output of the Hs-126 was too small is evident from the fact that for the Russian campaign the authorized strength per tactical reconnaissance squadron had to be reduced from nine to seven, and in the case of squadrons intended for panzer divisions to only six. The requirement of three additional planes in reserve had to be suspended. Owing to this inadequate output the operable strength of tactical reconnaissance squadrons declined by the end of 1941 to a minimum: in the command zone of Army Group South, for example, to an average of one plane.

One reason why the development of tactical reconnaissance planes was not promoted as energetically as that of other military types was that, because of the political situation, efforts were to be directed first at the build-up of the combat air forces to serve as a deterrent to war. Another was that Hitler had assured the military commands there would be no war before 1942. Another important reason for the neglect of the tactical reconnaissance arm was that the Army air forces during the time of the military build-up had no top level command authority of their own invested with the necessary powers of command. Such an authority was only established in March 1939 in the form of a "Commander of Army Air Forces and Luftwaffe General Attached to the Commander in Chief of the Army," who controlled all long-range and close-range air reconnaissance units allocated to the Army. Prior to the establishment of this new position these units had been grouped together under the various air divisions of the operational air forces. It was only natural that these division headquarters did not take as great an interest in the units which would not remain under their control in time of war as they did in their own bomber and fighter units.

The section formally responsible for supervision and development of all air reconnaissance forces, both those with the Army and those with the operational air forces, was the Inspectorate of Air Reconnaissance Forces and Air Photography within the Reich Air Ministry. This section was also required to develop the specifications, both tactical and technical, for further development of aircraft to be

used for reconnaissance purposes. However, the decision whether the requirements stated by the section were to be put into effect and included in the general development program was made by the Luftwaffe General Staff, which had to coordinate them with the stated requirements of the other arms inspectorates, namely, the bomber and fighter inspectorates and bring them into alignment with its own views and with the requirements of the other arms and inspectorates for negotiations with the Technical Office.

The difficulties encountered by the Inspectorate of Air Reconnaissance Forces in efforts to have its requirements met are illustrated by the case of the Focke Wulf 189 (FW-189).^{*} This plane was developed in line with the specifications laid down by the inspectorate in 1937, and was completely developed for serial production in that year. But even as late as June 1939 the Luftwaffe General Staff still refused to approve the plane for tactical air reconnaissance purposes, even though it met most of the requirements of the inspectorate, although it was much slower than desired.[†] The inspectorate finally did succeed in having the FW-189 introduced, as the successor of the Hs-126, but much time had been lost in the meanwhile.¹ Indeed, as late as the beginning of the Russian campaign in 1941, only a limited number of the 189's had been placed in service in the tactical reconnaissance squadrons.

The new plane was a considerable improvement over the older types. While its two engines gave it a much greater safety factor, it could also carry an additional crew member, as a rear gunner. This not only relieved the observer of this function, but provided constant

^{*} Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

[†] Instead, the Luftwaffe General Staff desired to introduce a three-seater model--but with only one engine--which the inspectorate had rejected. Apart from its other weaknesses this plane was unsymmetrical, in that its engine was mounted in one of the wings, which therefore had to be larger than the other. This also had the effect of almost completely obscuring vision for the crew members on that side.

observation of the most threatened quarter. The observer's seat was next to the pilot, which made for a better understanding between the two. The closed cabin afforded protection and more freedom of movement for the crew. It was so arranged that the pilot and the observer had a clear forward field of vision, thus permitting good photographic work, since the plane could be steered to point targets. Its limited capability in blind flying could become a full capability by the addition of a radio operator with appropriate radio equipment.

Of all aircraft models used hitherto by the Luftwaffe for tactical reconnaissance missions, the FW-189 was the closest approach to the ideal. It was superior to all former models in construction, flight safety, facilities for crew cooperation, armament, equipment, and operating range. One important disadvantage was that it was not faster than the Hs-126. Throughout the pre-war period and during the war the Luftwaffe at no time was able to produce engines with a thrust equalling those produced in foreign countries, and this was the reason for the failure to increase the speed of the FW-189. During 1941 and 1942 the plane was thought suitable in every respect for close-range and battle reconnaissance missions. From 1942 on, however, when Russian fighter defenses began to improve, it no longer met requirements because of its low speed. However, it was used with success in night reconnaissance up to the end of the war.

The question presents itself whether it was a wise measure to incorporate the three separate missions of tactical, battle, and artillery reconnaissance for execution with one and the same type of aircraft, since these missions in some points varied widely one from the other. For tactical purposes, the plane had very much the same types of missions to execute as any strategic reconnaissance unit. Therefore, each air reconnaissance squadron should have been given a certain percentage of twin-engine aircraft of the strategic reconnaissance type. This percentage could have been up to 50 percent. A plane of this type would not only have been more suitable for the execution of normal tactical missions, but at the same time would have been able to execute longer range missions for the artillery.

Battle reconnaissance would have required an armor protected plane, which probably could also have served as a ground-attack plane. A plane of this type no doubt also could have handled close range missions for the artillery. Technologically, the development

of an armor-plated battle reconnaissance plane would have been possible, since the German Army Air Forces at the end of World War I in 1918 had two such models, one from the firm of Junkers and one from the Allgemeine Elektrizitaets Gesellschaft, both of them known as the "Infantry Plane" and both protected by armor plating from ground fire.

There is also the possibility that a helicopter could have performed the missions of close range artillery reconnaissance even better than a plane, and the artillery arm had repeatedly requested the Luftwaffe prior to the war to furnish helicopters to replace the stationary observation balloons in use. However, the Luftwaffe High Command refused to introduce helicopters as artillery planes, although a suitable model (Focke) was available for the purpose before the war.

The artillery arm also requested introduction of the Fieseler-156 (Storch) liaison plane, to be used in the artillery as a forward observer plane for reconnaissance and fire directing missions. However, the Inspector of Air Reconnaissance Forces refused to approve this request, stating as his reason that so slow a plane could not be employed without fighter protection and that no fighters would be available for this purpose. The number of Fieseler Storch planes lost in front areas while on liaison missions during the war proved how justifiable this view had been.

Finally, the question arises why consideration was not given at an earlier juncture to the use of single-seater fighter aircraft for reconnaissance missions. This suggestion was first made to the Inspector of Air Reconnaissance Forces at the turn of the year 1939-40 by the appropriate staff officer of the Luftwaffe Operations Staff. The inspector considered that fighter aircraft would be suitable only for tactical air reconnaissance photography missions and not for missions as a normal tactical battle reconnaissance unit or for artillery reconnaissance missions.

However, since stronger engines were not available for the FW-189, and since faulty political and military trains of thought had prevented the development of new types of more suitable aircraft, it became necessary to adopt fighter aircraft as an expedient. To this end fighters available at the time received appropriate equipment and were used for tactical reconnaissance purposes. These were

the Messerschmitt 109-G (Me-109) and Focke-Wulf 190-A-6 (FW-190) types.*

It was thought that, for the time being at least, the disadvantage could be accepted of not having slower aircraft carrying an observer for the execution of special type reconnaissance missions. Developments in foreign countries also seemed to show that the use of fighter aircraft for reconnaissance was at the time the only possible course to be taken. It is only natural that the fighter-reconnaissance type of plane was far superior to any type of multi-seater reconnaissance type of tactical reconnaissance aircraft in speed, climbing ability and versatility. Whereas the multi-seater reconnaissance plane was forced to do everything possible to avoid combat against fighter aircraft, the fighter-reconnaissance plane was able to defend itself, particularly when operating as part of a pair or flight, even against a numerically superior enemy fighter force. Owing to its speed and maneuverability it was also better able to escape antiaircraft ground fire than the normal type reconnaissance plane. Finally, its diving capability enabled it to descent swiftly to detect details and then climb back rapidly to a high altitude.

But the fighter-reconnaissance plane also had distinct disadvantages. For one thing, the pilot had to act simultaneously as observer, a function he could not perform to full satisfaction in addition to the task of piloting his plane. Thus, a reconnaissance fighter could carry out road reconnaissance at high or low altitudes, but could hardly be used to carry out point reconnaissance missions in the open terrain, such as the precise detection of a battery position. Artillery fire observation was also a difficult mission; it was impossible to observe accurately the general placing of artillery fire without having an observer along for the purpose. Vertical air photography, including panorama photos taken with an automatic camera could be carried out with a single-seater plane, but it was impossible to take oblique photos, such as are necessary in battle reconnaissance by air.† The photographic coverage of large areas,

* Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163, Karlsruhe Document Collection.

† Editor's Note: The inability of Luftwaffe single-seater aircraft to take oblique photographs is explained by the fact that the only

as required for cartographic purposes, for example, and in which the lateral overlapping of the separate film strips has to be rigidly observed, was also a mission which the single-seater plane pilot could hardly be expected to execute. Such missions had to be assigned to long-range reconnaissance units.

For bad weather and night missions the reconnaissance fighter was just as suitable as any other fighter type of aircraft, which means that its usefulness was restricted. At night or under conditions of poor visibility, the pilot was forced to concentrate his attention on flying the plane, thus greatly lessening or even eliminating tactical observations.

On the whole, the use of single-seater aircraft for tactical reconnaissance proved a practicable measure. Indeed, under the proper conditions and within the scope of its capabilities the fighter plane was used for such purposes with success.

Strategic Reconnaissance Units for the Army. At the opening of the Polish campaign the Luftwaffe assigned to the Army ten long-range or strategic air reconnaissance squadrons. During the 1940 campaign in France, the Army still had the same number of long-range air reconnaissance squadrons. By the opening of the Russian campaign in 1941 three night reconnaissance squadrons were also assigned to the Army, which thus then had a total of thirteen long-range

available oblique-purpose camera, according to Allied intelligence, was a hand-held, hand-operated instrument with a 12.5-cm. lens and with the official designation of RB 12.5/9x7. This limitation naturally obviated the possibility of a fighter pilot's taking oblique shots. Indeed, American and British development of aerial photography was considerably in advance of the German, for the Luftwaffe had developed no new camera up to the middle of 1944. Air Intelligence Summary, USSAFE, No. 27, 14 May 1944, p. 5. USAF Historical Archives. The USAF, for example, developed an oblique-purpose camera which, at least as early as January 1944, had been installed on the P-51. Ltr., Hq Ninth Air Force to CG, USSAFE, subj: Photographic Survey of the Ninth Air Force, 24 January 1944. USAF Historical Archives, 519.626, 1944-48.

or strategic air reconnaissance squadrons. This figure obtained for the remainder of 1941. Since long-range air reconnaissance for the Army became a mission of the Luftwaffe in the spring of 1942, these squadrons were directly assigned to the Luftwaffe during that year. In the period 1942-1944, the number of squadrons, on a monthly average, was 23 in 1942, 27 plus in 1943, and 28 plus in 1944, with an appreciable drop in the latter part of that year, down to 15 squadrons in April 1945.* Whereas it was possible during the Polish and French campaigns to assign each army group and each army participating one long-range reconnaissance squadron, this was no longer the case in the Russian campaign.

Initially, beginning with 1 July 1934, long-range reconnaissance squadrons were equipped with Type He-45 aircraft. In the following year, in view of the inadequacies of the He-45, each long-range reconnaissance squadron was assigned three He-70 aircraft[/] on the recommendation of the Inspectorate of Air Reconnaissance Forces. The He-70 was a fast single-engine plane known generally as the "Blitz," which had been developed by the German Lufthansa Airlines for the transportation of mail. Its great speed was due primarily to its favorable aerodynamic design. Weapons and other military equipment were then installed with the object of making the plane usable for long-range reconnaissance. But in spite of its advantage of speed over the He-45, the He-70 proved of only limited value for long-range reconnaissance purposes because of the poor field of vision from the observer's seat. Also the model adapted for the purpose was 18 miles slower than the original model because of the weapons installed and because of the coat of camouflage painting it had been given.

For this reason Do-17-P^{//} planes were used from 1937 on to equip the long-range reconnaissance squadrons allocated to the Army. The first twin-engine model assigned to the long-range squadrons, the Do-17-P was designed originally as a dual-purpose plane, to be used as a light bomber or twin-engine fighter. It rendered excellent service as a long-range reconnaissance plane in the Polish and French

* Editor's Note: Statistics showing monthly figures are available in the original manuscript and the translated draft of USAF Historical Study No. 163. Karlsruhe Document Collection.

[/] Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

^{//} Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

campaigns.

Up to the end of the war the Ju-88* was also used as a long-range reconnaissance plane, the only difference being that its engines were improved. It rendered excellent service in this field, although its losses were heavy--as will always be true in operations involving penetrations by individual aircraft into the far rear of enemy areas heavily defended by fighters. At the beginning of the Russian campaign the He-111† aircraft was used temporarily in the reconnaissance squadrons assigned to armored groups.

In efforts to avert the loss of strategic reconnaissance aircraft and to create the possibility of air reconnaissance over strongly defended hostile areas, such as Britain, several varieties of Arado 234 twin-jet planes were placed in service for such missions towards the end of the war.

Night Reconnaissance Units. On the initiative of the Luftwaffe General with the German Army High Command three night reconnaissance squadrons were organized for the campaign in Russia, each of them equipped with nine aircraft (Do-17Z) suitable for blind navigation. The number of these squadrons remained fairly stable, rising to four in August 1942. From June 1944 to April 1945 the number was constant at three squadrons. †† The squadron's planes were given equipment to drop parachute flares and flashlight bombs for night photography. Although the aircraft initially employed proved highly satisfactory, they were later replaced by an improved model, the Do-217.

* Editor's Note: Standard twin-engine day or night bomber. Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

† Editor's Note: Twin-engine heavy bomber. Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

†† Editor's Note: Statistics showing monthly figures are available in the original manuscript and the translated draft of USAF Historical Study No. 163. Karlsruhe Document Collection.

Units for Temporary Assignment in Army Support Missions

Fighter Units. The 1935 edition of Air Field Manual No. 16 still adhered to army command of fighters, in paragraphs 130 and 131: "Fighter and antiaircraft artillery forces committed in defense missions within operational zones of the Army will as a rule be assigned under Army command." In those times the operational zones of the Army were considered as those areas in which it was essential for the Army to have unrestricted command authority in all fields of endeavor, military, administrative, and political (executive authority), in order to be able to conduct its combat operations successfully. It was thought, therefore, that the Army should also have responsibility for the air defense mission in such areas and should have control over the necessary means for this purpose.

Experience gained later in war games, maneuvers, and on other occasions led to the realization that, given the existence of a separate and independent air force, it was no longer possible to maintain the principle of sole responsibility of the Army in such areas. Large elements of the Luftwaffe units would be stationed in such areas, together with all their signal communications and supply and servicing installations. Very often such areas also contained factories and installations of vital importance for the armament industry and for the military effort in general, but the defense of which was not of direct concern of the Army, a mission for which the Luftwaffe was in general responsible. If the Luftwaffe were to commit its forces in the execution of defense missions in these areas, it was not feasible to place these forces under Army command. They had to remain under Luftwaffe control to insure swift shifts in the main effort of defense caused by enemy attack action.

The defense of areas with such a wide frontage in the forward areas of combat also could not be handled by fighter and antiaircraft artillery forces alone. Effective defense here was possible only through continuous destructive attacks by bomber forces against the enemy air forces on the ground. Bomber forces for missions of this type required fighter escorts when crossing the front line areas. On the other hand, when enemy air forces endeavored to cross the operational zone of the Army with the intention of attacking targets farther in the rear, and thus were outside the Army's operational zone, it was necessary for friendly fighter forces to intercept and

attack them continuously before they could cross the front areas.

The circumstances just described would result automatically in the development of heavy concentrations of fighter forces within the Army zones of operations, only some of which would be intended for missions in protection of Army forces or for other Army support purposes. To have placed them under command authority by Army headquarters would have resulted in continuous controversies between the Army and Luftwaffe commands over the sequence and priorities of air missions and would have made uniform direction of operations impossible.

Another point recognized at an early stage was that the mission of air defense commenced at the factories in which aircraft were manufactured and extended throughout the length and breadth of the friendly zone of interior; that it had to be considered as an homogeneous whole, and could not be divided up between the Army, the Navy, and the Luftwaffe. Air Field Manual No. 16, in paragraph 24, stated quite correctly that, "Attack, defense, and local protection are reciprocal missions. They must be directed by one center in accordance with uniform principles." For this reason a supplementary sheet to Air Field Manual No. 16 published prior to the war established in paragraph 121 that fighter forces would only be assigned to Army command "when the situation on the ground made this necessary and the overall situation permitted." This doctrinal statement was supplemented in paragraph 121:

Fighter units of the Commander in Chief of the Luftwaffe stationed within the Army zones of operations or near such zones for purposes of operational air warfare can, under instructions from the Commander in Chief of the Luftwaffe and in agreement with the locally responsible commands of the Army, be employed in operations to protect the zone of operations against air attack or to prevent enemy air action over the zones.

The above formulation was arrived at only after serious disputes with the Army and represented only a compromise solution. It served to confirm the view that under given circumstances, fighter units after all would be assigned under Army control.

In actual fact no fighter forces were assigned under Army command throughout World War II. Instead, the Luftwaffe was assigned responsibility for the execution of the following missions for the Army: 1) Air defense within the Army zones of operations; 2) action to achieve control of the air over front areas, above all to safeguard reconnaissance units in the air in the execution of their missions; 3) fighter action in support of combat action on the ground under certain circumstances.

In the light of experience gained in World War I the Luftwaffe attached great importance to the ability of its fighter forces to participate in combat on the ground in appropriate circumstances. When employed in such missions they were able to participate not only with their aircraft gunfire but also with bombs. For this reason the fighter models used in the first years of World War II were so constructed that bomb clips could be attached under their wings, thus enabling them to carry bombs. Since these clips reduced speeds by approximately 24 miles, they were attached only when required.

Tactical or Close-Range Bombers. Up to 1938 the Luftwaffe High Command had no front line special air units available for commitment in missions in direct support of the Army. The only force of this type in existence at the time was organic to the training wing. It was an experimental group, equipped with Henschel-123 (Hs-123)* planes, and known as a ground-attack group (Schlacht-fliegergruppe). With a strength of forty aircraft, it was organized in three 12-aircraft squadrons plus a headquarters flight. It was not clear at the time whether the fact that 38 ground-attack squadrons, with an authorized strength of 228 aircraft, had been considered necessary towards the close of World War I had been due to the conditions of position or static warfare. It was hoped that this type of warfare could be averted in the future through the use of modern means of warfare, such as tank and air forces. Consequently, it was thought that the best way to support army operations would be through indirect support, through air attacks in the rear areas of combat and against the hostile armament industries. If the occasion arose, it was envisioned that the air forces intended for operations

* Editor's Note: Single-engine, single-seat assault or ground attack fighter.

of this type, which would be a part of the operational air forces, could also be committed temporarily at any time in the battle area.

However, controversy over the above point was by no means over. Decisions had been postponed until after the build up of the operational air arm was completed and until more experience could be gained with the existing experimental ground attack group. Experience in the Spanish Civil War, where out-dated fighter types, no longer suitable for missions of this type because of their inadequate technical capabilities, had been used with decisive results to participate in ground combat brought the whole problem into the foreground.

Prior to German occupation of Sudetenland in 1938, when the possibility of armed conflict had to be taken into consideration, orders were therefore issued for the immediate activation of five so-called ground-attack groups to be numbered 10, 20, 30, 40, and 50. The 10th and 50th Groups received Hs-123 aircraft, each of the other three groups received Arado-68 (Ar-68), * He-46, and He-51[†] aircraft. Starting in November 1938 four of these five groups became dive-bomber groups when they were reequipped with Type-Ju87 dive-bomber aircraft. Only one remained in existence as a specific ground-attack unit, equipped with Hs-123 aircraft. When war broke out in 1939 two special types of air units were thus available for commitment in direct support of army operations, i. e., ground-attack units and dive-bomber forces.

In the case of the ground-attack units, the situation remained unchanged in the first years of warfare, with only the experimental unit of the former training wing in existence. It was only from 1943 on that first steps were taken to activate more ground-attack units, raising the total to five by September.

It gradually became evident that the dive-bomber units were no longer suitable for action with their out-dated aircraft. Consequently, beginning in October 1943, the existing dive-bomber groups were

* Editor's Note: A single-engine biplane, designed primarily as a training plane.

† Editor's Note: A single-engine biplane, designed primarily as a training plane.

reorganized as ground-attack groups and reequipped with FW-190 aircraft. This action raised the number of ground-attack groups from 5 to 14 in October, with a high of over 24 by December 1943. The monthly average in 1944 was 20-plus groups, while the figure for April 1945 was 17.*

Although frequently committed in independent air force operations, such as attacks against airfields as part of the battle for air superiority, up to October 1943 the dive-bomber forces remained the main air arm for missions in direct support of army operations on the field of battle. The average monthly number of groups varied from approximately 11 for 1940 and 1941 to 7 for 1942 and 12 through September 1943.†

Special Type Aircraft for Ground-Attack and Dive-Bomber Forces. In response to invitations from American aero clubs, Ernst Udet†† in 1934 had traveled to America to participate in aviation championship contests. There he had come to know the Curtiss Helldiver, developed by the United States Navy as a ship-carried fighter plane and also equipped for operations as a fighter-bomber against ships. Udet was greatly impressed by the demonstrations of the plane in dive-flight and the release of bombs at very low altitudes, and obtained from the German Ministry for Aviation permission and funds to purchase two planes of this model for Germany.

The planes thus purchased served as models for the development of German versions of dive-bomber aircraft, a development which was destined to meet considerable opposition and difficulties.² In his memoirs, Heinkel for example states:

* Editor's Note: Statistics showing monthly figures are available in the original manuscript and the translated draft of USAF Historical Study No. 163. Karlsruhe Document Collection.

† Editor's Note: Statistics showing monthly figures are available in the original manuscript and the translated draft of USAF Historical Study No. 163. Karlsruhe Document Collection.

†† Editor's Note: General (Generaloberst) Ernst Udet, famous German fighter pilot in World War I, became Chief of the Technical Office of the Luftwaffe in 1936, and later Chief of Procurement and Supply. He committed suicide on 17 November 1941.

American firms, above all the firm of Curtiss, had been producing dive-bombers already for a number of years. Over there they had given these planes the highly descriptive designation of "Helldiver" because of the extraordinary strains dive-flight imposed on the pilot. In 1932 I had produced a dive-bomber, the He-50 for Japan. . . . A series of these planes had been constructed in 1933 and 1934 for the Luftwaffe, for the experimental equipment of one dive-bomber squadron.

However, when Wolfram Freiherr von Richthofen, later Field Marshal von Richthofen, in 1934 took over the Development Branch of the Technical Office the idea of a dive-bomber was killed. Richthofen had stated categorically: "Diving to a level below 6,600 feet is complete nonsense." Owing to the high stage of development reached in anti-aircraft artillery, he maintained, every plane which risked a descent to such low altitudes would become a victim of anti-aircraft fire

A few engineers in Richthofen's branch who did not agree with their chief in this matter had admittedly continued to make experiments in this direction. Thus, they had on their own responsibility carried out tests with the Henschel Hs-123, a double-decker originally designed as a single-seater fighter plane. Richthofen nevertheless remained skeptical. It therefore appeared all the more surprising when now, in 1936, a large-scale contract was suddenly awarded for the development of dive-bomber aircraft.

The influence behind this volte-face centered around the figure of the famous German aviator, Udet. If Udet's appointment as successor to Richthofen as Chief of the Development Branch was the source of considerable surprise, even more so was his promotion soon after (10 June 1936) as chief of the entire Technical Office. But of course so fateful a change, for both Udet and the Luftwaffe, was not foreseen at the time.*

* Editor's Note: For Udet's unfortunate influence on the development of the Luftwaffe, see Richard Suchenwirth, Historical Turning Points in the German Air Force War Effort, USAF Historical Study No. 189, pp. 7-8.

This is one of those rare cases in which the officer, that is von Richthofen, who was destined later to achieve the most famous successes in the use of this weapon initially opposed its development.

The Hs-123 was thus developed from the American Curtiss Helldiver model. The new plane was an all-metal, semi-high-wing plane without stays, which proved suitable for dive-bombing and for ground attack. The lower wing had only one one-piece rib, while the upper wing had two two-piece ribs supported by canopy struts. The ailerons were on the upper wing, the landing flaps on the lower, and the stabilizer was supported against the fuselage. Both the stabilizer and ailerons had disconnecting flaps which could be adjusted while in flight, while the undercarriage was in two cowled halves built in. The air-cooled engine was covered by a NACA hood.*

The first five of these planes were tried out in the Spanish Civil War in 1937. However, the Hs-123 played no important role, since it was soon replaced by the Ju-87, a Junkers dive bomber with improved performance, the first test model of which was ready in 1935. In the development use was made of the experience gained with the former Ju-47 model. The Ju-87 thus had many similarities with the Ju-47, and was developed along the lines of a fighter plane. It was a relatively small, highly maneuverable plane of all-metal cantilever low wing monocoque construction. A particularly noticeable feature was the gull type wings, necessitated by the very compact undercarriage, providing a good field of vision forward and downward for the pilot, and insuring the most favorable airflow over the fuselage and the wing.

The fuselage and the power units had to be specially adapted to the enormous strains which would develop during dive flight, necessitating a large amount of detail work in the construction. The use of dive-flight brakes made it possible to keep the high centrifugal forces and the stress and strain on the fuselage, the power unit, and

* Editor's Note: The NACA cowling, of which the hood formed a component part, was developed by the United States National Advisory Committee for Aeronautics, and the report on its design was published in 1934.

the crew within tolerable limits. Plans to have a retractable undercarriage were abandoned in order not to weaken the wing junction.*

Later modifications, in particular the change-over to a new undercarriage, enabled the plane to carry 2,200-4,000 pounds of bombs, or made it possible to use the plane for dual purposes.[†] One important disadvantage of the dive-bomber was that it could not be employed when the cloud ceiling was lower than 2,600 feet, since the bombs could only be released in a relatively vertical dive. The manufacture of these aircraft ceased in October 1943.

When it became evident during the war that the Ju-87 was too slow to protect itself, the decision was taken after numerous tests to equip the ground-attack units with FW-190 planes, a fighter model, after various adaptations in the plane's equipment. Operational testing of this model as a ground-attack plane commenced early in 1942.

The FW-190 was a single-seater fighter plane powered by an air-cooled engine. This feature was considered a special advantage, since the plane could not be put out of action by hits in the cooling system. Its compact structure and advantageous distribution of weight gave the plane a high degree of maneuverability. Its machine guns and cannon gave it a very heavy fire power. Having a wide (retractable) undercarriage, the plane had excellent take off and landing capabilities, so that it could operate from field-type airstrips.

During the first years of warfare the dive-bomber forces proved adequate for combat action against enemy tanks. Soon after the beginning of the Russian campaign, however, the large numbers of tanks in action and the fact that tanks now had better protection against bombing made it necessary to seek new ways and means for antitank action.

After various experiments a number of special units were organized in 1943, the first being an experimental unit for tests in

* Editor's Note: Technical data in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

† Editor's Note: Presumably the author means that, with a greater bomb-carrying capacity, the aircraft could also be used in level bombing.

antitank action at Rechlin. This unit was later transferred to Bryansk on the Russian front in order to test its effectiveness in actual combat. It consisted of an antitank squadron of Ju-87 planes and the 92d Squadron with Ju-88 planes. In addition, an Antitank Air Command was established which had as components the 51st (Antitank) Fighter Squadron, organized in January 1943; the Experimental Antitank Squadron (Me-110 planes), organized in April 1943; and the 1st Twin-Engine (Antitank) Wing Squadron, established in June 1943.

However, this force was deactivated in July 1943 and its place was taken in October of the same year by the 4th Group, 9th Ground Attack Wing. The group contained the 13th and 14th squadrons of the wing, equipped with Focke-Wulf planes, each armed with two 30-mm cannon. Another four squadrons were soon added. Some units of the newly activated ground-attack wing also contained an antitank squadron.

The decision was taken in 1945 to establish a few provisional squadrons and equip them with recoilles type antitank weapons.

In 1942 one 37-mm gun was mounted under each wing of the Ju-87 dive-bomber aircraft of the Experimental Antitank Air Detachment at Rechlin. Plans provided for a special type of ammunition to be furnished for these guns, with a Wolfram core, and capable of piercing the strongest armor plating known at the time. The detonators were set to explode the charge only after the shell had pierced the armor, so as to achieve maximum effects inside the tank struck. Already a slow aircraft, the speed and maneuverability of the Ju-87 plane were still further reduced by these changes. However, the guns made it possible to aim accurately, with a margin of error of between 8 and 12 inches.³

Soon after the opening of the Russian campaign, the Russians commenced sending out small planes at night to harass German troops and headquarters staffs and deprive them of rest. Most of these planes were of the U-2 type, * carried only a few bombs, and penetrated to just behind the front lines.

As a countermeasure, the Germans in the autumn of 1942

* Called "sewing machines" by German soldiers.

began organizing a few squadrons as harassing squadrons. A start was made by the Fourth Air Fleet, which organized a few of these squadrons in the southern sector of the eastern front; the First Air Fleet followed later with the establishment of a group. Very soon the Luftwaffe High Command established these units as regular table of organization units. At the end of 1943 a number of groups were consolidated to form the 1st Night Ground-Attack Wing, and in 1944 twelve of these wings, numbered 1 through 12, were in existence. Of these wings the 1st, 2d, 4th, 8th, and 9th were equipped with Ju-87s, the 3d and 5th with older types of training and practice flight aircraft. The 7th Wing had Italian C/R 42 (Fiat) planes.* The 6th, 11th, and 12th wings, committed in Estonia and Finland, each had only a small number of aircraft, while the 9th Night Ground-Attack Wing had only 9 aircraft in each squadron.

Initially the various squadrons were equipped with training and liaison types of aircraft, such as the Arado-66, Gotha-145, and Heinkel-4; even Fieseler-156 (Storch) planes were used for this purpose.

In Italy, the Luftwaffe's Second Air Fleet assigned CR-42 planes to its night harassing units, and at the time of the Allied landings at Anzio-Nettuno in February 1944, air fleet headquarters requested approval from the Commander in Chief of the Luftwaffe to use Ju-87 aircraft. This plane, hitherto used as a dive-bomber, was now no longer suitable for dive-bombing missions since it could not be committed during daylight because of strong Allied air defenses. Although the Chief of Ground-Attack Forces expressed grave doubts about the advisability of this measure, Ju-87 aircraft were assigned and achieved excellent results in night operations. This made it possible actually to damage the enemy instead of only harassing him.

Bomber Units of the Operational Air Forces Required to Cooperate When Necessary. The bomber units of the Luftwaffe were so equipped that, in addition to their other missions, they could execute missions in support of the ground forces. But their usefulness in such areas was subject to limitations, since the heavy

* Editor's Note: A single-seat fighter biplane with a radial air-cooled engine. Called the "Freccia" ("Arrow").

antiaircraft fire encountered in battle areas made it impossible for the units' large twin-engine aircraft to operate at low enough levels to search out appropriate targets. For this reason their real targets were outside of the enemy battle zone. Concerning their use, Air Field Manual No. 16 stated in paragraph 21:

In close cooperation with the ground forces and the Navy, air forces, and particularly the bomber units, frequently will be unable to find targets against which they could bring their full striking power to bear and through the destruction of which they could effectively support the Army or the Navy.

It is sounder practice to commit these air forces against distant targets, the destruction or neutralization of which can exercise a decisive influence on the combat operations of the Army or the Navy.

Thus, action against the sources of the enemy military potential might also be advisable even during times of close cooperation with the Army and the Navy

From the above it is obvious that only a part of the bomber forces was intended for missions in support of Army operations at any given time.

The Luftwaffe began the war in 1939 with a total of 31 bomber groups (of 3 squadrons each), including the so-called fast bomber groups. By the following September the total had risen to 45, which remained the approximate figure at the beginning of the Russian campaign in June 1941. Three more groups were added for the remainder of 1941, but the total dropped to an average of 35 groups for the first four months of 1942, rising to a high of almost 47 groups in September. The year 1943 saw the highest total, with a monthly average of 54-plus groups. The monthly average in 1944 was 41-plus, with a sharp decrease toward the end of the year. And by April 1945 the number of operational bomber groups had shrunk to 7-plus.*

* Editor's Note: Statistics showing monthly figures are available in the original manuscript and the translated draft of USAF Historical Study No. 163. Karlsruhe Document Collection.

The German Air Forces had three types of medium bomber aircraft:

a. Dornier 17, known as the Do-17. At the beginning of the war Model Z (a twin-engine monoplane) of this type was in use in front line units. Owing to its great speed* it was particularly suitable for low-level attacks, for which reason these aircraft were assigned primarily to units of the VIII (Close-Support) Air Corps. In 1942 this model was replaced by the Do-217.

b. Heinkel 111, known as the He-111. Model He-111-HP, a twin-engine heavy bomber, was in use at the beginning of the war, and with certain modifications remained in use right up to the end.

c. Junkers 88, known as the Ju-88. This type was intended as standard equipment for the Luftwaffe. It was introduced in three variants:

(1) With a flight capability of 900 miles carrying a normal bomb load of 3,300 pounds. If the disadvantage of longer runway requirements for the take-off were accepted, the plane could carry a load of 6,800 pounds in bombs.

(2) With a flight capability of 1,440 miles carrying a normal bomb load of 1,100 pounds. If overloaded, the plane could carry a bomb load up to 3,300 pounds.

(3) With a flight capability of 1,600 miles with a bomb load of 1,100 pounds.

The plane carried a crew of four, consisting of a pilot-commander; a bombardier-observer-copilot; a radio operator, who was also the rearward and upward gunner; and a forward gunner, who was also responsible for downward fire. All crew members were seated in one compartment and had good facilities for intercommunication. The plane had all equipment for oblique and dive attacks which had proved sound in the Ju-87 dive-bomber model.

* Editor's Note: Maximum speed at 16,000 feet was 275 m. p. h.

Of the 40 bomber groups in existence on 12 February 1940 24 were equipped with He-111s, 12 with Do-17s, 3 with Ju-88s (just being introduced at the time), and 1 with FW (Focke Wulf)-200,* equipped only for operations at sea.

Organization: the Key to the Mobility of Bomber Forces. The units were not organically tied to any ground service organization units. They could be serviced and maintained by any airfield operating company anywhere. Two airfield operating companies were provided for every bomber group in existence. This made it possible, if the situation required, to move airfield operating companies in advance from one area or theater of operations to another. The only provision made to orient newly assigned airfield operating companies on any special features of specific aircraft or its engines was that in every group each aircraft had one member responsible for the servicing, while each squadron had an aircraft sergeant, a radio, a weapons, and a bomb servicing supervisor. These latter personnel were carried along in the squadron transport plane.

The permanent local authorities, such as the local air base command, air base area command, or Luftwaffe Administrative Area Command Headquarters were responsible for such matters as the messing, billeting, and supplies (fuel, ammunition, etc.) of any units operating from their areas, so that a unit transferred to any airfield found everything present which it required. This "lodge" type system, in which each tactical airfield operated independently of any parent unit, made it possible for any unit to move from one airfield or theater of operations to another as fast as it could travel under its own speed in the air for immediate commitment in its new area of operations.†

Unlike the bomber units, reconnaissance and ground-attack units were dependent in their operations on their organic motorized ground service elements. However, they took along advance parties when moving to a new area, so that they were able to operate

* Editor's Note: Probably the FW-200K, a four-engined monoplane used for long-range oversea reconnaissance, mine-laying and convoy attack.

† Editor's Note: From time to time the USAF has experimented with similar systems.

temporarily with these servicing parties until their regular ground components arrived. The tactical reconnaissance units had adequate surface motorized transportation and personnel to enable them to establish and maintain a forward battle or tactical airfield besides their base airfield.

Development and Procurement of Munitions for Ground Support*

Fragmentation Bombs. Even before World War II it was understood that the available SC-10 22-pound and SD-50 110-pound fragmentation bombs could be used with good results against large area live targets comprising closely massed personnel, such as troop assemblies or moving columns.

In view of the stated requirement of the Army for direct support, however, it was to be expected that air action would also be called for against dispersed infantry or other scattered targets, and in frequent cases even against dug-in targets.† A special type of ground-attack bomb, the SD-2 4.4-pound fragmentation bomb was developed specifically for such purposes, to be used by ground-attack aircraft against such targets. As a rule these bombs were to be dropped in large numbers by planes flying at a low altitude, the purpose being to cover large areas rather than to strike individual targets. The bombs therefore required no stabilizing fins and so were constructed in ball shape.

On the basis of experience in the Polish campaign and in the campaign in the west, in 1940, the decision was taken at the beginning of the Russian campaign to have other air units, such as fighter, dive-bomber, and bomber use these bombs. It was found necessary, however, to provide the planes used for this purpose with special bomb ejectors.

* Editor's Note: The German Air Force system of weapons selection is the subject of a monograph (as yet unpublished) by the present author, in the GAF Monograph Project.

† Editor's Note: Details of bomb types used in Army support missions in Appendix No. 39 in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

According to a report of 17 May 1941 from the Chief of Special Supplies and Procurement Services (Generalluftzeugmeister)⁴ certain twin-engine bomber units (5 Ju-88 groups and 3 Do-17 groups) had such special equipment for the use of these bombs, and each of these planes could carry 360 Type SD-2 fragmentation bombs. Among single-engine fighter and dive-bomber units, seven groups (4 Me-109 and 3 Ju-87) were so equipped, and each plane could carry 96 Type SD-2 bombs. Plans for July 1941 (after the Russian campaign had been launched) provided for measures to equip another two groups, twin-engine fighter units, for the use of these bombs, each plane to carry 96 bombs.

As long as fronts remained fluid, these bombs proved highly effective although unfortunately in short supply. But once the ground situation became stabilized, it was found that the antiaircraft defenses were too effective for low-altitude operations, which were the prerequisite for this type of bombing, which from then on could be carried out by single-engine aircraft only on a limited scale and by multiple-engine aircraft not at all. It was only in the very last stages of the war, in the general state of extreme emergency when the fronts in the east had practically ceased to exist as continuous lines, that the bombs again came into use on an appreciable scale.

Development of Small Bombs for High Altitude Bombing. It became evident at a very early stage that the fact that the SD-2 fragmentation bombs could only be used in low-altitude operations was a serious disadvantage.

It is astonishing that the German command failed to realize the importance of very small bombs, to be scattered in very large numbers on targets. In the 1940 campaign in France the Luftwaffe had captured over one million of these 2, 2-pound (1 kilogram) bombs to be delivered on targets in large drop containers. A special detonator caused the containers to open at a certain altitude above the ground and scattered the small bombs in a fairly regular pattern in the terrain. The bombs captured in France could have been used without any difficulty with the German bomb containers used for electron incendiary bombs, which were available in adequate quantities and which fitted into the German bomb clips. Without consulting the field forces, the Luftwaffe General Staff released the captured bombs for use as scrap material, the idea being to salvage the small

quantities of copper used in the detonators, since copper supplies were so very short in Germany. Too late, the importance of these bombs for use against live and dug-in targets was realized, and only then did production begin in Germany.

No information is available as to precisely when the idea (which was quite logical) was conceived to use these new bombs against live targets. That the necessity had not been realized sooner to develop very small bombs for use with special equipment, such as containers, in order to be able to attack effectively large areas by placing bombs at short intervals, is due to the fact that the Luftwaffe for a long time adhered to the idea that its real targets were not to be found within the battle area on the ground. On the contrary, it was felt that the logical targets for air attack to produce really effective results were the sources of hostile military power to be found within the interior of an enemy country, and this view was quite sound. The weakness of the German Army and faulty decisions by the German Command were what compelled the Luftwaffe in a steadily growing measure to attack ground targets within the battle area.

The SD-1 (2.2 pound) fragmentation bomb proved particularly effective after a new container (AB-250) to hold 225 of them was put into use. This container had the shape of a bomb and, similarly to a bomb could be aimed from the delivering aircraft. The container was opened by a detonator which could be set to explode at the desired height above the ground, from which point the bombs scattered over the target area below. In this way a large area could be covered completely and the small bombs even found their way into foxholes and similar shelter lacking overhead protection. They were therefore extremely effective against live targets.*

In 1943 the present author commanded the 1st Air Division in the central area of the eastern theater. On one occasion units of the division used these bombs in an attack against a wooded section in which massed Russian troops were assembled for a jump-off in an attack on the ground. After the air attack German troops were able to enter the wooded section without encountering any resistance at

* Editor's Note: There is little doubt but that this is the German bomb after which was modeled the American "butterfly" bomb.

all, , to find what could in the truest sense have been called a "dead man's wood. "

In spite of all efforts by the responsible authorities, it was unfortunately not always possible later in the war to have these bombs and the containers available in anything like sufficient numbers.

In the 9 February 1943 Special Supplies and Procurement Services conference, Field Marshal Erhard Milch had the following to say on the subject of the production and tactical significance of this type of bomb:⁵

At the front there is a badly felt need for 2.2-pound (1 kilogram) bombs. . . . What targets are to be found which make operations more than profitable? In their rear areas the Russians are moving forward in gigantic columns. They are marching in three columns abreast, with horses, horse-drawn columns, and vehicles in three columns, three vehicles abreast. The infantry are advancing in cross-terrain marches, widely dispersed in groups of 10, 20 or 40. Nothing effective could be done here with large bombs. If the small bombs were available it would be possible to rain these down on them.

Once the snow is off the ground, and the cover is already very thin, enormous results could naturally be achieved with the 2.2-pound bombs, above all if operational missions were flown more frequently by the Luftwaffe than is presently the case.

In contrast with the 2.2-pound bomb the 110-pound (50 kilogram) bomb is only useful when the intention is to destroy tanks, guns, shelters, or similar targets. In such cases the heavier types of bombs, from 110-pounds (50 kilograms) upward, are essential. Against these massed targets, which are to be found in large numbers and the destruction of which would have a decisive influence on the outcome of the war, it is necessary, however, to have the 2.2-pound bomb.

If I can strike these people with these small bombs that would be a gigantic achievement. All through the summer

the Russians will want to do nothing else but attack. Either they will march forwards and attack, or we can attack and they will march rearwards. In either case I must be there with the small bombs, which will decimate them and break their morale.

The Fourth Air Fleet and General (Generaloberst) von Richthofen have reported that they have requisitioned and received nothing, that they would be able to deliver on targets the entire production of 350,000 of these bombs on one single day. This output thus appears far too small. Another point is that we have no supplies of these bombs stockpiled in outside depots, so that they cannot be made available for use in various front areas.

It was found very frequently, however, that the responsible German field commanders failed to realize the great value of these bombs for action against live targets.

New Antitank Weapons. During the war against Russia anti-tank combat action developed into a problem of the first order. The significance of the problem can be realized when the fact is taken into consideration that, according to postwar reports, Russia's output in tanks during World War II reached a figure of 150,000 compared with Germany's production of only 25,000. In addition, Russia received another 13,303 tanks from deliveries by the Western Allies.

The German Army had nowhere near enough antitank weapons, for which reason the Luftwaffe had to provide support in this field. Owing to faulty measures by the German Command and because a large number of the Russian tank factories were located in areas beyond the range of German bombers, no measures were taken to destroy the factories and thereby reduce production. Instead, it became necessary laboriously to destroy the tanks under exceedingly heavy fire on the field of battle.

The Luftwaffe was not adequately prepared for a mission of this type, and appropriate weapons for attack had to be developed with all speed. For this purpose steps were taken to mount one 75-mm gun under the pilot cockpit of Ju-88 aircraft, and one 37-mm gun under each wing of the Ju-87 (dive-bomber) aircraft. The tests

carried out with the large caliber gun mounted on Ju-88 aircraft were discontinued, however, because no way could be found to surmount the difficulties encountered. In contrast, the Ju-87 with its 37-mm antiaircraft type guns in many cases produced excellent results, while the best average results were obtained with the twin-engine Henschel-129 (Hs-129) aircraft carrying 30-mm guns. In spite of all efforts, however, it was found impossible to make sizable air units available for antitank action until the newly introduced FW-190 rocket-armed ground attack plane made its appearance.

With the ever-increasing need for antitank air action, large-caliber high-explosive bombs (1,100 pounds) came into use as an emergency measure. The difficulty of hitting tanks operating in dispersed order was fully realized, for which reason the large caliber bomb was chosen with the object of putting tanks out of action even if only a near hit was scored. It was found, however, that the explosive pressure from such bombs could only incapacitate a tank if it exploded within roughly twelve feet of its target and immediately above the ground without penetrating the ground. Penetration into the ground would have channeled the blast upward instead of sideways. In practice, near hits capable of putting a tank out of action proved a rare exception.

Experience soon showed that the chances of scoring a hit were better with a large number of smaller caliber bombs with a highly effective explosive charge, and as a result a special antitank bomb was introduced. Weighing only 8.8 pounds (4 kilograms) this bomb was designated SD-4-H1.* The use of the hollow charge principle in these bombs made it possible to achieve very good results against tanks, since they were able to pierce armor up to a thickness of 5 1/8 inches. In addition, they were constructed to have a fragmentation effect, so that they were also useful against infantry operating with tanks.

It was found best to use the bombs with bomb containers of 1,100 pounds (500 kilograms) size, with an opening at the point. Each container held 78 SD-4-H1 bombs, and when delivered in a dive-bombing attack the effect was that of shrapnel concentrated at

* Abbreviation for Hohlladung-hollow charge.

the target. The chances of achieving direct or near hits were far more favorable than in the case of the SC-500 bomb. Hits within a radius of 26.6 yards (24 meters) were still close enough to set fire to the tank's fuel or ammunition, against a radius of only 4.4 yards (4 meters) in the case of the SC-500 bomb.

The new type of bomb was carried chiefly by Ju-87 dive-bomber aircraft, and their use decreased considerably when aircraft not capable of dive bombing replaced the Ju-87 in early 1944 as a result of the growing inadequacies of the latter aircraft's flight capabilities.

Use of Bombs Against Permanent Fortifications. The types of bombs in use at the time proved adequately effective against the obsolete kinds of fortifications found in Poland, Belgium, and Holland but they were not adequately effective against modern fortification installations, such as those of the French Maginot Line or the Russian fortifications at Sevastopol on the Crimean Peninsula. General Plocher writes as follows on this subject:⁶

The effects of even the heaviest caliber bombs (3,000-5,000 pounds, 1,400-2,500 kilograms) on permanent fortifications were not great enough to completely neutralize the installations, even in the case of direct hits. It was only attacks against batteries in open emplacements that had a really annihilating effect

The Type SH-250 hollow charge bomb was introduced with the intention of achieving more effective results against fortifications. A report, dated 8 January 1942, by the Chief of Special Supplies and Procurement Services gave an analysis of its effectiveness:⁷ "Due to application of the hollow charge principle, the bombs when used against fortified works have a penetration of at least 10 feet (3 meters) in the case of concrete, and of almost twelve inches (300 millimeters) in the case of armor plating."

This type of bomb was introduced too late to be put to practical use, however, since no fortifications of the types for which it was intended came under attack after their introduction.

Traffic-Interdiction Bombs. At the beginning of the war an

adequate variety of bomb types was available for use against the types of targets involved. The only weak point was that in attacks against rail lines the bombs frequently bounced off the ground and detonated some distance away without destroying the rail tracks. This was particularly the case when the rail section under attack was on a raised embankment, where damage is usually of a more lasting nature than in the case of rail tracks in level terrain. In order to prevent bouncing, the bombs were provided with spurs,* which held the bomb in place when it struck the ground.

In 1941 the Chief of Special Supplies and Procurement Services arranged a series of tests with bombs against Russian railroads. His report of 29 October gave the results of the tests:⁸

Demolitions and bombings were carried out on the Orscha-Lepel section of railroad. The results were as follows:

S. C. 10 Bombs. These are unsuitable, since they damage the rails only if they hit in the immediate vicinity.

S. C. 50 Nose-Spiked Bombs. These can render Russian rail tracks unusable if they detonate between the rails or within 5 feet (1.5 meters) on either side of the rails.

The damage can be repaired by filling in the bomb crater and replacing the damaged ties and rails with sound ones, which can be accomplished in a relatively short time.

SC-250 Nose-Spiked Bombs. These bombs can do far more lasting damage to Russian railroads than the S. C. 50 type nose-spiked bomb, even if they strike 10 feet (3 meters) farther away, this being the difference between the craters caused by the two types.

Spike-nosed bombs should be dropped while the plane is

* Called the Dinort Stab after inventor, Dinort, who was later given general officer rank. Editor's Note: At war's end Brigadier General (Generalmajor) Dinort was Commander of the 3rd Flying School Division.

in a downward slope at an angle of between 10 and 15 percent from an altitude of about 165 feet (50 meters). In general, the bombs thus dropped will lodge themselves in the ground, although a very small percentage of them might still bounce off.

The report went on to state that, from November 1941 on, some 1,000 Type S. C. 50, 500 S. C. 250, and 500 S. C. 500 spike-nosed bombs would be available each month. Four S. C. 50 bombs could be carried by the Ju-87, two by the Me-109, and four by the Me-110. But the Me-110, when equipped with E. R. 4 or E. T. C-50 suspended bomb racks attached under the fuselage, could carry eight. As to the larger S. C. 250, models B and R of the Ju-87 could carry only one bomb, while model D could carry three. The Me-109 could carry one, the Me-110 and Do-217 two, and the Ju-88 four. And the load capacity of these planes was the same for the S. C. 500 spike-nosed bomb as for the S. C. 250.

Bombs for Attacking Inland Waterways. For use against stationary targets, such as canals, bridges, lock installations, ship-lifting and other port installations, warehouses, and wharves, the bombs designed for normal demolition purposes were available. Mines were frequently laid by aircraft to sink ships in large inland or other canals and waterways. Thus, Directive No. 45 issued by the Wehrmacht High Command on 23 July 1942 prescribed that "The lower reaches of the Volga River will be mined to interrupt shipping."

A few missions were also flown to lay mines in the Suez Canal.

Bombs for Road Interdiction. The various types of bombs in normal use were also available in attacks designed to destroy such targets as road embankments or road intersections.

During mobile operations it was found that troop movements could be seriously hampered by bombs so placed at the entrance or exit from built up areas that they caused houses to collapse and cover the road with debris. The bombs most frequently used for this purpose were the types generally used in attacks against cities, particulars on which are given in the following section. Throughout the war it was found that the destruction of man-made structures was one of the most effective ways of interdicting road traffic. However, the same

can be said of bombing designed to interdict rail or waterway traffic. Paragraph 166 of Air Field Manual No. 16 contained a passage on the significance of destroying large, important man-made structures "which will take a long time to restore to operability." However, this was not so much a problem of ammunition, adequate supplies of which were available, as a problem of direct hits, and thus a problem of the methods of attack and the bomb aiming devices used.

Action was even more difficult against emergency bridges of military construction, particularly pontoon bridges. Very often in such cases enemy smoke operations and ground defenses were such that it was impossible to achieve success in high-altitude or dive-bombing precision attacks.

The Commanding General, Sixth Air Fleet, for example, reported to the Commander in Chief of the Luftwaffe on 8 March 1945 that it was hardly possible for German aircraft to take direct combat action against the Russian bridges across the Oder River, because the Russians immediately placed the bridges under smoke concealment when the German aircraft were observed approaching. The air fleet therefore suggested using a special type of mine with a very small draft and known as the Wasserballon (water balloon) or other suitable floating demolition missiles designed for use in rivers, and special type weapons against these bridges.*

As early as 11 February 1945 the Commander in Chief of the Luftwaffe had already authorized the release of 200 spherical type drift mines from Army stocks to the Sixth Air Fleet for use against the bridges. Only one mission was flown with this type of mine (by the 7th Squadron, 4th Bomber Wing) and no records are available on the results achieved.

Owing to the urgently critical battle situation the decision was even taken to dispatch Mistel (Ju-268) composite aircraft on a mission against the bridges on the night of 14-15 April 1945. Even these aircraft achieved no noticeable results, for which reason the Chief of the Luftwaffe General Staff gave orders to commit the

* A document on the development of the Wasserballon is extant in report from the Sixth Air Force, 26 February 1945. Karlsruhe Document Collection, C VI 2.

remaining 38 Mistel aircraft against other targets.⁹ It is thus evident that no suitable weapons were available to destroy the bridges involved.

To counter the German use of river type or other drift mines the enemy soon commenced the use of torpedo or other nets, placed up stream, to protect bridges. For this reason an effort was made in January 1945 to destroy by means of Wasserballon type mines the torpedo nets used by the enemy to protect the bridges at Nymegen, in Holland, against attack. However, this action failed because the boat dispatched for the purpose first came under a bombing attack and then was sunk by artillery fire.

Training of Luftwaffe Personnel for Army Support

Officer Training. The older generation of officer personnel assigned to higher level Luftwaffe command positions had in almost all cases been members of the Army establishment during the time when Germany had no air forces. Some had attended the army academy, where they had received training as Army General Staff Corps officers.

In the service schools of the Luftwaffe the younger generation of officer personnel received training in certain basic concepts of army tactics. In the Air Command and General Staff School (Luft-Kriegsakademie) newly established at Gatow in 1935, General Staff Corps candidates of the Luftwaffe were instructed by Army General Staff Corps officers in the subject of army tactics. Here, map maneuvers were conducted to demonstrate the tactics of army forces.

A small number of General Staff Corps and other officers were assigned to participate in courses known as the Reinhardt Course and lasting one year, where they were trained to serve as joint military command personnel (Wehrmachtgeneralstabsoffiziere) together with officers from the Army and Navy. Later this training was given at a Joint Command and General Staff School (Wehrmacht-akademie). In these courses the subject of the problems of joint military operations was dealt with in the form of special studies. In addition, the Army and the Luftwaffe exchanged a certain number of senior officers as participants or observers at the command map

maneuvers conducted separately by the two branches each year for higher level command personnel.

Training of Flight Personnel. After receiving basic flight training, personnel were assigned to the Air Service Schools (Fliegerwaffenschulen) for theoretical and practical training in tactics. Here instructions continued on the subject of army support operations, and the participants took part in actual missions involving reconnaissance and the use of weapons against stimulated targets of all sorts. The types of such schools existing in the Luftwaffe were: air reconnaissance, fighter, dive-bomber, and heavy bomber (to train bomber crews).

Early in 1938 a new system started under which the army in a continuing process detached commissioned and appropriately gifted noncommissioned officer personnel to the Luftwaffe for training as air observers in the tactical reconnaissance squadrons.

Air Unit Training in Army Support. It is only natural that this subject was given particularly comprehensive treatment in the tactical air reconnaissance units, known as the Army air reconnaissance units (Aufklaerungsfliegerverbaende--Heer). To intensify this training the practice was adopted in 1936 of allocating these units to the appropriate Army commands (divisions, corps, etc.), to which they were to be assigned in case of war. These Army forces were authorized to include their allocated air reconnaissance squadrons in all maneuvers, and as a matter of principle the officers on the army command staffs and those of the air reconnaissance squadrons took part in each other's field exercises and map exercises.

During the initial stages of the Luftwaffe build-up the subject of cooperation with army forces was neglected. Air units participated, nevertheless, in the maneuvers and other exercises conducted by the Army, and this undoubtedly benefited training and cooperation on both sides. During small scale field exercises, particularly those conducted at the maneuvers areas, the Army also was authorized to request that the Luftwaffe should carry out exercise missions in order to afford the ground troops an opportunity to practice active and passive air defense measures. Sizable Luftwaffe forces participated in all appropriate army maneuvers, and on a particularly large scale in the 1937 joint Army-Navy-Luftwaffe maneuvers. In general,

however, the ruling viewpoint in Luftwaffe command circles was that air support for the Army would take the form of indirect support through action against the enemy rear rather than that of direct support on the field of battle. Thus, plans for air support provided even up to early 1939 that action by dive bomber units was to be directed at targets in the enemy rear.

These views only changed after the experience gained in the Spanish Civil War and when the outbreak of general war came to be viewed as a possibility, that is in the first months of 1939. Then, the ground support units activated after the Czechoslovakian crisis and some of the existing dive-bomber units were consolidated under General von Richthofen, the last officer commanding German troops in Spain, and transferred to troop training and other areas for accelerated and intensive training in operations closely coordinated with those of the Army. Shortly before the Polish campaign Hitler convinced himself personally of the high standards achieved in this training program.

In 1937 the Army detached an Army Tactics Instruction Staff (Lehrstab fuer Heerestaktik) for assignment to the Inspectorate for Air Reconnaissance and Air Photography. This staff had the mission of promoting an understanding in the Luftwaffe of the science of Army tactics and particularly of the latest experience gained in the operations of mobile troops, which included armored and motorized infantry divisions. By means of demonstration exercises conducted by the Training Air Wing, intermediate and higher level command personnel received instruction from time to time on the most up-to-date experience and views on the subject of the employment of air forces in support of Army operations.

Regulations Governing Army-Luftwaffe Cooperation. While the basic concepts governing cooperation between Luftwaffe and Army forces were established in Air Field Manual No. 16, the field manual entitled "Operations" (Truppenfuehrung) formulated the tactical principles for the Luftwaffe units which would be assigned under Army commands in the event of war. In addition, a number of publications under such titles as Directives (Richtlinien), Guiding Principles (Leitfaeden), and Maneuver and Exercise Comments (Bemerkungen zu den stattgefundenen Truppeneubungen) were disseminated to intermediate and higher level command personnel.

On 1 February 1939 a Tactical Experience Group (Gruppe Taktische Erfahrungen) was established as part of the Operations Division of the Luftwaffe High Command, with the mission of preparing material of this type and insuring its proper dissemination. Of the bulletins and other material thus disseminated some merit special mention, such as:¹⁰

1) Principles for Tactical Instruction at Service Schools--
1937 (Leitfaden fuer den taktischen Unterricht auf den Kriegsschulen--
1937);

2) Tactics Bulletin for the Conduct of Operations by Close Support Air Units; CINC, Luftwaffe, Operations Staff, 2 May 1941 (Taktisches Merkblatt fuer die Fuehrung von Nahkampfverbaenden vom Oberbefehlshaber der Luftwaffe, Fuehrungsstab vom 2. 5. 41);

3) Bulletins #1 and 2 on the Operations of Armored Forces Air Units (Merkblatt 1 und 2 fuer den Einsatz von Panzerschlachtflieger);

4) the periodical "Vereint Schlagen";

5) Detailed Tactical Remarks by the Commander in Chief of the Luftwaffe, published by the Operations Branch (Taktische Einzelhinweise des Oberbefehlshabers der Luftwaffe, herausgegeben von der Fuehrungsabteilung).

Weaknesses in the Luftwaffe Training Program. In spite of all the measures outlined above, training in the Luftwaffe and in the Army remained inadequate. Within a very short space of time both the Luftwaffe and the Army repeatedly activated new series of units. The large majority of all Luftwaffe units in existence at the time were divided in 1939 in order to double the number of units, and were not fully brought up to their authorized strength again. The time remaining up to the outbreak of the war was inadequate for the proper training of the units thus newly created. The organizational work thus incurred took up too much time, so that too little attention was given to tactical requirements. In addition, the numerical standards established in the Luftwaffe unit activation program was designed for achievement only in 1942. At the end of 1938 Hitler issued a directive calling for an increase of the Luftwaffe to five times its existing

strength. Training requirements and the lack of adequate aircraft manufacturing facilities, man power, and raw materials to produce the necessary number of aircraft and the necessary quantities of other equipment made it impossible to effectuate these plans. The Luftwaffe therefore entered the war with a far smaller strength than provided for in the unit activation program. In point of numerical strength its forces were planned only for a war on one front.

Because of the heavy superiority of the German military forces as a whole at the time, however, these weaknesses did not result in any disadvantages in the early stages of the war, and actual warfare then served as the best school. There can be no doubt that the establishment of specialized training courses would have proved profitable later in the war, when the conditions of combat became more severe and when new missions, such as that of antitank combat, developed for the air forces.

When Germany later, in 1942, found herself involved in a multi-front war, the strengths available to the Luftwaffe were completely disproportionate to its numerous missions. And the German command took the short-sighted view that the steadily mounting numerical superiority of the enemy made it impossible to spare the time or forces for proper training courses.

When all this had been said, however, the fact still remains that once America and Britain had modernized their hitherto inadequately equipped air forces and had achieved considerably increased numerical strengths, the Luftwaffe from 1943 on found itself in a hopeless situation.

PART II
ARMY SUPPORT OPERATIONS

Chapter 3

AIR RECONNAISSANCE OPERATIONS¹Types of Reconnaissance Operations

The mission in air reconnaissance operations was to furnish information on which the army commands could base their operational decisions. This included information on such items as the approach of enemy ground forces, the forward or rearward transportation movements of enemy forces, the current location of enemy reserves-- with particular emphasis on mobile units, and the construction of defense systems in the enemy rear, together with current changes and developments. For this purpose it was particularly important to carry out continuing air photo reconnaissance covering rail and road routes in the far enemy rear and in the areas on open flanks.

The mission in tactical air reconnaissance was to provide information for the command and operation of army troops on the field of battle. This included information on such items as the general disposition of enemy forces, the distribution of enemy units, developments of the terrain for defense, and the construction of enemy defense positions. An important item was the identification of motorized and armored vehicles in the current battle area.

Once combat contact was established with the enemy on the ground, the tactical air reconnaissance mission developed into battle reconnaissance and artillery reconnaissance. Together with the other intelligence media available to the army commands, battle air reconnaissance was to furnish information required for the conduct of combat action. This included information on such items as the disposition of enemy forces, in particular the disposition and commitment of enemy artillery, the location of enemy reserves and armored units, and all other developments behind the actual line of combat or main line of resistance. Another mission of air units committed to battle reconnaissance was to observe the progress of the battle on the ground and to determine the current location of the forward friendly lines and friendly infantry or armored spearhead forces.

Air units employed in artillery reconnaissance had two major missions. First, they furnished target data, particularly for fire

against enemy artillery forces approaching or going into firing positions; and, secondly, they observed the placing of adjustment fire by friendly batteries and then reported on the effects of the fire for destruction which followed.

The division of air reconnaissance areas between the air reconnaissance units allocated to the Army and those operating under Luftwaffe commands was defined as follows in paragraph 85 of Air Field Manual No. 16: "As a rule the areas in which the Luftwaffe will conduct air reconnaissance will be farther in the enemy rear than the air reconnaissance areas of the Army and the Navy. Whenever possible these areas will be delimited by a line marked by distinct geographical features."

This definition was formulated under the influence of the assumption that the forces of the Luftwaffe would be employed primarily in the conduct of operational warfare. In contrast with this assumption, airpower throughout the war was employed for direct Army support on a much greater scale than had been anticipated, so that the targets for air attack were usually within the areas defined as Army air reconnaissance areas. It was also within these areas that the ground organization of the enemy air forces was to be found.

Because of these circumstances the provision also quoted in paragraph 85 of Air Field Manual No. 16, as an exception rather than the rule, became in actual fact the rule. "The current situation," the manual observed, "might call for another arrangement. The events of war will frequently lead to changing air reconnaissance areas and air reconnaissance missions."

In some cases the Army and the Luftwaffe conducted air reconnaissance within the same areas. The only difference here was that the air units employed in reconnaissance missions for the Army were required to keep under observation more or less straight lines, such as rail or road routes, as far as the range of operations permitted, while the units carrying out reconnaissance for the Luftwaffe flew on more or less zigzag courses from one target to another. In practice, the reconnaissance missions thus were different in execution although not divided into areas but divided according to the type of mission. It was nevertheless not possible to avoid a certain

overlap in reconnaissance operations, but in most cases this resulted in a more closely meshed reconnaissance picture, something which was to be desired and which would have been hard to achieve in the normal manner because of the inadequate forces available for the purpose. And, in any event, special organizational and signal communications measures (which will be dealt with later in this section) insured a constant interchange of air reconnaissance information between the Army and the Luftwaffe.

In exceptional cases, when special situations made this necessary, air units otherwise responsible for reconnaissance for the Luftwaffe also conducted operational air reconnaissance for army commands. Thus, when the first German troops entered the war in the African theater in 1941, twin-engine fighter units of the Luftwaffe conducted long-range reconnaissance for the Army, since no regular long-range reconnaissance units were available. The mission of these twin-engine fighter units was to keep under observation the areas of western Egypt and seaborne traffic from Egypt to Tobruk.

As a rule air reconnaissance units allocated to the Navy or long-range reconnaissance units of the Luftwaffe conducted air reconnaissance at sea when this was necessary to cover the flanks of ground units operating near a coastline.

The boundaries for air reconnaissance zones within the operational zones of the Army were established by the Army High Command coinciding with the zones allocated to the various army groups. These in turn determined the zones of air reconnaissance for the air reconnaissance units attached to the various field armies.

Deviations from this rule sometimes became necessary when the number of long-range or strategic air reconnaissance squadrons available was inadequate. This was the case, for example, in the Westwall areas, during the Polish campaign of 1939. During this period Army Group C with its three armies responsible for defense of the Westwall had a total of only three squadrons available. Consequently, the whole frontage had to be divided between these three squadrons, without regard for the boundaries of the individual field armies. In Russia also, because of the large areas involved and the inadequate number of long-range air reconnaissance squadrons allocated, it was necessary to divide the frontage into arbitrary zones

without regard for the immense frontages of the individual field armies committed.

During the 1939 campaign in Poland and the 1940 campaign in the west, the Army High Command held two (during the Russian campaign one) long-range air reconnaissance squadrons in reserve. These were not assigned specific reconnaissance areas, however, but were used to secure more closely meshed long-range reconnaissance during confusing or decisively important situations. The situation at Kutno* in the Polish campaign and the assignment of long-range air reconnaissance units to keep under observation the embarkation of the British Expeditionary Corps at Dunkirk might be cited as examples of such situations.

Planning for Air Reconnaissance

At the headquarters of the army commands responsible for army air reconnaissance, the existence of a clear concept of the capabilities and limitations of air reconnaissance was essential.

After pointing out the speed and comprehensiveness of air reconnaissance "under favorable conditions," Air Field Manual No. 16 proceeded to circumscribe its capabilities. It was observed that such reconnaissance was not suitable for detail which is not discernible to the eye or the camera. Further, as the manual cautioned, air reconnaissance is subject to limitations of enemy action, weather, and the time of day. These limitations, however, the manual concluded, were at least partially compensated for by the enormous coverage of which air reconnaissance was capable. These prewar definitions were based on World War I experience and underwent very little change during the war since no radically new technical innovations were placed in operation, particularly in the field of air photography. It is also likely that no radically new developments were available. †

* Editor's Note: Kutno, an important rail center, was a key point in the decisive Battle of the Bzura in which a Polish army was captured on 15 September 1939.

† Editor's Note: See † note, p. 26.

The responsible headquarters of army commands were probably well enough informed on the subject to realize that air reconnaissance, even with the help of air photography, could produce no results when it was impossible to see a well-hidden enemy, for example, when enemy troops concealed themselves in dense forest areas. It was also understood that even with the use of parachute flare bombs and night photographic equipment it was extremely difficult at night to discover troops. For these reasons it was also understood that negative reports provided no grounds for a safe assumption that no enemy troops were present in an area searched by reconnaissance units.

In contrast, it was difficult for personnel who themselves were not aviators to conceive how weather conditions could hamper air reconnaissance operations or the limitations which weather conditions could impose on such operations. For example, army tactical air reconnaissance was seriously hampered and restricted by the very fact that the aircraft types employed in tactical reconnaissance missions at the beginning of the war and even later were not equipped for blind flight or instrument navigation. The only exception here was the FW-189, and it was only introduced during the Russian campaign and was only conditionally capable of instrument navigation.

To army command agencies the performance of tactical air reconnaissance was in painful contrast to that of long-range reconnaissance units. It was difficult to make them see that while technical deficiencies often paralyzed the former at the front, the latter, taking off in the same weather, often broke through the cloud cover far in the enemy rear.

The fact was that the development of equipment for the tactical air reconnaissance units lagged seriously behind the existing possibilities of technological developments,* making bad-weather and night operations of the tactical air reconnaissance squadrons possible on only a limited scale. This disadvantage had made itself felt as early as the campaigns of 1939 and 1940, but it had not been possible to remedy it prior to the opening of the Russian campaign.

* Editor's Note: See pp. 24-27.

In the planning of air reconnaissance missions, which represented only one of the numerous sources of intelligence information, the responsible army commands had to take into account all intelligence information already available on the enemy, so that observations made from the air would provide new indications for use in supplementing or checking the information already available. Even the assumed behavior of the enemy had to be taken into consideration, a requirement stated in paragraph 95 of Air Field Manual No. 16.

In accordance with these requirements it was a responsibility of the appropriate army command to decide whether air reconnaissance was to be conducted as a one-time mission and if so at what time (for example, at daybreak to detect the tail end of night movements), or whether missions were to be flown repeatedly over the same area and thus in a series of recurring missions. Quite often it was only after receipt of the first air reconnaissance reports that it was possible to decide on further air reconnaissance activities. This was the case, for example, when the first reports showed the necessity to keep track of detected movements by motorized enemy units.

The points outlined above were the factors which governed the direction of operational and tactical air reconnaissance and particularly of battle air reconnaissance activities. The closer the enemy force involved came to the front areas, and the faster its movement, the greater was the need to keep it under continuous observation, and this applied particularly to armored and motorized infantry units.

Owing to the increasingly effective fighter defenses encountered as the Russian campaign wore on, the German system of continuous observation over the entire reconnaissance area gave way to what was called point reconnaissance. In this system reconnaissance activities were concentrated against specific areas of current operational or tactical importance and were designed to clear up specific questions for the army commands. In addition, reconnaissance aircraft currently in use had by this time become too slow, and were inferior to the increasing numbers of fighters encountered on the Russian side. For this reason a number of tactical air reconnaissance squadrons received single-seater fighter planes to replace their former aircraft. This situation also gave rise at the time to an increase in night air reconnaissance activities.

Another governing factor in the direction of air reconnaissance activities was the number of reconnaissance squadrons allocated or under instructions to cooperate with the army command concerned, and the capabilities of these squadrons.

Operational Air Reconnaissance

Ten strategic air reconnaissance squadrons were available during the campaigns in Poland, the Balkans, and France, and in general this number proved adequate. At the beginning of the Russian campaign, thirteen strategic reconnaissance squadrons were available to the army. This number proved too small to provide adequate operational reconnaissance coverage of the gigantic areas involved in the eastern theater. With only thirteen squadrons available, it was not even possible to assign a squadron to each of the highest level commands of the German Army of the east (three army group, seven army, and four panzer group* headquarters plus headquarters of the Commander in Chief of the Army).

It had been thought that the operational air reconnaissance activities of the air fleets, which at the time were conducted separately from those of the Army, would serve to supplement the intelligence information secured through Army operational air reconnaissance. To a certain extent this was true, but it was nevertheless found from the very outset that operational air reconnaissance for the Army commands could not produce as clear and complete results as had been the case in the former campaigns.

At the start of the campaign the forces of Army Group South were responsible for a frontage of 420 miles, extending all the way from the Black Sea in the south to the Pripyat marshes in the north. With only four strategic air reconnaissance squadrons (to serve the headquarters, the three armies and one panzer group it controlled) available in this large area, operational air reconnaissance naturally had to be conducted in a manner different from that usually adopted in former campaigns. Dispensing with the requirement for army

* An army type headquarters but without rear administration echelons.

group headquarters reconnaissance ahead of its armies, Army Group South adopted the following arrangement: one reconnaissance squadron was assigned to the Eleventh Army operating on the far right flank and separated from the rest of the front; two squadrons under central control by army group headquarters were consolidated with the night reconnaissance squadron to form a reconnaissance group responsible for reconnaissance in front of the Sixth and Seventeenth Armies; and the remaining squadron was assigned under the First Panzer Group for long-range reconnaissance missions supporting the panzer group in the execution of its operational mission, so that it was not possible to assign this squadron any specific area of responsibility.

On his own initiative the Luftwaffe General with the Commander in Chief of the Army had organized special night reconnaissance squadrons from the units allocated under his command. Each of these squadrons had nine Do-17 type twin-engine aircraft fully equipped for blind flying and instrument navigation. The intention had been to organize one such squadron for each field army committed in the east, but the Commander in Chief of the Luftwaffe had given approval for only three. These three squadrons were therefore allocated to the three army group headquarters operating in the eastern theater. These three squadrons had to be used not only for long-range but also for tactical night air reconnaissance missions in the operational areas of the army corps, since the normal tactical reconnaissance planes were only conditionally capable of operating at night, a fact which has been explained earlier in this study.

A tactical air support command staff was assigned to each army group headquarters. Under instructions from the army group, this staff, to which the requests of the subordinate armies were channeled, directed all night reconnaissance operations. With the few aircraft available for the purpose it was not possible to conduct systematic and continuous reconnaissance at night, so that only particularly important requests could be met and only those missions flown which held out prospects of success.

A very important factor governing the conduct of air reconnaissance operations was the capability of the available aircraft, in particular their radius of action. In the campaigns in Poland and in the west the only limiting factors which restricted the depth to which reconnaissance could penetrate had been the existing geographical

and political borders. In the eastern theater the restricting factor was the capability of the aircraft available.

The Junkers-88 aircraft in service in the strategic air reconnaissance squadrons of both the Army and the Luftwaffe in the Russian campaign were the best type of aircraft the Luftwaffe had available for such purposes at the time. The Ju-88 had a radius of action adequate for the purposes of reconnaissance for field army headquarters, but a longer range would have been needed to meet the requirements of the Luftwaffe High Command, the Army High Command, and the Army group headquarters. If reconnaissance aircraft with a longer operating range had been available it might have been possible to detect in time the Russian transfer of divisions from Siberia to the front in western Russia, since planes observing the few rail routes across the Ural mountains would have spotted the transport movements.

Finally, another factor which had to be taken into consideration in the planning of air reconnaissance missions was the current air situation--the strength and behavior of enemy air forces and countermeasures taken on the friendly side. In operational air reconnaissance, which was carried out by individual planes and usually at very high altitudes, this factor played a lesser role than in tactical and battle reconnaissance. There was little evidence of any systematic fighter defense activities against strategic air reconnaissance, and no such systematic activities came to the knowledge of the present author during the 1939 or 1940 campaigns or during the campaign in Russia.

Missions for operational air reconnaissance were assigned by the appropriate army command headquarters, usually in writing. Frequently the mission assignment contained instructions for a number of days ahead, which were added to in the form of detail orders from case to case. These instructions, which were frequently included as annexes to operational orders under the heading of "Special Instructions for Air Reconnaissance" (Besondere Anordnungen fuer die Luftaufklaerung) contained points formulated roughly in the following manner.

- 1) Supplementary information on the enemy situation which was of importance for the execution of the air reconnaissance mission.

2) Information on the air situation, such as the presence of enemy fighter or antiaircraft artillery forces.

3) Information on the commitment of friendly bomber or fighter forces.

4) Details on the width and depth of the reconnaissance areas to be covered for operational and, when necessary, for tactical reconnaissance.

5) The specific operational air reconnaissance mission for the period involved, with emphasis on the information desired by the command, usually accompanied by details on the road and rail routes and other targets, such as defense installations to be taken under observation (by means of air photos).

6) Reporting method. For example, instructions could stipulate that the unit was to report by radio whether it could detect signs that the enemy had crossed a specified river or other terrain feature.

7) Instructions for tactical air reconnaissance when applicable.

Instructions issued by the Fourteenth Army* for air reconnaissance on 1 September 1939, the first day of the 1939 Polish campaign, exemplify the form of a mission assignment from an army headquarters:²

1. Reconnaissance Areas.

Northern boundary line for Fourteenth Army air reconnaissance operations: Beuthen-Miechow-Sandomierz.

Depth to which reconnaissance is desired: To a line from Sanck-Zhyrow-San to Przemysl-Sandomierz-Lublin.

Line of division between operational (army), and tactical

* Editor's Note: One of three armies of Southern Army Group. Fourteenth Army was deployed in the Upper Silesian industrial region, eastern Moravia and western Slovakia.

(corps) air reconnaissance.

Air Reconnaissance: Popradtal to Neusandez /Nowy Sacz/-
Limanowa-Mussyna-Grybow-Bochnia-Krakow-Wolbrom-
Pilica /river/.

2. Instructions to 4th (Strategic) Squadron, 14th Air Recon-
naissance Group, on operational air reconnaissance for Four-
teenth Army Headquarters:

Detect troop movements against Fourteenth Army; traffic
on rail and road bridges over San and Dunajec Rivers, defense
preparations at these rivers.

Behavior of troops in and near Krakow and at troop train-
ing grounds Bojanow (15 miles southeast of Sandomierz). For
this purpose the following must be kept under observation:

a. Rail Routes: Premysl-Chyrow-Sanok-Jaslo-Neusandez
/Nowy Sacz/; Przemysl-Jaroslav-Rzeszow-Tarnow-Krakow;
Rzeszow-Jaslo; Tarnow-Neusandez /Nowy Sacz/.

b. Road Routes: Przemysl-(Sanck)-Krosno-Jaslo-Gorlice-
Neusandez /Nowy Sacz/; Jaroslav-Rzeszow-Debica-Tarnow-
Krakow; Sandomierz-Debica-Jaslo; Tarnow-Neusandez /Nowy
Sacz/.

The strategic squadron will detect the presence and move-
ments of sizable enemy forces in and from the following zones:

a. From Krakow along the main highways to south and
west as far as Nyalenice /Myslenice ?/-Wadowice-Trzebinia.

b. Unloading along the Tarnow-Krakow rail route.

c. The Sanok-Krosno area (between one and two divisions).

It is of particular importance to detect southward move-
ments, towards Slovakia, out of the last-named area above.

Concurrent Missions for the Strategic Squadron:

a. Keep under observation the road route Gdow-Mylenice-Wadowice-Andrychow (field type fortification works).

b. Detect whether Vistula River bridge in existence at Baranow (12 miles southwest of Sandomierz) (Air photos).

3. Tactical Air Reconnaissance for Army Corps. Army Headquarters attached particular importance to early recognition of where stiff enemy resistance is likely to be encountered in the light of the present status of the development of field type fortifications and the concentration of troops (Line: permanent fortifications in the [southwestern] Polish industrial region of Nikolai-Pless [Pszczyna]-Bielitz [Bielsko]-Saybusch).

Instructions of the above type were customary at the time when the various army command headquarters still had tactical control over air reconnaissance units, and were formulated with assistance from the attached tactical air support command staff. After the Luftwaffe had assumed responsibility for tactical air reconnaissance for the Army the procedure changed. Luftwaffe liaison teams attached to the various army headquarters served in an advisory capacity to the army staff and forwarded the requests of the army commands for air reconnaissance to the appropriate Luftwaffe commands. These commands coordinated army desires with their own reconnaissance plans and forwarded them, in the form of orders, to their air reconnaissance units.

Tactical, Battle, and Artillery Air Reconnaissance

In planning tactical air reconnaissance missions it was essential to make use of the results obtained in operational air reconnaissance if this could be done without causing undue delay. If no operational reconnaissance results were available the targets for tactical air reconnaissance had to be farther afield, at times as far as the maximum operating range of the aircraft employed.

As long as the tactical air reconnaissance squadrons intended for such purposes remained under tactical control by the Army, tactical, battle, and artillery air reconnaissance activities were

directed by means of direct orders from the army corps or armored division headquarters to the squadrons. In the organizational field, by the beginning of the Russian campaign a group command staff, together with a tactical air reconnaissance squadron, had been assigned to each panzer corps, and one so-called armored division tactical air reconnaissance squadron (Aufklärungsstaffel--Panzer) to each armored division.

The number of such squadrons available was large enough during the campaigns against France and Poland, and also in the Russian campaign, to make it possible generally to assign one tactical air reconnaissance squadron under each army corps. Only a small number of army corps had no tactical air reconnaissance squadron of their own. These latter were forced to rely on the reconnaissance conducted by adjacent corps, and this naturally resulted in complications and delays in the assignment of missions and in reporting. New tactical air reconnaissance squadrons were activated, however, so that the Army at the beginning of the Russian campaign had a total of 36 normal tactical air reconnaissance squadrons plus 20 armored division air reconnaissance squadrons, compared with a total of only 30 normal tactical air reconnaissance squadrons available at the outbreak of the war.

Compared with the units available in the 1939 and 1940 campaigns, however, the capabilities of the squadrons available in the Russian campaign were considerably smaller. Instead of the nine planes per squadron, the normal squadrons now had only seven planes each, while those assigned to the armored divisions had a strength of only six planes each. Furthermore, the squadrons now no longer had their reserve of three planes each. With their smaller authorized strength of only seven planes and in view of the increased frontages held by the individual corps in the Russian campaign, the demands made on the squadrons had to be reduced. To make matters worse, the inadequacy of their aircraft equipment reduced the range of operations for which the squadrons could be used. Reference has already been made to the limited operability of the aircraft during periods of bad weather and at night, a deficiency which was only improved by the introduction of the FW-189 model planes.

These factors and the wide range of missions involved imposed restrictions on the commands responsible for the commitment

of tactical air reconnaissance squadrons.

As long as the corps and the armored divisions had tactical control over their own tactical air reconnaissance squadrons, the reconnaissance mission was formulated in a Special Instructions for Air Reconnaissance Annex to operational orders. The instruction annex contained items similar to those listed previously in the case of operational air reconnaissance.

For artillery air reconnaissance, the annex would contain instructions, for example, to make available an artillery observation plane to the artillery commander of 2d Division from daybreak on to report on the placing of artillery fire. A second artillery observation plane might be required to direct the adjustment fire of heavy flak trajectory batteries of the corps artillery. In addition, instructions concerning voice radio communication and the designation of receiving points for air-drop messages would be included.

Written orders of the above type as a rule applied only to the first missions flown on the day concerned. If further air reconnaissance missions were required, the air liaison officer received them orally and transmitted them to the squadron or, in cases of extreme urgency, to the crew of one of the aircraft on the ground at the tactical airfield. In the case of the squadrons assigned under armored divisions oral instructions were more usual. The operations of these squadrons were more or less in the nature of extended battle reconnaissance and had to be adapted to the speedy movements and rapidly changing directions characteristic of operations by armored units. For this reason reconnaissance instructions had to be given in a brief, quick form. The squadrons assigned to armored divisions had a highly flexible ground organization service, with personnel and equipment specially selected for the purpose. The signal equipment of these units was based primarily on radio communications.

Direct orders from the army command to the aircraft crews were a rare exception resorted to only in very exceptional circumstances. The responsible army command gave its instructions to the squadron leader, and it was his responsibility to distribute the missions among his crews with orders as to the execution, insuring the most rational use of his units.

After the Luftwaffe had assumed responsibility for army air

reconnaissance and had consolidated the squadrons to form tactical air reconnaissance groups, the assignment of missions followed the pattern generally in use in cooperation between the flying forces of the Luftwaffe and the Army. If no agreement existed for direct cooperation between the army corps headquarters and a squadron of the tactical air reconnaissance group concerned, the corps forwarded its request for tactical, battle, or artillery reconnaissance support through its attached air intelligence officer to the appropriate air corps or air division headquarters.

The Execution of Air Reconnaissance Missions

As a rule operational air reconnaissance missions were flown by individual planes. The strategic air reconnaissance plane was to fly as inconspicuously as possible and was to avoid air combat if at all possible. Admittedly Air Field Manual No. 16, paragraph 91, did contain a provision for unit-sized missions "against strongly defended areas or targets" requiring heavy defensive firepower. But in practice this never happened in the case of strategic air reconnaissance, at least not in missions for the Army. In like manner no occasion is on record of strategic reconnaissance conducted under direct protection by fighter forces. The fighter forces available were at no time adequate for such purposes.

During daylight, strategic air reconnaissance usually had to be conducted at high altitudes (between 16,500 and 26,400 feet) to achieve a greater degree of safety against possible fighter attack. During such missions the plane could usually descend to lower altitudes, particularly in the wide expanses of Russia, once it was far behind the enemy front lines, in order to get a better visual view of details. Low altitude strategic reconnaissance missions produced particularly good results but had to cease when the Russian fighter defenses increased in strength.

The main purpose of night time operational reconnaissance was to detect troop movements on roads. The units employed operated at lower levels than during daylight and used parachute flare bombs to light up the area under observation and flashlights for air photography.

The depth to which operational reconnaissance could penetrate in the eastern theater was limited only by the operating range of the aircraft employed.

Air photography was used to confirm the observations made by eye and, primarily, in reconnaissance operations at very high altitudes exceeding the power of human vision. The main purpose was to secure air photos of such targets as rail depots, built up areas, supply depots, and airfields, and panorama photos were taken of entire rail and road sections to determine the density of traffic on them. Immediately after air photo films were processed* in a preliminary interpretation, the results which were most important were passed on to the proper quarters, followed by the results of the final interpretation from the positives after these had been prepared.

In operational reconnaissance radio reporting was used only in exceptional cases while the aircraft was on its mission, since radio messages could be intercepted by the enemy and would have revealed the whereabouts and course of the reconnaissance plane and exposed it to fighter attack. The only cases in which radio reports were required were those in which it was essential to inform the army command very speedily of certain observations made, for example the detection of large enemy motorized forces, or if it was essential to inform the command speedily of no signs discovered of enemy troops within a specified area.

Normally, the report was made orally, after landing, to the squadron leader, who passed on particularly important or urgent reports to the appropriate tactical air support command staff or the army command involved, or who instructed the reconnaissance pilot to make such reports directly. In some cases it was desirable for the air observer to report orally to the tactical air support command staff or army command concerned. As a rule the reconnaissance reports were then formulated in writing, when necessary with marked sketches, and forwarded to the appropriate headquarters.

In all campaigns the army commands paid full tribute to the strategic air reconnaissance arm. With the exception of enemy

* Called the "wet interpretation" (Nassauswertung).

preparations in the southern and western theaters from 1943 on, where German airpower was so markedly inferior to that of the Western Allies that air reconnaissance operations were completely impossible, the operational air reconnaissance forces accurately detected all sizable enemy intentions.

The War Journal of Army Group A covering the first phase of the 1940 campaign in the west contains numerous entries on the road and rail movements of French and British army elements. All of these had been detected by air reconnaissance and the information thus furnished had served as the basis for interpretation of the current situation. For example, the entry for 25 May reported:

The intelligence information available was supplemented in the course of the afternoon by air reconnaissance, which reports enemy forces moving north and northwest (toward Ostende and Dunkirk) from the Lille-Douai-Valenciennes area. While this weakens the assumption that these enemy forces intended coordinated action with the forces south of the Somme, it emphasizes the necessity to close also the envelopment in the north.

In his advance from the Syrte in April 1941, Rommel decided not to follow the British forces along the hard coast road but to follow in an enveloping pursuit through the desert instead. In making this decision his views were confirmed by the information secured through air reconnaissance, as is revealed in a study on the campaign in Northern Africa.³

Night air reconnaissance also in many cases furnished information which influenced the operational decisions of the command. An entry in the War Journal of General Franz Halder, Chief of the Army General Staff, contained one piece of information which was exceedingly important for the command,⁴

Nachtaufklaerung (Night Reconnaissance): From the zone of the Fifth Russian Army: On all roads troop movements towards the east, against the Dnepr River (!). We have drawn attention to this possibility for days past. Army Group South has always denied these possibilities.

As in the case of operational reconnaissance, tactical, battle,

and artillery reconnaissance missions as a rule were executed by individual planes, which did their utmost to avoid air combat. When the enemy air forces were particularly active, it was customary to provide for fighter action to coincide in timing with the operations of reconnaissance aircraft within specified areas. In practice the arrangements for coordinated action of this type were usually, and more easily, made by direct agreement between the reconnaissance and fighter units concerned rather than by means of instructions from superior headquarters. This was particularly the case when the units were based on the same airfield or on separate airfields adjacent to one another. Thus, cooperation was always excellent between the tactical air reconnaissance squadrons and Fighter Wing Moelders* in Russia. Moelders fulfilled every request of the reconnaissance units that it was possible to fulfill. In most cases, however, tactical reconnaissance units had to carry out their missions without fighter protection.

When the Russian fighter defenses in the front areas increased to such a strength that the whole conduct of tactical air reconnaissance became problematical, some of the reconnaissance squadrons received single-seater fighter aircraft with automatic air photographic equipment in place of their old types of planes. These planes always operated in a strength of at least two, with the pilot of one plane carrying out the reconnaissance mission while the other maintained a watch for enemy fighters. On rare occasions it was even necessary to commit the planes in formations of four when the Russian air forces were particularly active.

These fighter-reconnaissance planes naturally could not be used for all types of reconnaissance missions, among which was the difficult mission of artillery reconnaissance, and were employed primarily to keep road routes under observation, a mission they were also able to execute in low-altitude operations.

Editor's Note: The 51st Fighter Wing (equipped with Me-109's), commanded by Colonel Moelders, was a component of the II Air Corps (Fliegerkorps), Second Air Fleet (Luftflotte). Second Air Fleet was deployed with Army Group Center, and II Air Corps with Fourth Army and Second Panzer Army.

The altitudes at which aircraft carried out tactical reconnaissance missions during daylight varied greatly in accordance with the type of reconnaissance required, current weather conditions, and the enemy defenses encountered. Tactical reconnaissance extended to a depth of 120 miles behind the enemy main line of resistance. The aircraft generally flew at high altitudes over the enemy lines, but, once in the enemy rear, would descend to lower altitudes in order better to detect details if the mission assigned made this necessary and if the air situation was such that the risk could be accepted. Fighter-reconnaissance planes were particularly suited for operations of this type because of their great climbing ability, speed, and maneuverability. When on missions restricted to air photography, the planes operated at great altitudes, which varied from 16,500 feet upward according to current weather conditions.

Daylight battle reconnaissance missions were usually flown at altitudes below 6,600 feet. During the night, planes had to operate at low and sometimes almost at ground altitudes, and this was even necessary during daylight if the mission assignment required the detection of details, or if the mission was one of observing the advance of friendly troops. Battle air reconnaissance was very largely dependent on the current air situation, and in many cases the planes assigned such missions had to be protected against enemy action by friendly fighters or by antiaircraft artillery.

In most cases artillery air observers had to adapt their operating altitude to their current mission. For example, a plane assigned to observe the placing of fire by the heaviest types of flat trajectory guns against targets far in the enemy rear would fly as high as clear observation would permit. Planes assigned to observe fire from lighter caliber guns or to report the general placing of friendly artillery fire would fly back and forth at low altitudes between the target and the friendly artillery positions. During their missions they behaved in very much the same way as battle reconnaissance planes and also required protection by fighters or antiaircraft artillery.

Tactical air reconnaissance units were frequently used by the army commands for photographic map surveys of large areas, for example to obtain continuous strip photos of specific terrain sectors, such as rivers or other defense positions as a precautionary measure.

In Russia, where the available maps were incomplete and contained inaccuracies, the photo coverage thus obtained was used to prepare photo maps, true-to-scale air photo mosaics, and normal maps. An example is the mapping work done at headquarters of the LII Corps in 1941 in preparations for crossing the Dnepr River. As early as 20 August the assigned reconnaissance squadron was employed in photographic missions along the road, preparing photos with an approximate scale of 1:20,000, which of course would plainly reveal detail along the shores of the river. As a result of this work, it was possible to prepare quickly a provisionally rectified grid photo map in four sections, drafted on the same scale as the photographs. This map, printed in two colors, was furnished to the command staffs and to the assault boat and engineer detachments. ⁵

Following the introduction of the FW-189 plane for use in night air reconnaissance in tactical reconnaissance units, night reconnaissance missions increased. Another factor which made it necessary to concentrate more on night air reconnaissance was the increasingly large numbers of fighters committed on the Russian side. The 4th (Tactical) Squadron, * 31st Air Reconnaissance Group, for example, was employed increasingly in night reconnaissance missions from January 1943 on, directed at the areas on both sides of the Smolensk-Lirssno highway. In these missions the aircraft of the squadron penetrated to a depth of 60 miles. Other examples of successful night missions by the same squadron included highly effective night artillery fire direction against the Veliki Luki rail depot, as well as profitable night air battle reconnaissance for the IV Corps from the Gorodok-Nevel-Vileika rail depots † as far as the region on both sides of the Orsha-Smolensk highway. ⁶

It is probable that in some cases inadequate night air reconnaissance had adverse repercussions on the conduct of operations. This can be assumed from the following statement by Polish General Kutzeba concerning a Polish attack against the German Eighth Army on 10 September 1939, in which the Poles achieved tactical surprise

* Editor's Note: The 4th (Tactical) Squadron was presumably a component of VIII Air Corps, Second Air Fleet.

† Editor's Note: Gorodok and Nevel are almost directly north of Vitebsk in Belorussia, while Vileika [Vileyka] is northwest of Minsk.

with superior forces. General Kutzreba considered that the Germans had underestimated the Polish force (three infantry divisions, two brigades and one regiment of cavalry) as a result of only daylight reconnaissance. The Polish force had attempted to confine its movement as far as possible to hours of darkness, since, as General Kutzreba observed, "We had already been able to learn from experience that the German air forces . . . customarily ceased operations before evening."

Another point which becomes obvious from the above account is that in this case air reconnaissance during the hours of evening dusk had been neglected. On the basis of experience gained in World War I, great importance had been attached to air reconnaissance missions carried out during dusk, since it was frequently possible in this way to detect the start of troop movements, or, in the morning, to detect the tail end of such movements. Throughout the war early morning and late evening air reconnaissance was common practice.

That the command failed to attach greater importance prior to the war to night air reconnaissance and to promote such activities through the allocation of appropriate types of aircraft and through special training was a serious omission. Air Field Manual No. 16 merely stated that night air reconnaissance at times "may be necessary."

Reporting Equipment and Techniques

Use was made at times of what were called point maps (Punkt-karten). In these maps precisely surveyed salient terrain features, such as road intersections, bridges, large individual buildings (such as churches or factories) were marked by a black dot and a number. All the airborne observer had to do was to report his observations and/or targets by point number and state its lateral and longitudinal distance from that number, thus giving the position of his reported observation or target in relation to the referenced point number. Point maps of this type could be produced speedily on the spot whenever required with field type equipment.* Very frequent use was also made of grid maps. In this method a map or an air photo was divided

* See Appendix 1.

into squares and targets observed were reported accordingly.* Small celluloid angles were used to determine subdivisions of the squares.

Tactical and battle reconnaissance planes, particularly the latter, reported while airborne by voice radio to their squadron headquarters, with the air liaison officer attached to the appropriate army command listening in. Artillery observation planes reported, also by voice radio and while airborne, directly to the artillery unit they were supporting. If radio communications failed, or when reporting to a command with which no air-ground radio channels existed (as was the case with spearhead units and infantry staffs) use was made of the airdrop message system, a smoke cartridge being dropped with the message to facilitate its finding. In special cases, for example to give the precise location of an enemy artillery position, the airborne observer could, even during daylight, remove a film from his film case and deliver it by air drop for immediate development and interpretation.

In general, each observer, immediately after landing at his base airfield or tactical air strip, reported orally to his squadron leader or air liaison officer. Important items from the report were transmitted orally and immediately to the appropriate headquarters by the squadron leader or air liaison officer as advance reports. In special cases it was sometimes necessary for the observer to report personally to the appropriate headquarters.

As was the case with reports by operational reconnaissance observers, discussed previously, the items reported by the observer orally were formulated in writing in an "observer's report," which stated more or less the following points:

- 1) Assigned mission.
- 2) Route and altitude of flight.
- 3) Maps used.

* Editor's Note: Examples are extant in Appendices 2a and b in unpublished appendices of USAF Historical Study No. 163. Karlsruhe Document Collection.

4) Precise details on observations made, usually in chronological sequence and with precise information on the location and time of the observation.

5) Uncertain observations or assumptions, specifically stated as such.

6) Details on air photos taken.

7) Air situation items: enemy aircraft sighted individually or in unit formation while airborne, with details on the types of aircraft, time and altitude of observation, and information on air combat, and whether antiaircraft artillery fire had been encountered.

8) Miscellaneous items: weather conditions, technical failures while in flight--engine trouble, or failure of weapons or other items of equipment. *

Processing and Interpretation of Air Photos

To insure speedy interpretation and intelligent use by the ground forces of the large numbers of films secured through air photography, it was essential to have a special air photo service organization. As a rule the air photo section of the air unit whose planes had taken the photos developed the film and prepared a preliminary interpretation from the negative. The purpose here was to ascertain whether the photo revealed enemy measures which required immediate counteraction. It had to be decided whether the information was to be transmitted immediately to the appropriate army headquarters for operational or tactical decisions of combat action, or whether an immediate repetition of the reconnaissance mission was needed.

If the area photographed was within the enemy battle zone, the film was forwarded without delay by the air unit photographic

* An example is extant in Appendix 3 in unpublished appendices of USAF Historical Study No. 163. Karlsruhe Document Collection.

section to the headquarters photographic section of the field army concerned. This section received all intelligence data reaching the army headquarters from other sources (such as agents, prisoner interrogation, ground reconnaissance), so that the section was in a position to verify such intelligence data by the photos, or to use it to facilitate a proper interpretation of the photos. The results obtained by these processes were forwarded as speedily as possible to the command and troops in the form of photo interpretation reports or photo interpretation sketches.*

The results of the air photo interpretation were reported in various ways. Simple results were consolidated in a written air photo interpretation report. Air photo "sketches"[†] or overlays were used for the reporting of more comprehensive results.

Exchange and Dissemination of Results

The speedy and adequate dissemination of information obtained by means of air reconnaissance to all Army and Luftwaffe commands concerned required constant, close attention, and special measures. In addition to the army commands concerned, the Luftwaffe also always had an interest in the results of air reconnaissance in order to be able, when appropriate, to commit air forces against detected targets as part of the army support mission.

For the above reasons air reconnaissance reports were exchanged constantly between the tactical air support command staffs and liaison teams attached to army group, army, and panzer group headquarters, and directly between the various Army and Luftwaffe commands. This exchange of information was handled by the G2 sections as a rule, and in particularly important cases by the G3 sections, the chiefs of staff, or the commanding officers themselves.

* Editor's Note: Chart showing organization of the Luftwaffe Air Photo Service, in Appendix 5, unpublished appendices of USAF Historical Study No. 163. Karlsruhe Document Collection.

† Editor's Note: Appendix 4 in unpublished appendices, USAF Historical Study No. 163. Karlsruhe Document Collection.

In spite of all the careful agreements reached and arrangements made, it was only natural that friction frequently developed in this interchange of information. Prior to the Russian campaign the Commander in Chief of the Luftwaffe therefore again issued detailed orders on the subject of the interchange and the interpretation of intelligence information from air reconnaissance sources. Air reconnaissance reports were to be consolidated at air fleet and air corps headquarters and the headquarters of the close support air commands assigned under the latter; the tactical air support command staffs and air liaison teams attached to army group, army, and panzer group headquarters. The intelligence sections or intelligence officers of these headquarters and attached staffs were responsible for the examination of all intelligence reports and for an appropriate selection to be disseminated, and also determined to which headquarters and staffs and by what means they were to be distributed.

In addition, the tactical air support command staffs were required to broadcast three times daily by radio a consolidated digest of the reconnaissance reports. So far as they were of general interest, reports turned in by air units other than those engaged in air reconnaissance were to be included in these broadcasts.

The orders stressed the requirement to make proper use of the results obtained by air photo reconnaissance and to pass on the information thus received.

Special attention was drawn to the necessity to maintain secure communication channels of all types, including direct wire communication channels between the Luftwaffe and Army commands, to assign liaison officers radio facilities and liaison aircraft, and to exchange current information daily on the locality of airdrop message receiving points and landing strips for liaison planes of the Fieseler 156 (Storch) type. In addition to the above, the orders contained instructions for the exchange of liaison officers between the tactical air support units and the tactical air support staffs attached to panzer groups, air corps, and armies, and army groups, as well as the air fleet headquarters.⁷

Return to Luftwaffe Control of Units
Formerly Allocated to the Army, 1942

The immense expanses of the eastern theater of operations resulted in excessive demands being made on all forces available. Consequently, the organization hitherto in force no longer suited the purpose, and it was found essential to carry out severe measures designed to bring about a more economical use of the means available.

Certain debilitating factors in the air tactical situation became quite evident. Owing to the gigantic extent of the theaters in which ground forces of the Army were operating and to the necessity to conduct operations in a number of theaters, the Luftwaffe General attached to the Commander in Chief of the Army, and the tactical air support command staffs he controlled at the various Army headquarters, could no longer bring the necessary influence to bear in matters of the tactical use, training and supplies and replacements, and disciplinary command over the units concerned. In addition to the tactical air support staffs attached to the various army commands, the Luftwaffe commands required to cooperate with these army commands also assigned liaison officers or teams to them. This dual representation of the Luftwaffe was found undesirable, irrational, and the source of much friction.

As early as the late autumn months of 1941 the air reconnaissance units allocated to the Army were at an exceedingly low level of operability. This was due to heavy attrition of their equipment of all types, particularly aircraft and motor vehicles, the inadequate replacements which could be made available to them, and shortages in aviation and other motor fuel. In addition, the exceptionally early arrival of winter in 1941 resulted, by the end of the year, in the average operable strength of the squadrons having sunk to a level of only one or two aircraft each. Finally, the expenditures required to maintain unit ground service installations for the individual squadrons was no longer commensurate with the number of operable aircraft available in them. Thus, at the end of 1941 only 19 of the 56 tactical air reconnaissance squadrons committed at the beginning of the Russian campaign could be left in action, while 37 had to be withdrawn. A similar situation existed in respect to the strategic squadrons.

Since the Commander in Chief of the Luftwaffe was in no

position to bring these squadrons up to and maintain them at full strength, no other possibility existed than to consolidate the air reconnaissance services of the Army with those of the Luftwaffe in order to maintain at least a limited number of reconnaissance units through strict rationalization.*

The new organizational system set up by the end of February 1942 provided that the Luftwaffe was to assume responsibility for air reconnaissance serving the purposes of the Army. After a transition period lasting up to the winter of 1942 no units organic to the Luftwaffe would remain under tactical control by the Army. Instead, the air reconnaissance forces of the Luftwaffe were only required to cooperate with the various army command headquarters in the same manner as that in force for other air units assigned under the air fleets. Operational air reconnaissance for the various Army command headquarters was to be conducted by the strategic units of the Luftwaffe as an additional mission.

The subject of transferring the responsibility for army air reconnaissance to the Luftwaffe had been broached by the Wehrmacht High Command as early as after the 1940 campaign in the west, but had encountered opposition by the Commander in Chief of the Army. The Army was unwilling to become more dependent on the Luftwaffe than it already was. Furthermore, the Army contended, not without cause, that operational reconnaissance to serve the purposes of air operations was often conducted in accordance with viewpoints differing from those essential for army air reconnaissance. For these reasons the Army and the Luftwaffe each conducted their own air reconnaissance separately during the initial stages of the Russian campaign.

The mission of tactical and battle reconnaissance for the Army (including reconnaissance for the artillery and the infantry) was assigned to the tactical reconnaissance groups newly formed through the consolidation of the former normal army squadrons and the squadrons allocated to armored units under group headquarters. The number of these groups was kept as small as possible, and only 35 were organized. The groups were under complete control by the

* Editor's Note: As used here "rationalization" means organization on scientific principles of management, etc. for greater efficiency.

various air corps or air divisions, which designated the squadrons to cooperate with specific infantry corps and armored divisions. In addition to the mission of army air reconnaissance the groups also had to assume responsibility for tactical air reconnaissance for the air corps and divisions. Some of the squadrons in these groups received single-seater aircraft equipped with instruments for air photography, but the majority retained their FW-189 twin-engine, three-seater reconnaissance type planes.

The Chief of Air Reconnaissance Forces received instructions to remain with the Commander in Chief of the Army during the transition period to serve in an advisory capacity and to maintain liaison with the Commander in Chief of the Luftwaffe. He had no tactical command or disciplinary authority but exercised only the functions of an inspector of all air reconnaissance units, including air reconnaissance schools and air reconnaissance replacement units, etc., and was controlled functionally by the Chief of the Luftwaffe General Staff. The orders also directed the assignment of Luftwaffe liaison sections to the various army group and army headquarters and of Luftwaffe intelligence officers to the intelligence sections of other army commands with the mission of transmitting the requests of these headquarters to the air fleets or air corps instructed to support them.

The outcome of the transfer of all responsibilities for Army air reconnaissance to the Luftwaffe was that the Luftwaffe in an increased measure had to assume responsibility for measures to insure the transmission of results obtained in air reconnaissance to the various army commands in an appropriate form, using for the purpose the system of air liaison sections and air liaison officers, a system which was improved continuously. That the new organization time and again resulted in friction is evidenced by an order issued by the Commander in Chief of the Luftwaffe in the summer of 1944. The Reichs Marshal observed that, although the new system had worked well, "some commands . . . have failed to recognize these interrelations and missions and have not carried out orders in the proper spirit."⁸

The above order therefore provided for a more closely integrated system of lateral liaison, particularly between the tactical air reconnaissance squadrons and the appropriate army commands, and

for the establishment of radio communication channels to supplement the network of wire communications.

The advantages of the new system over the old were as follows:

1) The duplication of effort in air reconnaissance (particularly operational) which resulted when Luftwaffe-controlled and Army-controlled reconnaissance units operated within the same reconnaissance areas was avoided.

2) Clear cut chains of command resulted from the discontinuation of divided command authority, namely, tactical command authority by the Army, and disciplinary and administrative control by the Luftwaffe.

3) A more uniform use of air power was possible than was the case when the units were controlled by the Army.

4) Establishment of the air reconnaissance groups and the assignment of these groups under higher level air commands, which were usually nearer by than the controlling army headquarters had been, insured improved care of the troops and facilitated appropriate service supervision.

5) Complete integration of the units with their respective parent air units insured improved replacement services in respect to aircraft, other items of equipment, and aviation fuel.

6) Consolidation of the individual air reconnaissance squadrons under group headquarters resulted in a reduced ground service organization. Only one air base being required for use by all squadrons of a group made for a more economical use of personnel and servicing equipment.

There were also serious disadvantages resulting from the new rationalized system:

1) The reduced number of tactical air reconnaissance units made it impossible to assign one squadron to support each infantry corps or armored division. Instead, a single squadron in many cases had to assume responsibility for air reconnaissance for a

number of army headquarters.

2) A squadron supporting an army command was no longer able to use an air field near the supported army command but had to operate from the group air base which was farther away. This, and the situation described in 1) above, loosened the very close contact which had hitherto existed between each squadron and the army headquarters it was supporting. This in many cases complicated the assigning of missions and the process of reporting.

For the above reasons the new system could only be considered as a temporary emergency solution.

In the case of operational reconnaissance it was found that the new arrangement, in which Army and Luftwaffe air reconnaissance activities were combined, did not lead to any considerable savings in forces. For army purposes, units engaged in operational air reconnaissance were required to observe road and rail routes, enemy rearward sectors, and support lines as far as the operating range of the plane permitted. They thus had to report on their observations on more or less connected straight lines. Operational air reconnaissance for the Luftwaffe was directed at individual points, some of them far apart, such as airfields, industrial installations, and so forth. As a rule this meant that the units employed in such missions had to fly criss-cross from point to point. It usually proved necessary to employ separate aircraft in each of these two types of air reconnaissance.

As will be explained later in this study, it would have been a sounder policy at the beginning of the Russian campaign to give the tactical air support command staffs attached to the individual army group and army headquarters the status of tactical air command headquarters. For this purpose they should have been expanded and assigned full command authority over all tactical air forces, including air reconnaissance units, engaged in permanent missions of army support.

As was the case with the strategic air reconnaissance forces, the tactical air reconnaissance forces in all campaigns fought in World War II proved a reliable support for the Army, and wherever they were committed earned full recognition by the army commands

and troops. Commanding officers at all levels of the Luftwaffe also at all times emphasized the achievements of the tactical air reconnaissance units. This high praise was particularly well merited since the tactical air reconnaissance personnel, in contrast with the personnel in all other types of air units, had to rely, each man individually, almost completely on their own resources in executing their missions. This fact is brought out clearly in numerous acknowledgments by command headquarters of the Army.



Ju-87's (Stuka) in flight, near Rzhev, 14 Aug. 1942



Dornier 17F - Reconnaissance



Me-109 in flight



FW-190 taking off



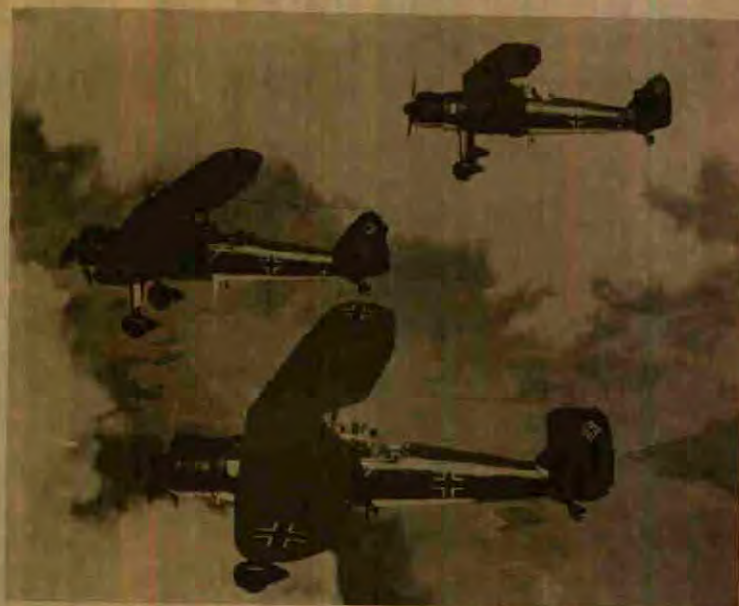
Heinkel 45 (He-45)



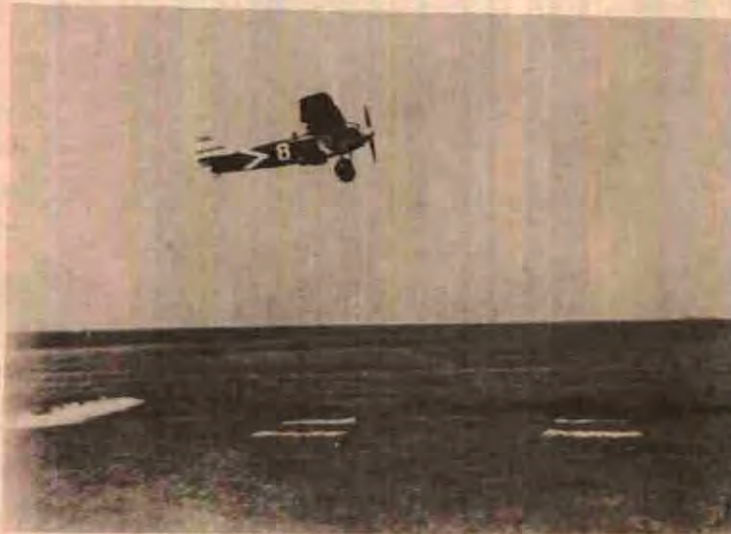
FW-189



Heinkel 46 (He-46) in flight



Henschel 126 (Hs-126)



Fokker D XIII (fighter-bomber). Dutch aircraft used by Germans for practice bombing in Russia, Lipetsk 1928



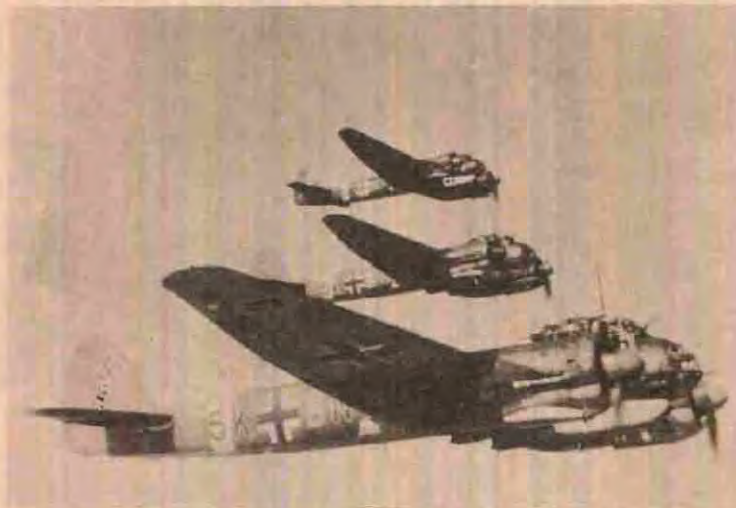
The "Mistel"



Heinkel 111 (He-111), II Air Corps, Russia 1941



Dornier 17Z (Do-17Z)



Ju-88's on combat flight, Russia



Henschel 123 (Hs-123)



Me-210's in Russia, 9 Sept. 1942



Dornier 15 (Do-15)



Henschel 129B (Hs-129B) Ground Attack Aircraft



Me-110



Ju-87's at approximate maximum dive angle



Me-109 equipped as a Jabo (fighter-bomber)



Ju-88C



Arado 234



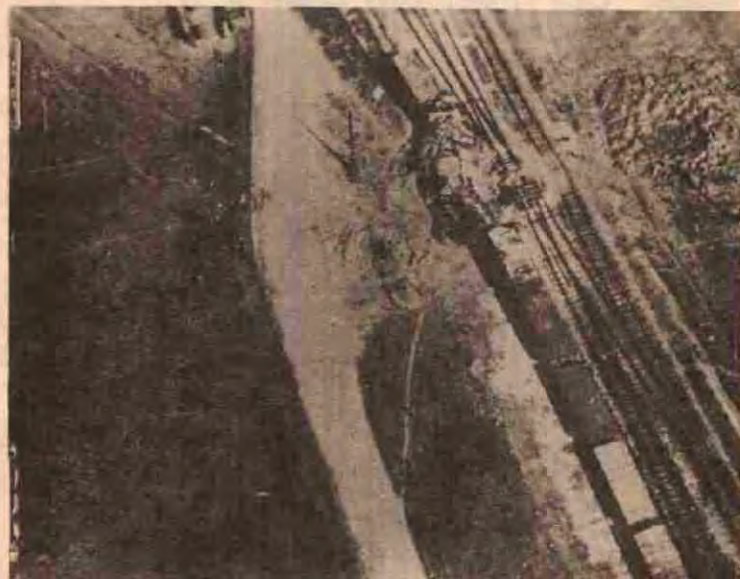
He-70



Do-17P



Heinkel 162 (He-162)



Stuka Attack on Railroad, Poland, 1939



Attack on Rolling Stock, Poland, 1939



Interdiction of the battlefield by Stuka's, Poland, 1939



Bunker destroyed by gunfire and Ju-88's,
Campaign in France, 1940



Rotterdam-Waalhaven airport, burning
and under attack by paratroopers, 1940



Attack on French Airfield, 1940



Attack on enemy column, Campaign in France, 1940



Dunkirk, 1940



French coastal battery after attack, 1940



Stuka Attack, Campaign in the West, 1940



Bunker destroyed by gunfire and aircraft,
Campaign in France, 1940



Interdiction of the battlefield, encirclement battle of Kiev, 1941



Stuka's returning from mission, Battle of Orel, 1941



Air Photo Showing Result of Destruction of a Bridge
During Encirclement Battle of Smolensk (1941)



Attack on railway bridge near Millerovo
by 54th Bomber Wing, 30 Sept. 1941



Result of Attack on Russian Antiaircraft Guns, Kiev, 1941



Russian prisoners, Encirclement Battle of Kiev, 1941



Russian tanks destroyed by the Luftwaffe



Result of Luftwaffe Attack on Russian Supply
Column in First Weeks of the War, 1941



Stuka Attack, II Air Corps, on Airfield at Kobrin, 1941



Air Attack on Russian Motorized Column,
Encirclement Battle of Bryansk, 1941



Air Attack on Railroad Station and Yards, Volokolamsk,
by 3d Bomber Wing, II Air Corps, 22 Sept. 1942



Direct Hit on Ammunition Dump Near Rzhev, 26 Sept. 1942



Bombs Falling on Moving Train, 54th Bomber Wing,
30 Sept. 1941