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THE RUSSIAN AIR FORCE
 IN THE EYES OF
 GERMAN COMMANDERS

By
 Generalleutnant A. D. Walter Schwabedissen

FOR NOT LOAN

USAF Historical Division
 Research Studies Institute
 Air University

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FOREWORD

The Russian Air Force in the Eyes of German Commanders by Generalleutnant a. D. Walter Schwabedissen, 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 nearly fifty separate studies, some of them in multi-volume form. The project, patterned, in part, after an Army program already in existence, 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 USAF Historical Division Dr. Albert F. Simpson and Mr. Joseph W. Angell, Jr., respectively, Chief and Assistant Chief of the Division, exercised over-all 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, as has been mentioned, 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 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 German phase 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 thirty-nine 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. The Project Editor, Mr. Edwin P. Kennedy, Jr., and Dr. Albert F. Simpson, Chief, USAF Historical Division, have, when necessary, indicated the relationship of the particular subject matter of each study to the other studies included in the project.

These studies find their principal authority in their authors' personal knowledge and experience. Thus, these studies 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. Instead, they have supplemented

their knowledge with 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.

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 der Flieger a. D. Paul Deichmann, who, as Chief Control Officer, became the moving force behind the entire project; Generalleutnant Josef Kamhuber, 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 is greatly appreciated; Generalfeldmarschall a. D. 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, Col. Wendell A. Hammer, USAF, 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, formerly Chief of Air Historical Branch No. 6 of the British Air Ministry and now Librarian, Air Ministry, gave invaluable assistance with captured Luftwaffe documents.

At the Air University, Maxwell Air Force Base, Alabama, a number of people, both military and civilian, have given strong and expert support to the project. Lt. Gen. Idwal H. Edwards, a former Commander of the Air University, initiated correspondence with Maj. Gen. Orlando Ward, USA, which resulted in a Department of the Army letter outlining the respective USAF-Army responsibilities for the project's execution. General Edward's interest in the project and its goals was matched by the assistance given by his successors: General Laurence S. Kuter, Lt. Gen. Dean C. Strother and Lt. Gen. Walter E. Todd.

Other personnel at Headquarters Air University who have given freely of their time and experience include: Col. Garth C. Cobb, formerly Director of the Research Studies Institute; 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 Col. Fred W. Miller, USAF Air Attache to Germany, and the Assistant Air Attache, Lt. Col. Leonard C. Hoffmann, both of whom gave indispensable aid during the project's last year in Germany. Also in Germany, Mr. Joseph P. Tustin, the Historian of Headquarters, United States Air Forces in Europe, has ably assisted the project by solving a variety of logistical and administrative problems.

This study was translated by Mr. Helmut Heitman and Mr. George E. Blau, both of whom deserve special thanks for their skillful contribution.

The editors are especially conscious of their debt to Miss Sara E. Venable for her typing of the final draft.

Above all, 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. Albert E. Simpson, Chief, USAF Historical Division, and Mr. Edwin P. Kennedy, Jr., the Project Editor, collaborated in the final editing of this study. To assure the technical accuracy of the translation, Mr. Kennedy compared the entire text with the original German manuscript. The stylistic peculiarities of the author, when they did not lend themselves to idiomatic English, were left in literal translation.

PREFACE

In World War II the Russian Air Force came of age. The men most vitally concerned with this, aside from the Russians themselves, were commanders in the German armed forces. The experience of these commanders, then, constitutes a unique source for information on an organization whose capabilities, both past and future, are of vital concern to the world.

German experience with the Russian Air Force has been both lengthy and intimate. It began in the early 1920's, when German flying officers, technicians, and engineers were sent to Russia to do work which the terms of the Versailles Treaty prevented their doing at home. From this early, rather uneasy association, the Russians gained valuable knowledge of German aircraft industrial techniques while the Germans acquired base facilities for tactical flying training of a select cadre of German officers.

The chief German experience with the Russian Air Force, however, derives from World War II. It was during this period that the Russians learned most from the Germans and the Germans learned most about the Russians. Although they almost ignored strategic air warfare, the Russians quickly followed the German example in other types of air operations and demonstrated a remarkable ability to adapt German tactics and procedures to the peculiar demands of their own circumstances. They also gave ample evidence of an ability to improvise and invent procedures and tactics of their own.

This study exploits this broad German experience. Compiled from the official records of the German Air Force and from reports written by German commanders who saw action in the Russian campaign, it documents many of the Russian Air Force's achievements as well as its failures. Although it is an abridgement of General Schwabedissen's original manuscript, every effort has been made to preserve what General Schwabedissen has to say and his way of saying it.

ABOUT THE AUTHOR

Both by training and experience Generalleutnant a. D. Walter Schwabedissen is well qualified to write the present study. Although he saw service in both World Wars as an air force officer, he is a member of that elite group of German Army General Staff officers which was transferred to the German Air Force in 1933, at the time the Air Force became an independent arm of the Armed Forces. Thus, General Schwabedissen is well schooled in the principles of both ground and air warfare, a necessity for anyone who writes about the Russian campaign where the latter was so dependent on the former.

Among his assignments prior to World War II were two years with the Training Branch of the Air Ministry, a year at the War Academy (Kriegsakademie) followed by two one-year assignments during which he successively commanded two different Luftwaffe Area Commands.

At the beginning of World War II General Schwabedissen commanded an antiaircraft artillery corps, after which he became Commander in Chief of all German Armed Forces in the Netherlands. Late in 1944 General Schwabedissen became Chief of the Activation Staff of the Hungarian Air Force, an assignment which gave him firsthand experience with the Russian Air Force during the closing phase of the war, when its strength had reached impressive proportions. He served in this capacity until the capitulation.

AUTHOR'S INTRODUCTION

For a proper understanding of the impression which German army, naval, and air force commanders had of the Russian air forces in the 1941-45 Russian campaign, it is first essential to obtain a clear picture of the status of the Russian air forces prior to World War II. An important part of this picture is the pre-war assessment of the Russian air forces by the German Command. It was this assessment which influenced the operational plans of the German Armed Forces, particularly of the Luftwaffe, and therefore governed the measures taken by German field commanders. An effort will be made in Chapter 1 to ascertain whether and to what extent the actual status of the Russian air forces deviated from the views held by the German Command.

The German Command, at the opening of the Russian Campaign, based its assessment of the Russian air forces primarily on the "Orientierungsheft Union der Sozialistischen Sowjetrepubliken (UdSSR)," which will be referred to in this study as the Intelligence Digest on Soviet Russia. This document was issued in February 1941 by Section IV of the Luftwaffe Intelligence Division. In preparing Chapter 1 the author has made use of this document and other military sources, of statements made by various German personalities who have occupied themselves with the problems involved, and of the writings of foreign observers. It must be borne in mind, however, that the latter sources are based in part on post-war information which was not available to the German Command at the opening of the campaign in 1941.

In the chapters which then follow an attempt is made to portray the Russian air forces as commanders in the three branches of the German armed forces saw them during the campaign. These chapters are based largely on numerous contributions by officers who served in the field. Their frequently diverging views are explained by the different time periods and front areas in which they gained their experience.

The author has also extended his research to after-action reports as well as documents of the Luftwaffe High Command, which represent a condensation of reports and information received at the time from field commanders. Here it must be borne in mind that from the moment German retrograde movements set in,

German field commanders were rarely able to obtain personal impressions of certain segments of Russian air power, such as the supply services, the ground service organization, and the air armament industry. Making allowances for these limitations, the present study can be considered a true presentation of the assessment by German commanders of Russian air power during the campaign.

Chapter 1

DEVELOPMENT AND APPRAISAL OF RUSSIAN
AIR POWER PRIOR TO THE RUSSIAN CAMPAIGNSection I: Development from 1918 to 1933¹

As organic elements of the Army and Navy, Russian air units in World War I achieved no significant and independent development. Apart from their large 4-engine Sikorski model, constructed in 1914, and a remarkable achievement at that early date, the Russian air forces of 1914-18 were largely dependent on Allied support, their units being equipped primarily with French and British fighter aircraft. In the 1915-17 period the Russian aircraft industry produced approximately 1, 500 to 2, 000 aircraft annually.

At the commencement of the revolution in 1917 about 500 obsolete aircraft were available, most of them French models, and only two aircraft factories were in existence. No aircraft at all were produced in Russia from 1918 to 1920. The Bolshevik Revolution, civil war, and the war with Poland resulted in such complete destruction of the Russian air forces that it became necessary in the early twenties to create an entirely new air force.

Lenin, and later Stalin, clearly realized the necessity to create a strong air force and energetically tackled the difficult problem. Neither in the military nor in the technical or industrial fields was the Soviet Union in any position to develop a new air force with its own resources. Help had to be sought abroad, partly through purchasing foreign aircraft, but in a greater measure through engaging foreign military and technical experts.

In the military field the good Russo-German relations in the 1920's provided the essential conditions for this assistance.² Russian air officers were given careful training in the general staff courses conducted by the Reichs Ministry of Defense in Berlin, and in 1924 an aviation training school was established at the Russian airfield of Lipetsk--approximately 150 miles south of Moscow--for officers of the German Reichswehr,^{*} as Germany's post-World War 100, 000-man national defense establishment was called. The experience gained by

^{*} Editor's note: The Reichswehr was the German national defense establishment under the terms of the Treaty of Versailles of 1919.

the German officers and the operational and training principles developed for the Luftwaffe were made available to the air forces of the Soviet Union. *

It is thus not surprising that most German views on the employment of air power were adopted by the Russians. The general view of the Reichswehr at that time was that air power must be auxiliary to the Army and the Navy. Although carefully studied, the theories of Douhet[†] and Rougeron^{††} had not yet been accepted. Consonant with German views, the new Russian Air Force was developed as an auxiliary of the Army and the Navy, so that main emphasis was placed on the establishment of fighter, reconnaissance, and light bomber units. Whereas the Luftwaffe later became an independent branch of the armed forces with far-reaching missions of its own, the Soviet air forces remained essentially an auxiliary of the Army and the Navy.

Foreign influences, however, were far more potent in the technical fields than in the military. Here again Germany initially took first place. In 1923, as a result of Russia's special interest in the construction of metal aircraft, the firm of Junkers, Dessau, established a branch factory** for

* The author was acquainted with Soviet AF officers Alksnis, Heinemann, and others while these officers were receiving training in the Reichs Ministry of Defense. He furthermore had the opportunity to acquaint himself with the training and experimental activities at Lipetsk during two extensive visits.

† Editor's Note: Giulio Douhet (1869-1930), Italian general and early exponent of strategic warfare.

†† Editor's Note: The author is possibly in error concerning Camille Rougeron, whose best known work, L'Aviation de Bombardement, Editions Berger-Levrault (Nancy-Paris-Strasbourg), echoes many of Douhet's ideas. This book was not published until circa 1936 and two years later appeared in a German translation (Das Bombenflugwesen, Rowohlt (Berlin, 1938)), thus much later than the period under consideration here.

** Editor's Note: This factory marked a turning point in the career of Hugo Junkers (1859-1935), the German aircraft manufacturer and inventor. With the secret assurance that he would be reimbursed from confidential Reichswehr funds, Junkers financed the construction of the Fili plant. According to the accounts cited below, he was never repaid. The ensuing financial loss was the first of a series, which saw Junkers slowly divested of all his holdings. For the details of this and other intrigues of which Junkers was the victim, see: Hauptmann Hermann, The Luftwaffe, Its Rise and Fall, G. P. Putnam & Sons (New York, 1943) and Curt Reiss, "Die Junkers Tragoedie," Muenchner Illustrierte, July and August, 1955 (copy in C/III/4, Karlsruhe Document Collection).

the construction of all-metal aircraft at Fili, on the outskirts of Moscow. There, fuselages and, on a smaller scale, Jumo-L-5 engines were manufactured. The factory was under German management and employed German engineers, designers, master craftsmen, and foremen, and it was here that Russian engineers and skilled workers received their training.³ In addition to repairing existing Junkers aircraft of the F-13, W-33, and A-20 types, the factory engaged primarily in the construction of Junkers 21 aircraft, a high-wing cantilevered monoplane powered by a Jumo-L-5 engine. The plane, intended as a multi-purpose model, was placed in serial production and introduced as standard equipment for Soviet air units. Approximately 100 of these aircraft were produced by the end of 1925. Other types produced, but not in series, were the Ju-22, an all-metal high-wing single-seater fighter, and the K-30, a 3-engine bomber. When this stage was reached the Russians thought that they had learned enough and commenced producing independently, so that the 25-year contract with Junkers came to an early end in 1927. The factory at Fili was taken over by the Soviets as their twenty-second aircraft factory.

Through their collaboration with Junkers, the Russians acquired an exemplary system of metal construction and material testing, and an excellently equipped engine construction workshop. Furthermore, large numbers of Russian engineers, designers, technicians, draftsmen and other skilled workers received training under the contract.

In the field of practical science the Soviets also profited greatly from the close collaboration of German specialists with the Central Institute of the Soviet Air Forces which will be referred to in this study as the ZAGI.* The institute was under the direction of Professor Tupolev,† who later became famous for his aircraft designs. A special role was played in this collaboration by Professor of Aerodynamics Guenther Bock, who was taken by the Russians to the Soviet Union after World War II, has since returned to Germany and is presently on the staff of the Technische Hochschule at Darmstadt.

* Editor's Note: Sometimes called the "Central Aero Hydrodynamics Institute," the ZAGI was founded in 1918.

† Editor's Note: A. N. Tupolev (1888-), credited with having designed the Russian version of the B-29 as well as the famous Tu series of jet propelled transports which have been used by Russian civil aviation since 1956.

In retrospect there can thus be no doubt that the relatively quick progress made by the Russians, despite serious difficulties in the initial years, was due primarily to assistance from German military and technical personnel.

Compared with German influences on the development of Soviet air power, those of other foreign countries, during the first few years, were small. They remained more or less restricted to the purchase of Italian, French, British, and Dutch aircraft and later to the copying of foreign fuselages and engines. Italy and Britain played a not inconsiderable role, Italy with its Combat twin-engine Komtal bomber--powered by Fiat engines, and Britain with its De Haviland 9a, and with Bristol, and Napier engines. It must be remembered that in these early years Soviet air units were equipped almost exclusively with foreign fuselages and, more particularly, with foreign aircraft engines.

While drawing extensively on foreign assistance in the development of its air force, the Soviet Union made strenuous efforts to make itself independent of this assistance. A number of steps were taken toward this goal. The first and most important of these was the creation of an efficient aircraft manufacturing industry. The program was logical and determined, particular stress being placed on the establishment of factories for the production of fuselages, aircraft engines, and accessories. In addition to the ZAGI previously referred to, a Central Directorate of the Soviet Air Forces was established in Moscow to direct the program. The ZAGI was assigned responsibility for all technological and construction measures adopted in connection with air armament.

The program was given added impetus by the First Five-Year Plan (1928-1932). In 1930 management of the air armament program was decentralized. Separate directorates were established for military and civil aviation and the overburdened ZAGI was relieved of some of its responsibilities through the establishment of a separate institute for aircraft engines (ZAMI), and another for conducting research on materials (VIAM). Most of the factories of the air armament industry at that time were established in European Russia west of the Urals, in the areas around Moscow, Leningrad, and in the Donets Basin. Besides Tupolev, other designers, including Ilyushin, Mikoyan, and Lavochkin* made

* Editor's Note: General Sergei V. Ilyushin (1894-), best known for the Il-2 (Stormovik) single-engine, low-wing, attack bomber; General Artem Mikoyan who, with General Mikhail Gurevich designed a series of famous planes designated by "Mig" (in WWII the well known Mig-3 single-engine, low-wing fighter); and Semyon A. Lavochkin (1900-) whose La-5 was a single-engine, low-wing fighter of WWII.



German personnel of the aircraft plant at Fili, near Moscow, 1925



Interior of the plant at Fili, summer, 1926

their appearance with models of their own, although these were frequently patterned on foreign prototypes.

In spite of all efforts the targets of the first Five Year Plan were not even approached. Thus, an annual output of 600 TB-1 and TB-2 bombers* had been projected, of which barely 50 percent was achieved. In the case of single-seater types--the main field of endeavor--the discrepancy between projected and actual output was almost if not quite as pronounced. The most serious difficulties encountered were the lack of machine tools, short supplies of aluminum and copper, and the lack of adequate numbers of skilled personnel.

In frequent cases quality was sacrificed for quantity and on the whole the manufacture and assembly of aircraft engines was so far in arrears that at the end of the first Five Year Program most of the first line aircraft were still powered by foreign engines. In addition, Russian fuselages were technically inferior to those of foreign make.

The program was also hampered by the purge of Trotzkyites, which began in 1928.

In spite of all defects and setbacks the Five Year Plan produced one important result: the Soviet air armament industry could be considered largely independent of foreign support. Other results included an increased output from Soviet aircraft factories which managed to produce approximately 2,000 planes annually; initiation of rationalized methods in the aircraft industry; and the discovery of a light metal--Kolchug aluminum--a Russian achievement. The progress thus made was also due in no small measure to the experience gained in the field of knock-proof fuels. In the manufacture of aircraft engines a logical course was being followed: concentration on the production of a small number of efficient types.

Another measure which furthered the development of the Soviet air forces was a program to expedite the training of aviators, ground service, and other specialized personnel. Here the Soviet Government succeeded, through a gigantic propaganda campaign, in arousing an enthusiastic national interest in aviation. A society, "Friends of the

* Editor's Note: The TB-1 (A. N. T. 4), a four to five seat medium bomber, was a monoplane powered with two German (B. M. W.) engines. Details on the TB-2 are lacking.

Russian Air Forces," was founded in 1923 and had as many as 1,000,000 enrolled members barely two years later. Generous measures to promote glider aviation on a large scale did much to arouse the enthusiasm of the younger generation and assisted materially in the pre-training of flying and technical personnel. Together with the (in some respects) ruthless methods of labor management of the totalitarian government, the inborn Russian characteristics of tenacity, endurance, frugality, and, particularly, obedience, promoted the speedy development of a solid foundation of suitable personnel. The widespread assumption that the average Russian has little, if indeed any, technical aptitude was soon proved a fallacy. The opposite was found to be true.

Although a long time was still to pass before the Soviet air forces and air armament industry would have an adequate reservoir of skilled labor to draw upon, the early results of the personnel training program certainly cannot be considered unsatisfactory since almost all personnel had to be trained from scratch.

While they were creating a military air force, the Russians took steps to promote civil aviation. The result was the development of a giant civil air transport service. Partly for propaganda purposes, the service used only aircraft of Russian manufacture. However, foreign aircraft were used on the route serviced by the Deruluft, a Russo-German airways company formed in 1921.* Military aviation and the aircraft industry profited to a certain extent from the use of installations of the civilian airlines and from the experience gained in civil aviation.

The stages in the development of Soviet military air power in the 1920-33 period were approximately as follows:

- 1923: The first squadrons were placed in service.
- 1928: The strength of the Russian air forces reached approximately 100 squadrons totalling roughly 1,000 aircraft. The units were stationed and trained almost exclusively in western Russia--in

* The Russo-German DERULUFT AIRWAYS was probably the first foreign air line in which the Soviets participated. So far as can be remembered, the aircraft chiefly in use were Junkers F-13 and W-33 during the initial stages. Later these were replaced by the German standard model for air traffic, the Ju-52.

the Leningrad, Moscow, Smolensk, Rostov, Kiev, Sevastopol, and other areas.

1930: Reports showed the existence of 20 brigades with 1,000 first line aircraft and 25 aviation schools of various types.

1933: Strength estimated at 1,500 first line aircraft at the end of the first Five-Year Plan. Annual production approximately 2,000 aircraft.

Russian reticence and secrecy and the immense size of the Russian territories made it extremely difficult for foreigners to gain an adequate picture of the growth of Russian air power. It was properly understood that the development which had taken place was achieved in the face of serious difficulties in the personnel and materiel fields, and that it was achieved at the cost of considerable sacrifices. In addition, individual reports showed that the training standards of flying personnel had made considerable progress. In 1933, for example, a large bomber formation of approximately 80 to 100 aircraft was observed operating in Central Russia. The aircraft flew in good formation and then landed by flights. In the same year it was reported that during a night exercise over Moscow a group-sized bomber force flew over the city by flights without untoward incidents.⁴

An appraisal of the status of Soviet air power in 1933, shortly prior to commencement of the second Five-Year Plan, can thus be summed up generally as follows: thanks to foreign support and its own strenuous efforts, the Soviet Government had succeeded, despite numerous difficulties, in building up a new force from nothing; numerically, this air force already had to be considered a power factor although it had not yet achieved the standards of efficiency common to other major military powers; in addition, the need for outside assistance had been overcome in both the military and technological fields, and the road was open to complete independence.

Section II: The Period from 1933 to the Opening of the Russian Campaign in 1941⁵

Following the pattern of development which had led to the status of its air power in 1933, the Soviet Government, in the following years, continued logically and undeterred on the course it had adopted. Military and technological developments in foreign air forces were watched carefully and ideas were adopted without hesitation. Apparently suitable aircraft models, engines, and appliances were purchased or copied, and foreign consultants were even called in, particularly from the United

States of America. All these measures were, however, of secondary importance.

Main emphasis during this period was on promoting the development of the air forces and achieving the highest possible standards of performance with exclusively Russian ideas and resources. This purpose was served particularly by the second and third Five-Year Plans, in which the air force and the air armament industry were given high priorities. The determining factors here were the words of Stalin: ". . . what the Soviet Union needs for the protection of its economic development and the pursuit of the objectives of its foreign policies is an air force ready at all times for action."

Although numerous changes took place in the tactical principles, organization, and tactical and technological structure of the Soviet air forces in the years which followed--as was also the case in other countries--the fundamental principle, that air power should be auxiliary to the Army and the Navy, was retained almost unchanged. All measures influencing the development of Soviet air power must be considered in this light.

The information on German intelligence media which follows is offered in advance because an objective appraisal of the conclusions arrived at by the Luftwaffe High Command in its assessment of Soviet air power at the opening of the Russian campaign is only possible if the sources available to the Luftwaffe intelligence service and their limitations are first understood.

A. German Procurement and Interpretation of Intelligence Information

It has been mentioned previously that the means and possibilities available to the German Command for procuring intelligence information were seriously restricted because of the way in which Soviet Russia shut out the rest of the world. The situation was further complicated by the deficiencies of the German military intelligence and counterintelligence services. Up to 1935 the German intelligence service was still in its infancy and up to 1938 it had made no serious preparations against Russia.

After conclusion of the Russo-German Treaty of Friendship in the autumn of 1939, the Armed Forces High Command, under

instructions from Hitler, issued a decree categorically prohibiting the procurement of intelligence information on the Soviet Union.⁶ Since the Russian liaison officer attached to the Luftwaffe gave no replies whatever to inquiries concerning the Soviet air forces, a complete vacuum developed so far as intelligence on Soviet air power was concerned. Intelligence activities were only resumed in mid-1940 after much valuable time had been lost.

Under the German set-up, the procurement of intelligence information on Soviet air power was a responsibility of the Air Section, Counterintelligence Office, Wehrmacht High Command (OKW/Abwehr-Ost). Intelligence interpretation was handled for the Luftwaffe by the Foreign Air Forces Branch, Reichs Air Ministry (Reichsluftministerium/Abteilung Fremde Luftmaechte) and later by the Intelligence Division, Luftwaffe High Command (OKL/Ic). The interpreting agency tabulated its requirements in sequence of their urgency and forwarded them to the Counterintelligence Office, which was alone responsible for the procurement. Collaboration between the two agencies was not always methodical, practical, or without friction. Be that as it may, the Luftwaffe High Command remained essentially dependent upon the success achieved by the Counterintelligence Office, which in general was mediocre, producing only isolated items of information rather than a comprehensive picture.

The various sources of information and the results obtained from them up to the summer of 1941 can be evaluated roughly as follows:

The Russian Press, Including the by no Means Numerous Publications on Aviation.

Only generalizations and no details were published. The processing of press reports therefore produced no important information apart from a few not insignificant items concerning the Russian armament industry in general.

Agents.

Owing to the highly effective counterespionage system in force in Soviet Russia, the employment of agents was almost impossible, so

that this source produced no material results.

Information from Russian Emigrants.

Usually the persons in this category completely lacked technical understanding. Their reports were meager and frequently tendentious, and therefore had to be accepted with considerable reservations.

The Attache Service.

The German air attache in Moscow, Lieutenant Colonel Aschenbrenner, had no opportunity to form a precise opinion on the Soviet air forces. Seriously restricted in his movements and under close surveillance at all times, he was generally not admitted to any installations of the Soviet air forces or to establishments of the air armament industry. Due to his efforts, however, in April 1941 members of the Luftwaffe Technical Office visited a number of Soviet air armament factories, including some in the Urals. This tour of inspection admittedly did not make a complete survey of the Soviet air armament industry possible, but it did permit a deep insight into the hitherto unknown and unsuspected capacity of that industry. (It will be necessary later in this study to return to this visit and the conclusions drawn from the information it provided.)

On the whole, the German air attache in Moscow was more impressed by Russian air power than the Luftwaffe High Command. The view held widely during and after the war that the air attache underestimated the efficiency of the Russian air forces and that shortly before the Russian campaign he fully concurred in the opinions expressed in the Intelligence Digest is erroneous. On the contrary, in a brief memorandum Aschenbrenner stated his opinion, which deviated from that contained in the Intelligence Digest. He was thereupon ordered to report personally at headquarters of the Luftwaffe High Command. There the Chief of the Luftwaffe General Staff and the Chief of the Intelligence Division endeavored to convince him of the rightness of their opinion but, as he writes on 3 November 1955, with negative results.

It must be stated here that the Luftwaffe General Staff did not share the opinion of the air attache and, furthermore, that the Commander in Chief of the Luftwaffe repeatedly refused to receive

him when he called to make a personal report. In retrospect this must be considered particularly regrettable, since the air attache during his long stay in Soviet Russia had been able to form his own opinions on Soviet air power in spite of the restrictions to which he was subject there. His opinion deserved more attention by the Luftwaffe High Command than it received.

The German air attaches in Japan, Turkey and the other Balkan States, Sweden, Finland, and the United States were also called upon to procure information on Russian air power. The attache in Japan was able to furnish valuable information on the Soviet air forces in the Far East, but the other officers produced only meager results.

Air Photo Reconnaissance.

This was one of the most important mediums for the procurement of information on Soviet airpower. Operating from airfields in Rumania, Hungary, Poland, East Prussia, and Finland, the high altitude planes of the strategic reconnaissance group commanded by Lieutenant Colonel Theodor Rowehl were able to obtain almost complete air photo coverage of the ground service organization of the Russian Air Force and of the fortifications in western Russia. The group also obtained air photos of numerous factories, communication targets, and major cities. Because of the restricted range at which the aircraft could operate, however, it was not possible for them to obtain information either on airfields farther inside European Russia or on industrial installations in the Donets Basin, along the middle reaches of the Volga River, or in the Ural region.

The Radio Intercept Service.

This proved an extremely valuable and highly successful medium for the procurement of information. By painstakingly piecing together the numerous items of information gleaned from intercepted Russian messages, the service secured good results on the strategic concentration, strengths, chains of command, organization, and types of aircraft of the Soviet air forces in the western areas of European Russia. On many an occasion it was due to such information alone that the command was able to decide on the proper employment of air reconnaissance.

B. Soviet Command and Tactical Principles.

The political and military leaders of the Soviet Union adhered steadfastly to the basic concept that the main mission of air power was to render direct support to the Army and the Navy. Accordingly, the air force remained firmly integrated with the Army and the Navy until 1935. Even after 1936, when the air force was uniformly organized and withdrawn from direct control by the Army and Navy and required only to cooperate with these two services, this basic concept remained unchanged.

The creation of heavy bomber units and a strong parachute force led temporarily to the assumption that the Soviet air force would now be required to perform more far-reaching strategic missions, but it soon became evident that these elements of the Soviet air force would also be directed primarily against targets of importance in relation to ground and naval operations. However, this by no means implied a basically defensive policy. On the contrary, the tactical principles, organization, and strategic concentration provided irrefutable evidence of the offensive nature of the Soviet air force.

The knowledge available to the Luftwaffe High Command concerning Soviet tactical air doctrine up to the opening of the Russian campaign can be summarized roughly as follows:

In the light of events in the Russo-Finnish War, training standards seemed low in coordinated action with ground forces, particularly during mobile warfare.

The Luftwaffe High Command expected close cooperation between the Soviet Army and Air Force, with the latter supporting the Army in areas of main effort during combat and assisting the Army in the execution of its mission. Accordingly, the composite air divisions assigned to armies were committed within the clearly defined operational zones of the armies concerned. No development of areas of main effort in the sense of strategic air warfare were recognizable. The command was considered awkward, old-fashioned, and inclined toward stereotype methods in the conduct of operations. In addition, the command appeared to be hampered at times by political party control.

The primary mission of Soviet fighters was to protect their

ground forces and supply routes. Low-level attacks on German troop concentrations, marching columns, and airfields in the near front areas were also to be expected. It was not usual for Soviet fighters to penetrate deeply behind the front lines. According to Soviet regulations, the main mission of fighters was ". . . to keep the air above the Soviet front on the ground free of enemy air forces."⁸ For these reasons the commitment of fighter units was largely dependent on ground operations. Fighter units under direct control of the Army High Command were assigned, as the situation required, to assume responsibility for air support in the areas most vulnerable to air attack.

Soviet ground-attack air units were, above all, to cooperate with units of the Army by attacking roads, rail routes, railhead depots, marching columns and troop concentrations. Of special importance were low-level attacks, under fighter escort, in support of armored and motorized ground forces in both attack and retrograde operations.

Also within the scope of army operations, bomber forces were to attack hostile supply movements and installations in the near front areas. The German command did not expect any sizable commitment by the Russians of bomber forces, including long-range bombers, in daylight missions far in the German rear. On the other hand, it was expected that single planes would carry out long-range harassing raids at night and during favorable weather. It was considered probable that such attacks might be extended occasionally into East Prussia and against sea routes to Stettin. The Luftwaffe High Command, however, did not anticipate the Russians employing their long-range bombers in a manner consonant with the principles of strategic air warfare.

Of the Soviet air transport services it was known that a large number of units existed and that they were to be used for carrying parachute and airborne infantry units as well as for other type transport missions. Plans were known to exist for the conversion of the civil air services to perform military supply and transport missions. In view of the defective standards of the civil air services, however, the German Command assumed that this would have only an insignificant effect.

The parachute and airborne infantry arm, organic to the Soviet air forces prior to the war, will be dealt with separately in Section IV.*

* See below, p. 33.

Experience in the Russo-Finnish War provided no indications of any properly preplanned employment of air power or of any concentration of effort in the operations of the Soviet air forces.

On the whole, the Luftwaffe High Command accurately assessed the tactical doctrines of the Soviet air force in spite of the difficulties encountered in the procurement of intelligence information. This overall impression is not disturbed by the fact that the German appraisal was inept and even positively faulty in some of its aspects, which will be dealt with later in this study. One factor must not be lost sight of: in estimating the Soviet Command's principles for the conduct of the war, the Luftwaffe High Command was dependent on the opinions of the supreme German command, namely, the Armed Forces High Command, and in the final essence on the personal opinions of Hitler. The Luftwaffe High Command, however, had no possibility of forming a general estimate, and to have done so would have exceeded its responsibilities.

C. Organization and Chain of Command.

The impression prevailing at the Luftwaffe High Command up to 1941 concerning the organization of the Soviet air force was more or less as follows: The Soviet Command held the view that the air force must be considered an auxiliary arm of the Army and the Navy and the organization of the forces was adapted to this view. This was thought to be particularly evident in the top levels of command and in the chains of command.

It would exceed the scope of this study to investigate the various changes made in the organization of the Soviet air force in the 1930's. Such an investigation would also hardly be worthwhile, since the basic concept, as stated above, was retained throughout in spite of modifications in the details.

Certain progressive developments occurred in 1936, however, when the air force was given a little more independence. Until then, the "Air Forces of the Red Worker and Peasant Army" remained integrated with the Army and the Navy. Air operations in coordination with operations of the Army were directed by the commanding officers of the army forces in the various military areas. In cooperation with the Navy, the arrangement was similar.

At higher levels of command, the air units--air divisions or brigades--were usually composite. Although these large units were no longer directly integrated into the Army or Navy after 1936, practically no change occurred in the actual tactical organization and doctrines. A real difference was that from then on most of the large units were organized to include only one specific aircraft type each. It also seemed that some stress was placed on the development of a long-range bomber force, as well as paratroop and airborne infantry units.

In detail, the Luftwaffe High Command had the following information on the organization of the Soviet air forces in the summer of 1941:

Peacetime Organization.

Air forces assigned to the Army were commanded by the "Commander of Air Forces of the Red Workers' and Peasants' Army," who was under the direct control of the Peoples' Commissar for Defense. Tactically, the air units with the Army were controlled by the commander of Army forces in each of the sixteen military areas and two military commissariats, and in the area of the Army of the Far East.

A "Chief of Air Forces," under the command of the Commander of Air Forces of the Red Workers' and Peasants' Army, was attached to each military area headquarters* in an advisory and executive capacity for all matters concerning the air forces. His responsibilities included the handling of administrative, training, personnel and materiel replacement, and ground service organization problems.

The Central Administration of Red Army Air Force units had a status equivalent to that of an air ministry in other countries. It was controlled by the Commander of the Air Forces of the Red Workers' and Peasants' Army and organized into ten branches: Air Forces Inspectorate; Aviation Research Commission; Science and Technology Commission; Administrative Branch; Equipment Branch; Replacement Branch; Supply Branch; Meteorological Branch; Training Branch; and Personnel Branch.

* See Figure 1.

The chain of command was similar in the Navy, where the air forces were under the Chief of Naval Air Forces who, in turn, was under the Peoples' Commissar for the Navy. An Administration of Soviet Naval Air Force Units had the same responsibilities as those described above for the Central Administration of Red Army Air Force Units within the Peoples' Commissariat for Defense. The Naval air units were tactically assigned to the individual Naval commands; for administration and training they were controlled by the Chief of Naval Air Units, a member of the staff of the Peoples' Commissar for the Navy.

Finally, the units responsible for border defenses and for the prevention of internal uprisings were organized as Air Forces of the Commissariat of the Interior. They were consolidated in a brigade, the squadrons of which were deployed throughout the Soviet territories.

According to German opinions, the reorganization initiated in April 1939 and still in progress in the summer of 1941 involved decisive changes in the organization and strengths of Soviet air units. One special feature was the apparently gradual disappearance of air corps and air brigades directly integrated with ground service units. Under the new system the air division, either single or composite type, * was the largest unit of the Soviet air forces. Each air division controlled from three to six air regiments and a number of air bases, the latter being units of the ground services. In 1941, thirty-eight air divisions had been identified and a total of 50 was assumed to exist. As a general rule each air regiment contained four squadrons; plans provided for a wartime increase to five squadrons. One hundred and sixty-two air regiments were reported in existence, the majority of them single-type units.

Wartime Organization and Chain of Command. †

It was assumed that in the event of war, the air forces would be directed by the Army High Command pursuant to directives from the Peoples' Commissariat for Defense. Presumably army groups would be assigned strategic bomber and fighter divisions, possibly

* See Figure 2,

† See Figure 3.

SOVIET AIR FORCES

Peacetime Control and Organization of Red Army
Air Force Units in a Military Area Command

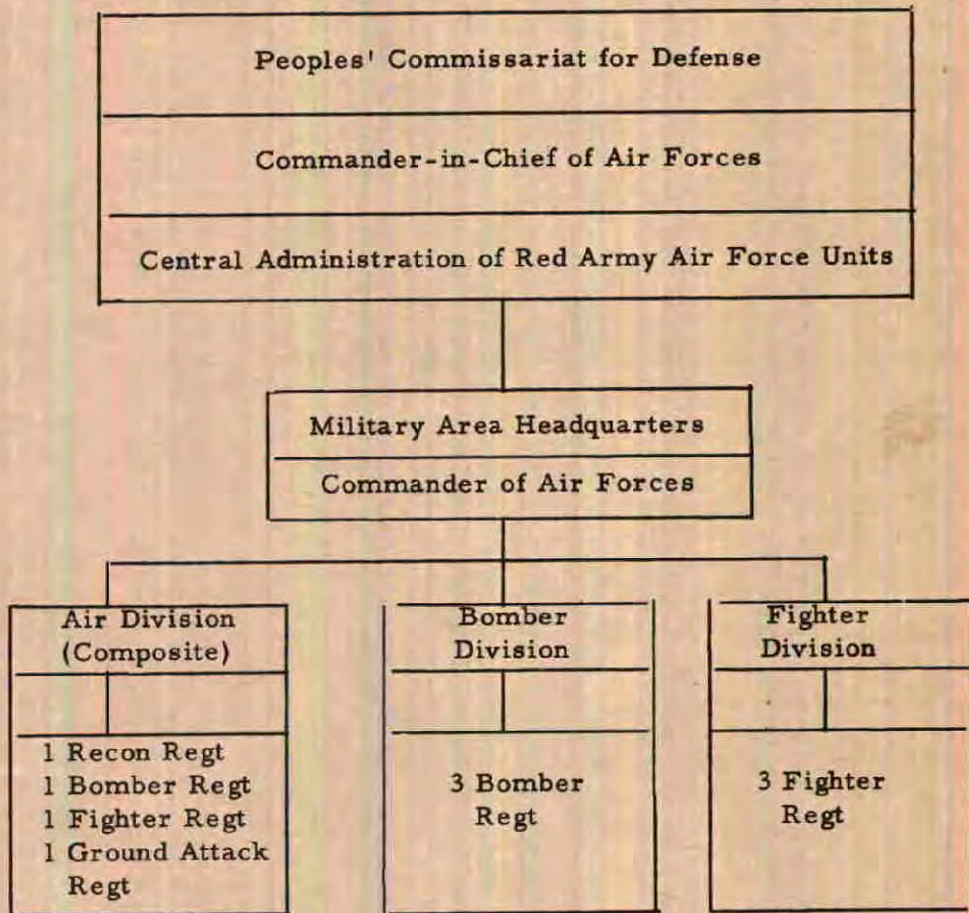


Figure 1

consolidated under air corps headquarters; armies would be assigned composite air divisions; and corps would be given temporary command of light bomber and ground attack air regiments. In addition it was assumed that all of these commands would have reconnaissance aircraft.

Circumstances in the Navy were assumed to be very much the same.

Strategic bomber divisions and one-third of the existing fighter divisions and strategic reconnaissance units were to be used to form a reserve under the Peoples' Commissariat for Defense.

In addition, fighter divisions would remain in rearward military areas, together with anti-aircraft artillery forces, for home defense purposes.

D. Strength and Strategic Concentration.

The last estimates of the strengths of the Soviet air forces prior to the outbreak of hostilities were given in the Intelligence Digest on Soviet Russia in the spring of 1941. These were the source for the Luftwaffe High Command's estimate of the strengths of the Soviet air forces at the outset of hostilities.

According to that estimate, 10,500 military aircraft were in field units, 7,500 in European Russia and 3,000 in the Far East.* Approximately 50 percent of all aircraft were thought to be modern types.

* Editor's Note: By comparison, in 1939 the Operations Staff of the Luftwaffe High Command estimated the total strength of the Soviet air forces, including Army and Navy, at 5,000 front-line aircraft. Of these, 4,000 were assumed to be in European Russia and 1,000 in the Far East. (Auszug aus Chef des Generalstabes, Nr. 700/39 g.K. (5. Abt. I) 2. Mai 1939 (Extract from Chief of the General Staff No. 700/39, Secret (Branch 5, Operations) 2 May 1939)). Extract in G/VI/2a, Karlsruhe Document Collection.

In detail the figures were as follows:

<u>European Russia</u>	<u>Modern</u>	<u>Outdated</u>	<u>Total</u>
Reconnaissance aircraft	-	620	
Fighters	2,000 (I-16)*	980	
Bombers	2,100 (1,100 SB-2 [†] & SB-3, 1,000 DB-3) ^{††}		
Transport & liaison planes		1,800	
	<u>4,100</u>	<u>3,400</u>	7,500
<u>Far East</u>	<u>1,000</u>	<u>2,000</u>	<u>3,000</u>
	5,100	5,400	10,500

Of the above strengths, the 1,800 transport and liaison planes were not considered military types, so that actually only 5,700 combat aircraft were estimated in European Russia. Owing to the high percentage of inoperable aircraft the probable actual effective strength of the Soviet air forces was estimated at only 50 percent of the above figures. It was also estimated that the fighter forces would be increased by about 700 in the first half of 1941, and that some of the existing units would be equipped with approximately 200 to 300 new aircraft of the I-18** type. No appreciable increase in the number of effective bombers was expected, but it was assumed that roughly 50 percent of the existing units would be reequipped with new types of aircraft.

The total number of fully trained aviators was estimated at 15,000, ground service personnel at approximately 150,000, and school and training aircraft at 10,000.

*Editor's Note: The I-16 was a single-engine monoplane equipped, like its predecessor, the I-15, with an M-25 (Wright-Cyclone) engine.

†Editor's Note: The SB-2 was a high-performance, twin-engine, mid-wing cantilever monoplane (see below, pp. 142-43).

††Editor's Note: The SB-3 was similar to the SB-2, but was equipped with more powerful engines. The DB-3 was a twin-engine, low-wing, cantilever monoplane employed as a reconnaissance bomber (see below, pp. 142-43).

** The I-18 (Mig-3 or I-61) was a single-seater, low-wing, cantilever monoplane with a 1,200 horse power engine.

SOVIET AIR FORCES

Table of Organization:

Air Division--Composite

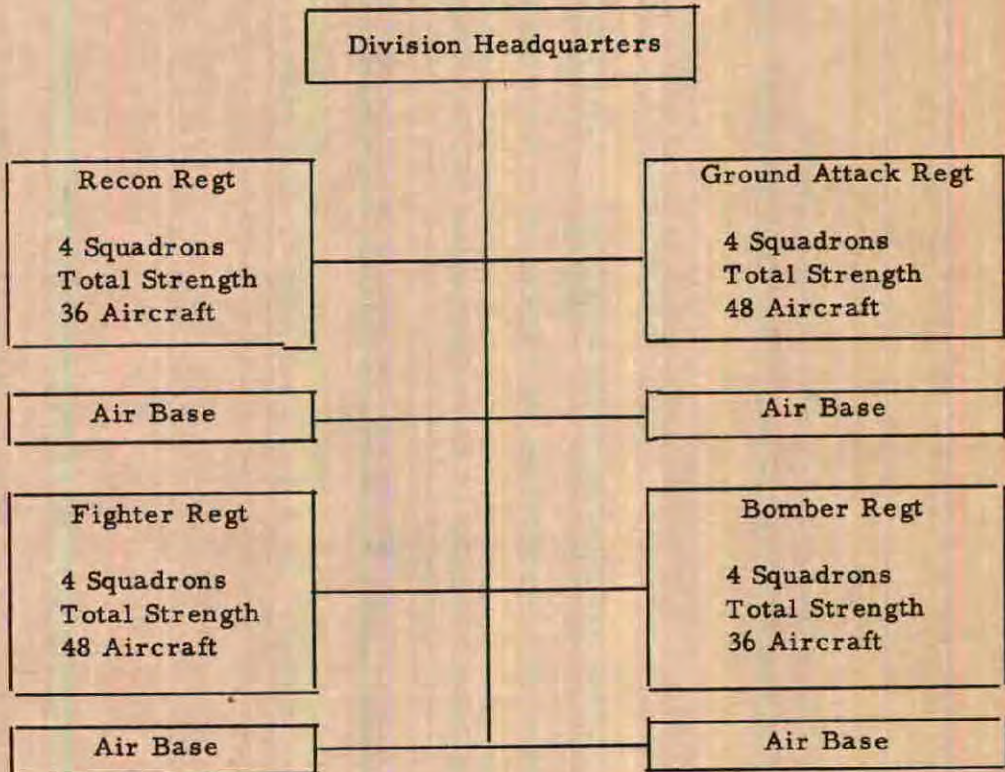


Figure 2

According to the Intelligence Digest, in February 1941 there were 570 bomber and reconnaissance aircraft and 585 fighters in Military Area Leningrad, 315 bombers and reconnaissance aircraft and 315 fighter aircraft in Special Baltic Military Area, 660 bombers and reconnaissance planes and 770 fighter aircraft in Special Military Area West, 460 bomber and reconnaissance aircraft and 625 fighters in Special Military Area Kiev, and altogether 395 bombers and reconnaissance aircraft and 445 fighters in Military Areas Odessa, Karkhov, and Transcaucasus. In addition 320 bombers and reconnaissance planes and 240 fighter aircraft were in the Moscow and Orel Military Areas as first line reserves. These figures correspond to the previously quoted total strength of 5,700 combat aircraft.*

In another study by the Luftwaffe General Staff in 1941⁹ the following main concentrations of air power are reported: 1,296 aircraft in Military Area Kiev, 1,662 in Special Military Area West, and 1,428 in Military Area Leningrad. The disposition of Soviet air forces was considered to be a strategic concentration for offensive operations.

Other sources arrive at different figures. In accordance with opinions held by the Luftwaffe High Command, the figures published by Russia in 1936, giving a total of 4,700 combat aircraft corresponded approximately to the information obtained by the German counterintelligence service. The Handbuch der neuzeitlichen Wehrwissenschaften¹⁰ quotes the strength in mid-March 1938 as 6,000 front line aircraft, 2,000 of them in Siberia and the Far East.

In contrast with the above estimates the German radio intercept service, from an analysis of intercepted messages, arrived at a figure of 13,000 to 14,000 Soviet combat aircraft,¹¹ a figure which Georg W. Feuchter¹² considers accurate.

The strategic concentration of Soviet air power in western Russia assumed by the German Command and the separate existence of the Far East forces is confirmed by other sources.

It thus emerges that the estimate formed by the Luftwaffe High Command--prior to the Russian campaign--of the main concentrations

* See above, p. 18.

† (Manual of Modern Military Sciences).

in the disposition of the Soviet air forces was approximately accurate. Concerning the strength of the air forces, however, opinions varied. It was to become evident later that the opinions of the Luftwaffe High Command were inaccurate on this point.

E. Aircraft Types; Weapons; Equipment.

In developing its air forces, the Soviet Command adhered steadfastly to its original policy of restricting itself to standardized construction, and to a small number of aircraft and engine types. For a long time the influences of German industry and American construction licenses remained predominant.

The Intelligence Digest gives the opinions of the Luftwaffe High Command on Soviet aircraft types, weapons, and equipment as follows:

Air regiments.

Previously mentioned these were always monotype--either fighter, or reconnaissance, or ground attack. In strength, the air regiment corresponded approximately to the German air group, and usually had four squadrons. The squadron was the smallest standard unit. The regiment had an authorized strength of 60 aircraft. However, in 1941 fighter and ground-attack regiments had an actual strength of only 48, and bomber and reconnaissance regiments of 36 aircraft. Correspondingly, the actual strength of a squadron was thus 12 or 9 aircraft.

The air reconnaissance forces.

These were organized in air reconnaissance regiments, independent air reconnaissance squadrons and independent long-range reconnaissance squadrons. Both regiments and independent squadrons were assigned to air divisions. They were equipped with types R-5, R-6, RZ, R-10,* and in some cases I-16 aircraft. All of these types

* The R-5 was a two-seat, single-engine biplane. The R-6 was a twin-engine, low-wing monoplane. The RZ was a single-engine biplane (also used as a ground-attack aircraft). The R-10 was the same as the Vultee V-11GB. Built under license by the Russians, this was a single-engine, two/three seat monoplane.

SOVIET AIR FORCES

Presumed Wartime Organization of Soviet Army Air Forces

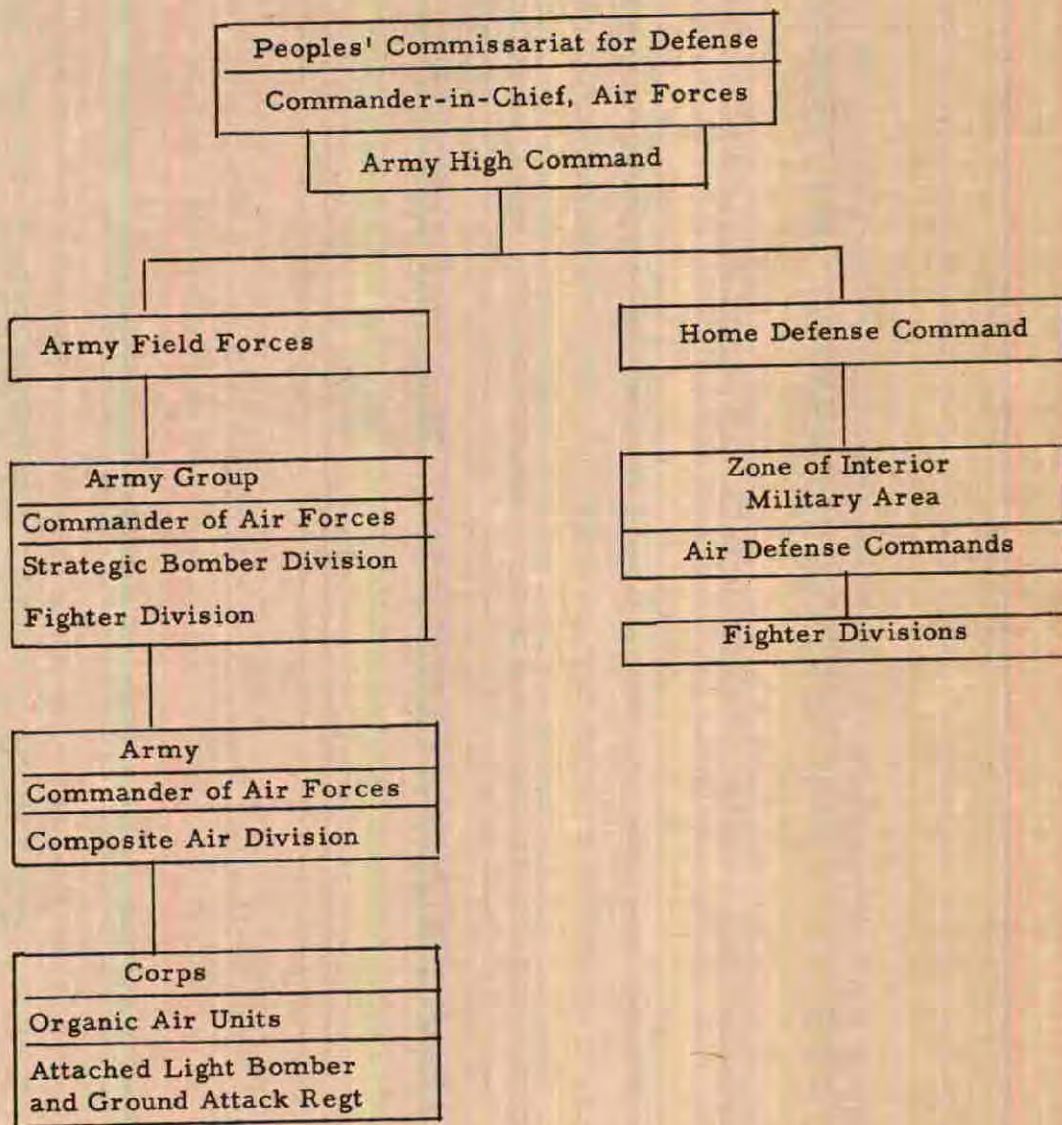


Figure 3

were outdated, with the exception of the R-10 and I-16, of which there were only a small number. In addition to the regiments and independent squadrons assigned to air divisions, there were independent air squadrons which, while they were assigned directly to army corps for close reconnaissance, artillery observation, or liaison missions, were administered, for logistical matters, by an air division.

The fighter forces.

These were organized in regiments, independent squadrons, and independent, long-range fighter squadrons, and as such were assigned to air divisions. The units were equipped generally with Type I-16 (Rata) aircraft and with types I-151 and 153 (modified versions of the I-16). The I-15* was considered obsolete. The I-16 was capable of good performance. Although slower than the German fighter aircraft, it was more maneuverable. It was a suitable weapon for attacking German bombers and was superior to them in air combat.

The older models in use, of primitive wooden construction, were inflammable and highly sensitive to gunfire. These disadvantages were less evident in later metal models. In these, the pilot was protected in front by the engine and in the rear by 8-mm armor plating. The planes had no cannon mounted in the engines, but they did have a cannon in each of the wings. The cannons fired normal explosive and solid core ammunition, the machine guns fired phosphorus steel core ammunition. The fire power of these weapons was inferior to those mounted by German planes. Most of the I-16 aircraft had four machine guns mounted in the fuselage, others had a cannon mounted in each wing and two machine guns mounted in the fuselage.

Very little was known of the modern Mig and Lagg types which were arriving at the front as part of a reequipment program, and practically nothing was known about a twin-engine fighter which presumably was still only available in test models.

Bombers.

Organized in fast bomber regiments and long-range bomber

* A single-seat, gull-winged biplane.

regiments, most of these were consolidated in appropriate air divisions. As a rule fast bomber regiments were equipped with types SB-2 and SB-3 aircraft, long-range bomber regiments with DB-3 aircraft. Some units still had the old TB model. SB-2 and SB-3 types were estimated to have a penetration range of 360 miles with a bomb load of 2,200 pounds; the estimated penetration range of DB-3 bombers was 660 to 720 miles. The SB models were copied from American Martin bombers. Their defensive power was rated low because the guns firing to the rear and upward and downward were served by one gunner who was simultaneously the radio operator. The defensive power of the DB-3 was rated higher. The older TB-3, 5, 6, and 7* were inferior to German models in every respect and were suitable as bombers only conditionally and only in night operations. No information was obtainable on a modern twin-engine bomber in serial production.

Ground-attack aircraft.

These were organized in ground-attack air regiments and were assigned to air divisions. The aircraft types in use were RZ, DI-6†, I-15, and in some units the I-4,†† all of which were considered obsolete. In addition it was assumed that between 100 and 200 SB-1** and Vultee V-11 aircraft, with modern equipment, were in service.

Transport aircraft.

These were organized in what were called heavy air regiments. Nothing definite was known concerning their control. They were used to carry paratroopers and airborne infantry and for transport missions of all types. In general the regiments were equipped with TB-3 aircraft, some with TB-5, 6, and 7, and in smaller numbers with DC-3, copied from the Douglas prototype. The TB-3 and 5 were completely obsolete.

Finally, a small number of ambulance aircraft existed which in wartime were assigned to armies, corps, and divisions. Nothing

* These were all four-engine, bomber-transport.

† A two-seat, single-engine biplane with a Wright (Cyclone) engine.

†† Probably the same as the DI-4, a two-seat, single-engine biplane.

** A twin-engine, mid-wing, cantilever monoplane.



The TB-3, a Russian bomber and transport aircraft.

The TB-7, also a bomber and transport aircraft.



was mentioned as to the type of aircraft employed for this purpose.

The Naval air forces.

Organized in brigades and independent squadrons, these included the coastal patrol squadrons, some of which were equipped with land-based aircraft. Tactically, they were assigned to the various naval commands. In other respects they were controlled by the Chief of Naval Air Forces. The units were equipped with TB-1 ¹/_a twin-engine monoplane and TB-3 aircraft mounted on floats, seaplanes of the Savoia, Sikorski, Martin, and Consolidated types, and Russian RM-5, Ant-22, and MBR-2 and 5 seaplanes. * The majority of the seaplanes in use were below modern standards in their performances. The Soviet Navy had no aircraft carriers.

Weapons.

The standard weapon for aircraft was the Shkass machine gun with a caliber of 7.62 mm, on a fixed or swivel mount, and with a firing performance of 1,300 to 1,400 rounds per minute. It had been found satisfactory under battle conditions in Spain and China¹³ and was known to be mounted in I-16, SB-2, SB-3, and DB-3 aircraft. Some planes also had double-barreled machine guns, but no details are available on aircraft cannon. The machine guns fired steel-core, armor-piercing, explosive, incendiary, smoke and tracer ammunition.

During the Russo-Finnish War a number of bombs used by the Soviet air forces were identified. † The demolition bombs were armed with fuzes that were too sensitive, so that their penetration performances were low. Duds, in contrast, penetrated deeply even in hard ground-- 110-pound bombs to a depth of approximately 20 feet and 220-pound

* The RM-5 was a three-seat, single-engine, reconnaissance flying-boat. The Ant-22 was a twin-hulled, six-engined, commercial flying-boat. The MBR-2 was a single-engine, short-range flying boat. The MBR-5 was probably another short-range, reconnaissance flying boat.

† 110-, 220-, 440-, 550-, and 1,100-pound demolition bombs; 5.5-, 25.3-, and 33-pound fragmentation bombs; 4.4-pound electron incendiaries (120-200 in each container), 5.5-pound thermite incendiaries, and 22- and 110-pound oil bombs with naptha and thermite fillings.

bombs to an approximate depth of 40 feet. The pressure effect varied widely. In bombing from an altitude of 3,000 to 6,000 feet the explosive pressure progressed horizontally, in bombing from altitudes of 16,000 to 20,000 feet the force travelled vertically. Incendiaries were armed with effective fuzes, but were easily extinguished unless coupled with an explosive charge.

Fuel Tank Protection.

This was provided only in I-16 and SB-3 aircraft. It was assumed that the pilot seat was armor protected in all models.

Other Items of Equipment.

These included bomb release devices, navigational, blind-flying, and other panel instruments, air photo, and automatic steering instruments, which were manufactured largely in Russian factories. In most cases they were manufactured under license from foreign firms and were not equal in quality to German instruments. Various types of radio transmitters and receivers were in use as well as radio aiming devices and radio beacon instruments. It was doubted, however, that bomber aircraft other than unit lead planes were equipped with radio transmitters and receivers. To what extent radio aiming devices were in use was unknown.

On the whole the Intelligence Division of the Luftwaffe High Command¹⁴ arrived at the conclusion that most of the first line aircraft in use by the Soviet air forces were obsolete models, and that the Soviet Air Command was making strenuous efforts to reequip all front line units with modern types. It was assumed, however, that the reequipment would proceed slowly in consonance with the general circumstances in the Soviet Union.

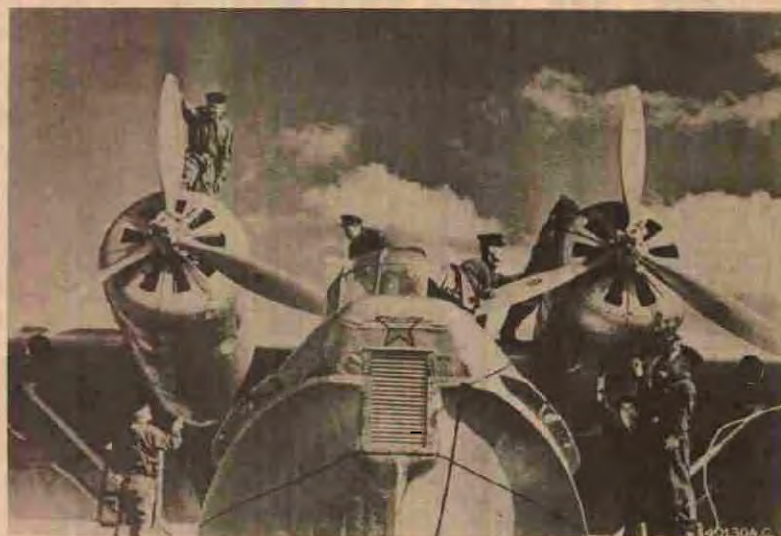
Foreign views coincided largely with the German appraisal of the Soviet aircraft types, weapons, and equipment which would probably be encountered at the beginning of the Russian campaign. Thus, the views of the Luftwaffe High Command in these fields were fairly realistic.

F. Training.

The views of the Luftwaffe High Command concerning the



The Russian MBR-2 Flying Boat



Another flying boat, the MBR-5

training status of the Soviet air forces were as follows:

Pre-military training was given in the military association OssoaviaKim. Here, over a period of three years, flying and ground service personnel received their instruction, which included paratroop training. The graduation certificate entitled the holder to enrollment in the air forces. Inadequacy of the training thus received, however, was in evidence by 1941.

Military training was given during three years of active service in the air forces; the period of service was to be extended to four years in the autumn of 1941. The entire training program for aviation and ground service personnel was controlled by the Central Administration of Red Army Air Force Units.

Flight training and advanced training for personnel who had received preliminary training in the OssoaviaKim was given in military aviation schools. Some schools trained pilots exclusively, others also trained air gunners, air observers, and air radio operators. The aircraft types used in training were the U-2, UT-1, UT-2, and in some cases the I-5.*

Ground and technical personnel, apart from those who received training in the OssoaviaKim, were trained in "schools for Junior Avio Specialists," of which there was one in each air division. Special schools existed for the training of engineers and designers.

Training in units appeared to be hampered by fuel shortages and by the inadequate operability of aircraft. Pursuant to the requirements of the Soviet training manuals, special emphasis was placed on formation flight training. Training in formation flying for fighter and bomber pilots was out of proportion to their other training. They gave evidence of good flight discipline and could be employed in daylight missions in good weather. Fighter pilots were also proficient in attacking ground targets. All units exhibited great interest in high-altitude aviation. Although blind and night flying were formal requirements, they were not mastered by the majority of Soviet pilots. Whenever

* The U-2 was a single-engine, training and ambulance bi-plane. The UT-1 was a single-seat, low-wing, training monoplane. The UT-2 was a two-seat, low-wing, training monoplane. The I-5 was a single-seat biplane, originally intended as a fighter.

possible, the assignment of night and bad weather missions was avoided. The known results of bombing tests were not impressive, and apparently only some of the bomber units were trained in cooperation with fighter forces. In like manner, the standards achieved in cooperation with ground forces, a subject considered particularly important, left much to be desired.

Although in 1941 the training status of the Soviet air forces was estimated to be considerably lower than that of the Luftwaffe, it was still assessed as good. In addition to being inadequately skilled in night and blind flying, it was believed that individual aircraft crews could be employed only conditionally in independent missions, since they had lost the faculty for independent thought and action because of excessive training in formation flying. Training for daytime operations during fair weather, however, was considered adequate.

The views of foreign observers and later German experience serve to substantiate and complete the above picture. Asher Lee, writing after the war of the prewar training status of the Soviet air forces states that¹⁵ the Soviet air command fully realized the importance of aviation training. This was why pre-military training commenced as early as in the colleges and continued in the Ossoaviakim, which established hundreds of aero clubs. After one year of theoretical instruction in night, week-end, and holiday courses, pilots received their initial practical training in type U-2 aircraft. The first solo flight took place after 25 to 30 hours of flight training. Then followed approximately 20 hours of flight at an airfield and one or two parachute jumps. By the end of 1940 the clubs had almost achieved their target of 100,000 trained pilots. Thereby they created the conditions which made possible the surprisingly rapid replacement of the heavy losses in pilots in 1941.

The training of pilots in the military aviation schools took two years. The first three months were taken up exclusively with infantry training and theoretical instruction in aviation. This phase was followed by practical training with U-2, later with UT-2 aircraft. After a total of 12-15 months of training the decision was made whether the candidate was to be enrolled as a fighter, bomber, or other pilot, or transferred to the ground services.

After two years of basic training, 50 percent of all pilot



Improved transport of wounded with a U-2



UT-2 trainers in flight

trainees were transferred to fighter pilot schools, where they were trained in courses lasting 6-9 months with UT, I-5, I-7, and in some cases I-15 aircraft. Tactical flight and formation flight were the weak points of Soviet fighter pilots, whereas their general flying proficiency and their performances in air and air-ground combat were considered good. The training principles were judged sound, considered, and effective.

Bomber pilots, and particularly observers, were very carefully trained, and candidates were selected with meticulous care. The training course for bomber pilots lasted 12 months, during which time main emphasis was placed on smooth cooperation between crew members. Training for ground attack pilots was less thorough and lasted only three months.

The training of reconnaissance pilots was badly neglected. No special schools existed for training in this area. It is hard to find an explanation for this in view of the fact that the main mission of the Soviet air forces was to support the Army and the Navy.

Special schools existed, such as the Air Warfare Academy--where air force general staff officers received training--a chemical school, an air forces medical school, and an air transportation school. In addition institutions existed in which women received technical training and in some cases were trained as transport aircraft pilots.

Although the views of the Luftwaffe Command thus deviated very little from these postwar views of Asher Lee, it must be admitted that the German Command failed to realize and understand fully the scope and effectiveness of the pre-military training in aviation given in the Soviet Union.

G. Ground Services and Supplies.

The information available to the Luftwaffe High Command concerning the ground services and supply organization of the Soviet air forces at the outset of the Russian campaign in 1941 was approximately as follows:¹⁶

The ground services were controlled by the Central Administration of Red Army Air Force Units within the Peoples' Commissariat for Defense, at lower levels by air divisions. Ground service

installations existed in each of the military areas, the number varying according to the importance of the military area. There was no recognizable pattern for the subdivision of the ground service organization in specific assembly regions for reconnaissance, fighter, bomber, or ground attack forces. A densely meshed system of ground service installations existed in the western areas of European Russia. The system was in a constant process of improvement and was particularly dense around Leningrad and Moscow. Information was available that numerous new airfields had been developed after 1939 in the Baltic areas and in Eastern Poland, and that others were under construction. The rapid construction of airfields was favored by terrain conditions in the Russian plains. The location of the majority of the airfields in Western Russia was corroborated by air photo reconnaissance results.

Airfields were classified as first, second, and third class airfields, and landing strips.

Airfields in the "First Class" category, usually located in the vicinity of large cities, were at least 1,100 yards square, frequently much larger, could accommodate at least one air regiment, and had reinforced concrete hangars, concrete runways, often rail and always road connections, surface and underground fuel tanks with a capacity of at least 1,100 tons, and bomb depots.

Second class airfields compared to first class airfields in size, and could accommodate units up to the size of a bomber regiment. The sheds were usually timber structures, and the fields had fuel tanks and bomb depots, and usually only road connections.

Third class airfields were equivalent to German tactical airfields but with longer runways. They had no permanent structures, no rail connections, and maintained a small supply of fuel in drums.

The landing strips could be compared with German advanced airfields. They had no service installations. They were available in large numbers, and new ones were constantly under construction.

To accommodate an air regiment a number of airfields could be consolidated into what was called an airfield system. In such cases, a first class airfield was usually designated as a base airfield for the regimental headquarters.

The supply services of the Soviet air forces were also controlled by the Central Administration of Red Army Air Force Units and administered in peactime by the military areas. For this purpose each military area headquarters, in accordance with its size, controlled a number of main bases with supply facilities and assigned rear service units to perform approximately the functions of an air park of the Luftwaffe. Organizationally, supply procedures were at an extremely primitive level. One of the main defects was the inadequacy of the stocks of aircraft spare parts maintained. For maintenance or major repairs aircraft had to be sent to special workshops or to aircraft factories.

From the main bases supplies were channeled through mobile supply bases, which were the supply staffs of air divisions, to the troops. As a rule, each main base headquarters was at a first class airfield. This base airfield, together with the airfield system it controlled, was assigned to the base headquarters by an air division. If a flying unit moved into the airfield system, it also established its headquarters at the main airfield and assumed tactical control over the supply base headquarters already there. Mobile air supply bases had no permanent location but were transferred together with their divisions. The Soviet Air Command placed particular value on this mobility, which was practiced and tested in numerous maneuvers.

A mobile air base comprised the following:

One airfield company of three platoons, one of them an air force machine-gun platoon; one signal company of three platoons--one of which was a radio platoon--and a weather service station (the signal company handled the communications for the airfield system and was tactically assigned to the flying unit stationed on the system); one motor transport company of three platoons (one truck and one tractor platoon, and one platoon with special vehicles such as fuel, water, and oil tank trucks, starter wagons, fire-fighting, and workshop trucks, The company had a total of approximately 70 vehicles, including trucks); one headquarters platoon; one ration depot; weapons, ammunition, POL, equipment, clothing depots and a number of workshops.

The Luftwaffe High Command arrived at the following overall appraisal of the Soviet ground service and supply organization:

Apart from the first class and some of the second class airfields, the ground service organization was considered below modern standards. Of roughly 2,000 airfields in Western Russia, only approximately 200 could be considered suitable for operations by bomber units. The others were unsuitable because of defective construction and equipment. Furthermore, according to the season of the year, a large number of airfields were only conditionally usable because of the dust, water, snow, or cold.

The operability of flying units was reduced by the inadequate development of airfields, the inadequate stocks of fuel and ammunition, and the inadequacy of available signal facilities. The Soviet ground service organization could not be compared with that of the Luftwaffe and ". . . the numerous airfields in existence in European Russia can therefore be considered as only conditionally useful for wartime air operations."¹⁷

In German views, the supply organization was unsound, particularly in respect to the supplies and the storage of fuel and aircraft spare parts. The advantages accruing from the permanent cooperation of each mobile supply base with a particular air division were more than balanced by the detrimental effect this had on the natural high mobility of air units. The loss of main bases or mobile bases would, therefore, seriously harm the entire supply system. The disadvantageous supply situation was further accentuated by the enormous areas involved, inadequate rail routes and their condition, the shortage of railway rolling stock, and the generally difficult road conditions.

Very few other German sources of information are available on the ground service organization of the Soviet air forces prior to the war.¹⁸ Those that are available present approximately the same picture as that just described. There were those, however, who warned against a too one-sided appraisal based exclusively on German views and underestimating the effects of the Russian ability to improvise and the natural Russian habit of frugality.

It was to become evident that the Soviets approached the problems of ground service and supply organization from a different and more primitive point of view than that of the western air powers, and that in Russian circumstances the methods chosen could also insure success. In this respect, and in respect to their gift for improvisation, the Russians were actually underrated by all concerned.

H. Air Signal Services.

At the outset of the campaign in 1941 the Luftwaffe High Command estimated that no separate organic air signal service existed in the Soviet air forces such as the Air Signal Corps of the Luftwaffe. According to the information then available, the signal services were directed by the Signal Inspectorate of the Red Army, to which the staff signal officers assigned to the air forces of the various military areas were responsible for signal communications within their respective command areas. These signal officers in turn controlled divisional, regimental, and mobile air base signal officers. From reports received it appeared that military area air commands and air division headquarters had signal battalions. The signal units assigned to a mobile air base were responsible for the establishment and operation of wire and radio communications on all airfields of their assigned airfield system, and were required to maintain a reserve of signal personnel and to maintain the weather reporting services. When a flying unit arrived, the commander of the air regiment assumed tactical command over the signal company stationed in the airfield system.

Flying units had no signal units assigned to them. Instead, radio operators and other radio personnel on aircraft were an organic part of the flying unit.

In wartime the military staff signal officers were transferred with their personnel to the headquarters of the air commands attached to army groups and armies.

The following signal equipment was in use: wireless telegraphy and radio as the main media of communication; wire communications; emergency means of communication, such as code and marking panels, message drop and reception facilities; visual signals, such as signal lamps, light signals, signal flares, and rockets.

About radio, the main means of communication, it was known that separate networks existed for ground-air-ground, ground-ground, air traffic control, and weather service. A radio directional service as part of the air traffic control system was still under development and could by no means be compared with the use made of radio direction techniques in the Luftwaffe. Only a few radio beacons existed and most of these were exclusively for civil aviation.

Radio traffic was governed by the "Regulations for the Radio Services of the Red Army," which stipulated among other requirements that all radio messages must be sent in code, including messages by voice radio. Experience in the Russo-Finnish War had shown, however, that in spite of the undoubted progress achieved in the training of radio personnel, messages were frequently sent in the clear during critical situations or under the pressure of time.

German authorities were unable to estimate the number of instruments available or in use.*

No important information was procurable concerning other communication media, which were insignificant in comparison with radio communications.

The Luftwaffe High Command, summarizing its evaluation of the signal communication services of the Soviet air forces found that they were poorly organized and that the Russian air signal network was unsuited to the flexible conduct of air warfare. It would appear that, on the whole, the Luftwaffe High Command estimate of the signal services of the Soviet air forces was sound.

Section III: Antiaircraft Artillery¹⁹

In the Soviet Union the antiaircraft artillery arm was an organic part of the Army. For this reason it will not be treated in detail in this study. Since, however, its activities were directed primarily against the Luftwaffe and since German aircraft personnel, thinking in terms of their own concepts, always regarded the Soviet antiaircraft artillery arm as a part of the Soviet air forces, a few remarks on the subject are necessary.

Soviet antiaircraft artillery units were assigned to all large Army units, down to division level, and to home defense commands. Home defense was organized in defense regions or locally defined

* The following radio instruments, however, were known to be in use: 800-Watt Stations, truck-mounted; 200-Watt stations, truck-mounted; 20-Watt stations, truck-mounted or on horse-drawn vehicles; 100-Watt aircraft radio instruments; 40-Watt aircraft radio instruments; 20-Watt aircraft radio instruments (two types); radio aiming devices; 500-Watt radio beacons, stationary or truck-mounted.

defense sectors. Within each of these regions or sectors all fighter, antiaircraft artillery, and aircraft reporting and air-raid warning units were assigned to one single air defense command. This insured uniform control. The equipment of the antiaircraft artillery units was considered obsolete.

The estimate²⁰ of the Soviet antiaircraft artillery arm by the Luftwaffe High Command in 1941 indicated that the arm was defectively equipped. The equipment was not uniform and only a small percentage was modern. The effectiveness of the arm was thought to be reduced particularly by the diversity of the weapons and other equipment in use and the resultant supply and training difficulties, and by the seriously inadequate number of automatic fire data computers. Serious resistance by antiaircraft artillery was expected only in the Moscow, Leningrad, Kiev, Odessa, Batum, and Baku areas.

On the whole it was considered that in view of the enormous size of the Soviet territories and the size of the Soviet Army, the antiaircraft artillery units in existence could not provide adequate protection.

No other sources are available to confirm the accuracy of the above Luftwaffe High Command estimate. It can be assumed, however, that the estimate was not far off the mark, although it was to be found later that the fire of Soviet antiaircraft units could be highly effective, and above all that Soviet training had reached astonishingly high standards in teaching the Soviet soldier to protect himself against air attack through active defense and camouflage.

Section IV. Paratroopers and Other Airborne Troops²¹

If the Soviet Union produced nothing else really new in the entire field of aviation, following foreign leads in many respects, it did pioneer the organization of paratrooper and airborne infantry units and for a long time was far ahead of other military powers in this field.

The origins of the Soviet paratrooper and airborne infantry arm, the units of which were assigned to the air forces, date back to 1930. In that year a Soviet military journal stated: "The parachute is no longer merely a lifebelt; in the future it will serve as a

means of attack." The first paratrooper regiments and airborne infantry brigades made their appearance in 1933; in 1935 the interest of military circles throughout the world was aroused by the Russian developments. In that year a force of approximately 1,200 landed by parachute with all weapons and equipment during the maneuvers around Kiev. Later in the year a complete division, together with tanks, was transported by air without serious mishap from Moscow to Vladivostok, a distance of 4,200 miles.²² Minister of War Kliment Voroshilov was therefore fully justified in stating at a congress in 1935:²³ "Parachuting is the field of aviation in which the Soviet Union has a monopoly. No nation on earth can even approximately compare with the Soviet Union in this field, far less could any nation dream of closing the existing gap by which we are leading. There can be no question at all of our being surpassed."

In the Caucasus maneuvers of 1936, the paratrooper arm still participated publicly, but from then on all exercises and maneuvers of the arm were carried out in strict secrecy. Without being able to give any definite reasons, foreign observers at the time arrived at the conclusion that in some way or other the results obtained with the new arm had been a disappointment. However, the maneuvers had served to demonstrate clearly that, as was the case with the Soviet air forces in general, paratrooper and airborne infantry units would be employed exclusively in very close cooperation with Army forces.

In 1938 it became known that the Soviet paratrooper forces were organized in four brigades, "Dessant brigades" as they were called, each approximately 1,200 strong.

The Luftwaffe High Command considered that the use of Soviet paratrooper forces in regimental size units during the occupation of Bessarabia* in 1940 provided no standards by which the value of these troops could be judged, since the operation encountered no resistance. The same applied to paratrooper operations in the Russo-Finnish War. In the large areas of Finland with their extensive forests the operations failed and the landed paratroopers either died of hunger and exposure

* Editor's Note: On 26 June 1940 Russia presented an ultimatum to Rumania demanding the return of Bessarabia and the cession of northern Bukovina. Two days later the Russians, using 1,000 paratroops, occupied the disputed territory, about 22,000 square miles extending west, northwest from Odessa, between the Ukraine and Rumania.

to the severe cold or were captured at their landing sites. (The Luftwaffe High Command rejected the widespread version current at the time that the failure of the Russian parachute operations in Finland was an intentional bluff by the Red Army.) Because of the reasons given above and the inadequate number of transport planes available in the Soviet air forces, the Luftwaffe arrived at the following views concerning the Soviet paratrooper and airborne infantry forces at the outset of the Russian campaign:²⁴

Following the successful German airborne operations in Belgium and Holland, it was to be assumed that the Soviets had devoted special attention to their paratrooper forces, which were reputed to have considerable numerical strength. Sizable paratrooper forces appeared to be assembled in the Kiev area, where a considerable number of transport aircraft had been identified. No details were available on strengths and organization.

One airborne infantry division of three regiments was known to have been concentrated in Military Area Moscow. The execution of large-scale airborne operations would be hampered by the necessity to use large numbers of transport planes for the movement of supplies. Isolated airborne operations, however, were to be expected.

From later statements by German observers the picture given above can be completed by noting that all sources acknowledge the unique development of the Soviet paratrooper and airborne infantry forces, and confirm the special value attached to their development by the Soviet Command as well as the unrestricted propaganda launched in their support.

According to Russian directives issued in 1936 the primary mission of these forces was to deal annihilating blows to the enemy rear. All operations were to be based on cooperation with Army forces in attack and pursuit. Thus, a passage in the regulations reads: "The most important mission of the paratrooper and airborne infantry arm is to support the Army in operations to envelop and destroy enemy forces."

On the whole, it appears that the German estimate of the Soviet paratrooper and airborne infantry arm, and particularly of the probability of their use, was fairly accurate.

Section V: The Air Armament Industry²⁵

It was common knowledge (and has been mentioned previously in this study) that Russia expended special efforts to promote its air armament industries and did everything possible to render its air forces independent of foreign sources.

In the spring of 1941 the Luftwaffe High Command estimated²⁶ that Russia had approximately 50 fuselage and 15 aircraft engine factories, 40 factories manufacturing equipment and appliances, and 100 auxiliary factories. The same source indicated that the annual output fell far short of the targets set for 1938 and 1939--8,000 and 12,000 aircraft respectively--and in 1939-40 averaged only 450 fuselages and 1,200 engines monthly, or between 5,500 and 6,000 fuselages and approximately 15,000 engines annually. It was thought that the industry could by no means dispense with the necessity to copy foreign models, particularly in the manufacture of engines. The output in engine parts, appliances and equipment, carburetors, spark plugs, and oil and fuel pumps was unsatisfactory. Flight safety was seriously reduced because of the poor quality of engines and engine parts. The existing weakness in the air armament industry had become more pronounced as a result of the introduction of light metal alloys which had proved unsatisfactory, and because of the purges of 1937, and it was evident that these weaknesses had not been overcome. Electrometals still had to be imported from Germany.

The number of personnel employed in aircraft and aircraft engine factories alone was estimated at 250,000, while the inclusion of personnel in all auxiliary factories increased the figure to over one million. It remained to be seen, however, how long it would take to develop an adequate cadre of skilled workers, engineers, and designers.

For these reasons it was considered unlikely that the output would rise appreciably in the near future or that any considerable technical progress was to be expected in the production of aircraft and aircraft engines. Although the aircraft industries had commenced manufacturing modern types of fighter and ground-attack aircraft, it was not possible to predict when air units could be re-equipped with more modern aircraft.

The air armament industries were concentrated locally around

the centers of the metal manufacturing industries and thus in the Moscow, Leningrad, Central Russian, Ukrainian, and Ural regions, with the appliances, instrument, and equipment industries chiefly in the Leningrad and Moscow areas.

The Luftwaffe High Command estimated that, owing to slow rates of production, the introduction of new aircraft types would proceed more slowly than in other, more up-to-date industrial countries, so that the Soviet Union would only be able, under peacetime conditions, to maintain a nucleus of modern units; in the event of war, however, the industry would be unable to prevent a rapid decrease of front-line strengths. In this respect, engine production would prove to be a particularly serious bottleneck owing to the difficulties already being experienced by the Russians in trying to manufacture enough engines to meet their requirements.

In contrast with other subjects connected with Soviet air power, numerous German and other sources of information are available on the Soviet air armament industries. The following passages are quoted from the Handbuch der neuzeitlichen Wehrwissenschaften 1938:²⁷

The air armament industry of the Soviet Union is shrouded in mystery. It is difficult to obtain a clear picture of the actual circumstances. The factories are closed to unauthorized investigators; only a small number of exhibits are shown; and the opinions of visitors are favorably or unfavorably biased according to their political views.

Particularly favorable conditions exist for air armament because of the availability of all required raw materials--including plentiful sources of oil--and because of the size of the Soviet territories, which make it possible to establish factories at great distances from the national borders.

The air armament industry is organized for mass production and is constantly being expanded. In view of the overall industrial requirements, however, it is doubtful whether the essential materials and labor can be furnished for the air armament industries.

It is estimated in 1938 that 50 fuselage and engine factories

and factories producing equipment and appliances are in existence, with an annual output of 6 to 7,000 aircraft fuselages and 70,000 aircraft engines.* It is estimated that the industry employs approximately 350,000 workers.

In spite of the indisputable progress thus revealed, it seems doubtful that the Soviet aircraft industry will be able to equip the large air forces which the Soviet Command is endeavoring to establish. A serious technological crisis has developed because of the outdated aircraft presently in use, and this applies particularly to heavy bombers.

Soviet air power can no longer be rated as high as it was two years ago.

Another German observer²⁸ comes to similar conclusions and draws particular attention to the strenuous efforts of the Soviet Government to develop an enormous air armament industry. He states that this industry was established either in large areas where the necessary raw materials were immediately available or in regions with good traffic channels to the raw material areas. Thus, as he points out, a western air armament industry region has been developed in proximity to the coal region of Rostov and the iron ore deposits of Krivoy Rog; a central region in proximity to the coal basin of Moscow, the iron ore deposits of Magnitogorsk (Magnetogorsk), and the non-ferrous metal deposits around Troitsk; and a third--Asiatic--region in the Far East, in the center of the coal and iron ore areas around Irkutsk and Chabarowsk (Khabarovsk).

Following a tour of the Soviet Union in 1936, French aircraft manufacturer, Louis Charles Breguet,²⁹ arrived at the following appraisal:

The blast furnaces, foundries, and electric power works are remarkably well equipped, and the engineers are unquestionably capable. Summarized, the impression is that with ten times as many personnel employed as the French, the Soviet industry is producing twenty times as many aircraft.

* Editor's Note: This figure seems inordinately high.

The efforts of the Soviets in the field of serial production are beyond conception. The factories work with production belts as is the case with our automobile factories. Personnel are employed in three shifts.

French aviation industrialist Henry Potez comments similarly, while French authorities on the subject estimated that the Soviet air armament industry employed 370,000 personnel in 1937 and produced 7,000 aircraft and 40,000 engines in 1936.³⁰

In April 1941 Lieutenant Colonel (now Generalleutnant a. D.) Heinrich Aschenbrenner,³¹ the then German air attache in Moscow, arranged for a number of Luftwaffe engineers to tour Soviet aircraft factories. The reports turned in by these engineers provided the Luftwaffe High Command with a particularly clear insight into the Soviet air armament industry. Besides the air attache, ten Luftwaffe engineers participated in the tour, which lasted from 7 through 16 April and included visits to the Experimental Institute for Aeronautics in Moscow, a fighter aircraft factory and an engine factory in Moscow, two engine factories at Rybinsk (Shcherbakov), the Fili Aircraft Factory and an engine factory in Molotov, in the Urals. Each of the factories visited was a giant enterprise, employing up to 30,000 workers per shift and operating three shifts per day.

The consolidated report on the visit stressed among other things: (1) that the factories were almost completely independent of subsidiary part deliveries, (2) the excellently arranged methods of work--extending down to details, (3) the well maintained modern machinery, and (4) the technical and manual aptitude, devotion, and frugality of the Soviet workers. Other remarkable features were that up to 50 percent of the workers were women, who were employed at work performed in other countries exclusively by highly qualified personnel, and that the finished products were of excellent quality.

Even though it must be assumed that the German commission was shown the best factories in existence, the compelling conclusion was that the other factories of the air armament industry must also have been at usable standards.

At the end of the tour of inspection, Chief Engineer Artem Mikoyan, designed of the Mig fighter and a brother of Anastos Mikoyan,

the Peoples' Commissar for Industry, * said to Aschenbrenner:³²
"We have now shown you all we have and all we can do; and we shall destroy anyone who attacks us." This was an unmistakable warning and was conveyed verbatim by the air attache to the appropriate German authorities.

It is not yet, or perhaps no longer, possible to ascertain whether the final report by the commission was shown in the original to Hitler and Goering. According to Aschenbrenner, Hitler's reaction when he heard of the results of the industrial tour was to exclaim: "Now one can see how far these people already are. We must start at once!" It is interesting in this connection to note that during the Nuremberg Trials Field Marshal Milch, after admitting knowledge of the reports by the German engineers on the Soviet aircraft production capabilities,³³ stated that Goering refused to believe the reports. Milch gave no reply when questioned as to what Goering had done to have the report on the industrial tour submitted to Hitler.

It is thus clearly established that the leading authorities of the Luftwaffe were informed of the results of the tour. Unfortunately, it is just as clear that the Luftwaffe High Command failed to draw any significant conclusions from the information and did nothing to change its official estimate of the capacities of the Soviet air armament industry. Instead, they assumed that the Soviets had bluffed the German engineers.

A comparison of the Luftwaffe High Command's 1941 estimate of the capabilities of the Soviet air armament industry with other German and foreign views reveals clearly that the Luftwaffe underestimated the Soviet air armament industry. This is all the more surprising in view of the fact that the highly illuminating report of the German engineer commission of April 1941 was known to Luftwaffe command circles. That this report found so little credence and produced no effects is hard to understand. Some observers³⁴ incline to the view that the German Command did not want to draw conclusions from the report, because such conclusions would not have fitted into the general picture of the military potentials of the Soviet Union developed by the highest levels of command, i. e. Hitler and the

* Editor's Note: Now (1960) First Deputy Minister of the Council of Ministers and ostensibly number two man in the Soviet hierarchy.

Armed Forces High Command. It is difficult to establish to what degree these views are justified, but they cannot be entirely discounted.

Section VI. The Armament Industry in General³⁵

It would exceed the scope of this study to go into details on the military economic condition of the Soviet Union prior to World War II. Since, however, the general state of the armament industry had an important impact on the development of Soviet air power, the 1941 views of the German Command on this subject are worthy of some study.³⁶ Its information indicated, for instance, that the rich mineral deposits within Soviet territories would secure adequate supplies of almost all mineral raw materials required for many years to come. In the armament and other heavy industries the pace was being forced at the expense of the production of consumer goods. In spite of this, however, the Soviet economy could not fully meet the requirements of the armament and other heavy industries. Other detrimental factors were the relatively high percentage of manufactured goods which failed to meet minimum standards, a serious shortage of skilled labor and management personnel, organizational deficiencies, and irregularities in the supply of raw materials; all of which resulted in frequent stoppages in production.

The fuel supply situation was unsatisfactory in spite of the existence of large petroleum deposits, of which 43 percent were in the Caucasus, approximately 30 percent in the Ural-Volga River regions and the Emba basin, and 27 percent in Central Asia and on Sakhalin Island. The principal reasons for fuel shortages were the increasing mechanization throughout the country, the heavy consumption of oil for heating and lighting purposes, heavy losses in transit and the wear and tear on drilling equipment and cracking and refinery installations. The latter even resulted in reduced outputs. The total output in oil was estimated at 34,000,000 tons in 1940 compared with a target production of 42,000,000 tons. This output included only 2,000,000 to 2,300,000 tons of aviation gasoline. Therefore, the output forecast for 1942--54,000,000 tons, of which 14 to 15 million were to be aviation gasoline--would be impossible to achieve. It was assumed that there would be a shortage of petroleum products, and particularly of aviation gasoline, for some time to come. Even

the peacetime requirements of the air forces and the Army could be met only through restrictions on the consumption by industry and the civilian population.

The Armed Forces High Command believed that the main centers of armament and general military industry were still in European Russia west of the Urals, particularly in the Ukraine and the Donets Basin. The great industrial and economic importance of the Ural region (Ufa and Sverdlovsk), and the large-area projects of the Ural-Kuznetsk Combine were known to the Armed Forces High Command, but it was at the same time considered as certain that the Soviet Government would not be able to achieve its goal of transferring 40-50 percent of all industries to the Combine. Although a few highly informative reports existed concerning the development of large industries in Asiatic Russia, no conclusive information concerning what was really happening was available.

The Luftwaffe High Command considered that the wide distribution of industries and their location in well protected areas made it seem unlikely that the Soviet economy could be so badly disrupted as to cause any decisive interruption of the overall national supply systems.

According to another German source,³⁷ the German Command's estimate of the economic structure of the Soviet Union was based primarily on statistics published by the Soviet Government in 1938 and on unrelated items of information from German engineers and technicians, and was summarized in a voluminous study by the Armed Forces High Command Economics and Armaments Office. In the light of presently available information there can be no doubt that the study arrived at false conclusions both in respect to the capabilities of the Soviet armament industries and the transfer of industries to Asiatic Russia. This faulty estimate was one of the major factors influencing the German Government in its decision to wage war on the Soviet Union, since it was assumed that seizure of the most important economic and industrial centers in European Russia--the Donets Basin, the Ukraine, and the armament producing areas around Moscow and Leningrad, could bring about the end of the campaign.

What has been said previously in this study concerning the German estimate of the Soviet air armament industries thus applies in even greater measure to the German estimate of the entire Soviet

armament industry.

Section VII: Transportation³⁸

Soviet authorities admitted that their transportation system was the weakest link in their program for the development of the Soviet Union. The Luftwaffe High Command estimated³⁹ that railroads formed the major means of transportation, accounting for 90 percent of all freight and passenger traffic. All efforts to develop the widely meshed rail net, particularly in the Asiatic territories, so that it could meet the growing requirements of the country, had failed. Development of the Russian rail system had never kept pace with the goals set in the various Five-Year Plans. It was expected that during a war the junctions at which the overburdened north-south industrial rail routes in European Russia intersected the east-west routes, which were so highly important for the movement of troops and supplies, would develop into particularly critical bottlenecks. Stoppages or interference in any form at these points would necessarily have a most harmful effect on the westward movement of troops and supplies and on the militarily important north-south industrial traffic.

Inland waterways were estimated to carry only 8 percent of all freight traffic against 20 to 25 percent in former times. Current efforts to relieve the burden on the rail system by increased use of waterways were not expected to take effect for a few years since the development of important projected canals would take much time.

The road net was considered inadequate, with roads too far apart and in poor condition. Road traffic could therefore not contribute much to relieve the rail system. A few motor highways existed or were under construction. The motorization program was seriously hampered by the inadequate road net and by the poor condition of existing roads.

For the above reasons the German Command came to the conclusion that the rail system was the only transportation medium which could be considered of military importance.

At this point it is necessary to discuss civil aviation in Soviet Russia.⁴⁰ It was generally known that every possible measure was being taken to develop civil air transportation and that a network of air routes covered practically all areas of the Soviet Union. Apart

from European Russia, with its traffic hub at Moscow, air routes were established primarily to those areas in which other means of traffic were underdeveloped, such as Siberia, the Far East, Central Asia, and Kazakhstan.

The following categories of air routes existed: main routes, called Magistral, which were of national importance and included the Moscow-Vladivostok, Moscow-Tiflis, and Moscow-Tashkent routes; routes of local importance, such as the Moscow-Astrakhan, and the Irkutsk-Yakutsk routes; periodic routes, which were only served periodically when the need existed; and the so-called Polar Sea routes. Numerous routes were operated exclusively for the transportation of freight. The aircraft types most often used were PS-35, PS-37, PS-40, PS-84, PS-89, Zig-1, and Stal-11.*

The Luftwaffe High Command realized the high significance of civil air traffic in the Soviet Union because of the poor road conditions, the inaccessibility of entire regions by any means other than air travel, and the enormous size of the Soviet territories. It was estimated, nevertheless, that the following deficiencies existed: the airways were equipped with outdated types of aircraft; the construction of airfields and their tanking facilities were, in general, primitive; the air traffic safety service was inadequately developed; and only 12 to 15 percent of all routes were equipped for night air traffic. The Luftwaffe High Command, therefore, considered that the outdated and inadequate development of the air routes and of the aircraft used seriously hampered the regular operations of civil aviation.

The Luftwaffe High Command also was aware of the plans to convert all civil aviation to military purposes in case of war. It decided, however, that this would have only insignificant results because of the defective condition of the civil air traffic system.

In contrast, other German observers⁴¹ pointed out as far back as 1938 that the general public in the Soviet Union was practically

* Editor's Note: Both the PS-40 and the PS-84 were Douglas aircraft built in Russia, the latter being the DC-3. All of the others (PS-89, PS-35, PS-37, Stal-11 and Zig-1) were twin-engine transport-passenger aircraft of various types.

excluded from air transportation, the main reason being that the entire system was to be reserved for military purposes. All airways, it was pointed out, were serviced by a firmly controlled military ground service organization which made it possible, whenever desired, to convert all civil air transportation lines to serve military purposes. These observers also considered that the existence of a comprehensive network of airways would considerably facilitate large-scale transfer movements of military air forces. This applied particularly to the east-west Moscow-Vladivostok Magistral. The additional importance of the possibility of using the civil air traffic facilities for the movement of military supplies and vital industrial commodities and raw materials was not to be underestimated, particularly in wartime.

In contrast, the Luftwaffe High Command had failed to appreciate adequately the military significance of the civil air services in the Soviet Union.

Section VIII: Soviet Air Forces in the Spanish Civil War⁴²

An extraordinary opportunity to estimate the quality of the Soviet air forces before World War II was afforded by the performances of Soviet air units in the Spanish Civil War of 1936-37. This was the first demonstration before the eyes of the world of the capabilities of Soviet air units. The views of a number of Germans who participated in the campaign are available on this subject and can be summarized more or less as follows:

Air support for the Reds in Spain was furnished almost exclusively by Soviet units under the command of Soviet officers. Aircraft, other materiel, and personnel replacements came primarily from Soviet Russia. In short, the Spanish Civil War was exploited by the Soviet Union as an opportunity to test its aircraft, weapons, other equipment, personnel, doctrines, and tactics under actual wartime conditions. It can be regarded as a unique dress rehearsal for a later war.

On frequent occasions the Soviet Command in the Spanish Civil War gave evidence that it was not capable of mastering the numerous difficulties in the fields of personnel, materiel, technology, and organization. There was evidence of awkwardness in operational

thinking, and of inadequacies in general staff training. On the other hand, there was also unquestionable evidence of ability to master organizational and supply problems by improvisations, and of aptitude in camouflage, ground services, and cooperation in air-ground operations. Also, it was found that the methods of handling command matters were uncomplicated.

Operational methods were generally primitive and revealed the following defects: (1) inadequate flexibility in attack and defense; (2) lack of originality; (3) failure to concentrate power; and (4) a tendency to dissipate forces. For these reasons the losses incurred in the Spanish War were disproportionate to the results achieved or to the existing personnel and materiel situation.

Although Soviet flying personnel were remarkable courageous and aggressive and fought well over friendly terrain, they were timid and uncertain of themselves over hostile terrain, and rarely pursued enemy aircraft beyond their own lines. Technically, Soviet pilots were good individual performers. In contrast, their training and performance in unit formation were inadequate. There can be no doubt that the personnel sent to Spain were an elite body, who after their return to the Soviet Union were to serve as instructors and to teach what they had learned from the Spanish campaign.

In the initial stages of the Spanish Civil War Soviet fighters appeared only individually. Later, they operated in flights of four, and only rarely in large formations of twenty to thirty aircraft. Although good in single combat, the Soviet fighter pilots remained inferior to their German opponents owing to their inadequate tactics for formation operations and the inadequacy of their fighter commands. This situation remained unchanged even after the appearance of their I-16 (Rata) aircraft, which were excellent for those times. These aircraft were a great surprise; they were far superior to the German He-51 type in speed, maneuverability, weapons, and climbing ability, but hardly equal to the German Me-109 model introduced later in the campaign. In the initial stages the Soviets also employed I-15 (Curtiss) planes, as fighters. After the appearance of the German Me-109, however, the use of the I-15 was restricted to ground-attack missions.

Soviet bombers played only a minor role in the Spanish campaign. The few bombing missions carried out were usually

by units of one to two flight size--never above squadron size--and produced no practical results. This was probably due to the inadequate preparation of the personnel for operations of this type and to the lack of training in such basic subjects as blind and normal navigation, and night operations. The SB-3, a twin-engine Martin bomber, was used in these missions. In speed, weapons, and other equipment it was inadequate to the requirements. These aircraft were also used more and more as ground attack aircraft as the campaign progressed.

The longer the campaign lasted, the more the Soviets used their aircraft as ground-attack units. Gradually, close support became the main mission of Soviet air power in Spain, although at that time the Russians had no specially developed model for ground attack. This mission had to be assumed by fighter and bomber units, which thus, in an ever increasing measure, had to be withdrawn from the missions for which they were best suited.

The number of reconnaissance planes used was so small that their operations were insignificant.

In the operation of their ground and supply services, the Soviets displayed remarkable gifts for improvisation, camouflage, and flexibility. Ruthless and unproblematical as they were by nature, they mastered many difficulties.

A relatively large number of Soviet anti-aircraft units were engaged in Spain and showed signs of remarkable improvement in their firing methods and tactics during the campaign. The light and medium anti-aircraft units were considered particularly effective.

No signs were noticed of the existence of a separate air signal service. From the operations of the Soviet air forces it was noticeable, however, that whatever signal system was employed must have been very faulty.

An extremely critical German observer⁴³ in Spain and later in the Russian campaign has the following to say of the Soviet air forces in the Spanish Civil War and of the lessons they apparently learned there:

The Soviet air forces, which were the only air forces employed on the Red side in Spain, revealed fundamental

weaknesses in their command, organization, training, and technical performances. These weaknesses they were unable to remedy in spite of their pronounced aggressiveness and flying ability, their aptitude at improvising, and the ruthlessness of their command methods.

The Soviets learned a lot in the Spanish campaign. That they had applied the lessons learned there to further develop their air forces became evident later in the Russian campaign. The lessons applied produced both positive and negative results. Those with a positive influence were the general experience gained by the command and troops--particularly in operations, formation flight, training, etc; the deductions drawn in the technological and organizational fields; and the importance of the ground attack arm, which they developed to remarkably high standards. False conclusions led them to forego the development of an effective bomber arm and thereby forfeit an opportunity for strategic air warfare. Another false conclusion was their application of experience gained in a limited campaign to the conditions of a general, major war.

It is certain that the Luftwaffe Command was able to develop, from the numerous reports received and from direct combat with Soviet air units in Spain, a fairly accurate picture of the status of the Soviet air forces at that time. The present writer has no information as to whether and in what measure this experience might have contributed toward a proper estimate of the later development of the Soviet air forces or whether this experience was properly used at all. No reference to the subject is to be found in any of the documents of the German Command presently available which deal with the last few years preceding World War II.

Section IX: Consolidated Luftwaffe High Command Estimate of the Soviet Air Forces at the Outset of the Russian Campaign

In closing this chapter, the overall Luftwaffe High Command estimate of the Soviet air forces at the outset of hostilities between Germany and the Soviet Union in 1941 can be summarized as follows:

In spite of the German numerical inferiority of 1:3 or 1:4, the striking power of the Soviet air forces and their chances of success

were considered on the whole to be considerably smaller than those of the Luftwaffe.

Lack of combat experience and a defective command system, it was thought, would adversely affect Soviet air operations. In particular, it was thought that the clumsy command system would prevent the productive coordination of ground and air operations--above all during mobile warfare--and the concentration of air power to suit current situations and changes in the area of main effort.

Because of existing defects in the ground service and supply organization, and the low degree of technical aptitude of the average Russian, the Soviet air forces were considered inadequately prepared for combat action: the effective strength of front line units was only approximately 50 percent of their authorized strength. Out of a total of 5,700 first-line aircraft only approximately 1,300 bomber and 1,500 fighter aircraft were fully operable. It was also taken for granted that the effective strength of units would be rapidly reduced in combat against a highly developed military opponent with modern equipment.

The main concentration in the Soviet strategic assembly of air power, excluding the strategic bomber units, was in European Russia where numerous airfields had been constructed since 1939. Efforts to increase the number of airfields in these territories continued. The main concentrations were in Latvia, Lithuania, and Eastern Poland. While hoping to be able to destroy the Soviet air units on the ground by means of an annihilating surprise attack, the Luftwaffe High Command nevertheless assumed the possibility that the Soviets would employ its remaining units in efforts to repel German air attacks and halt the German advance on the ground, the latter to be achieved by means of ground-attack air operations.

In like manner, it was assumed that Soviet air units would bomb German airfields and Army targets within the operational zones. Whereas it was known that only weak defenses existed at Soviet airfields, it appeared that the Soviet home air defenses were remarkably strong in fighter and anti-aircraft artillery units for the defense of major cities and industrial centers, particularly Moscow and Leningrad.

In respect to types of aircraft, weapons, and other equipment, the Soviet air forces were considered inferior to the Luftwaffe. The

aircraft with which units were equipped were considered more or less obsolete, with the exception of a few modern fighter types, of which only small numbers were in front-line units. Another assumed weakness was that units of the Soviet air forces were in the process of re-equipping with different types of aircraft. This, it was thought, would be a lengthy process.

The ground services and supply organization were considered awkward in operation and far below modern requirements. The same applied to the air signal system.

For the above reasons, the Luftwaffe High Command arrived at the conclusion⁴⁴ that because of their poorly organized supply system and because of their dependence on seasonal conditions in the use of their airfields, the Soviet air forces were highly vulnerable and their operability could be seriously depleted, if not entirely paralyzed, by means of repeated, sudden, massed attacks against their airfields and supply installations.

The parachute and other airborne forces were considered a well trained and well equipped force. However, it was thought that they were hardly likely to carry out any large-scale operations because of the awkward command system and the lack of transportation.

The main concentration of armament industries was assumed to be still in European Russia. The Luftwaffe High Command underestimated the extent to which factories had already been transferred and were in process of transferring to the Ural region and farther east. Great importance was attached to the existing personnel and materiel difficulties hampering the Soviet air armament industry and to the results these difficulties were thought likely to produce during war. The same views were held to an even greater extent concerning the entire Soviet armament industry.

The transportation system was considered the weakest factor in the Soviet military potential and was known to have a low capacity. The most important means of transportation, the rail system, could by no means meet requirements and furthermore was highly vulnerable at certain critical points. Any serious interruption of rail traffic would have a considerable impact on the execution of military operations. It was thought that the use of civil aviation facilities to solve wartime problems of transportation and supply movement would produce only

insignificant results.

Other German and foreign sources confirm the appropriateness of the above overall Luftwaffe High Command estimate of the Soviet air warfare strength and potential in all essential points, with the exception of the air armament industry, the armament industry in general, the transportation system, and in some respects the numerical strength of the Soviet air forces and their ground service and supply systems, all of which the Luftwaffe High Command had underestimated.

Chapter 2

THE SOVIET AIR FORCES FROM THE OPENING OF
THE RUSSIAN CAMPAIGN TO THE END OF 1941Section I: General Review¹A. The Course of the Air War and Russian Air Operations.

When the German attack struck the Soviet Union in the early dawn on 22 June 1941, the German Command was hoping to bring its campaign to an early end through the employment of blitzkrieg tactics.

Although the Luftwaffe High Command possessed a fairly accurate appraisal, Russian air power was, in general, an unknown factor for field commanders in the German Air Force, Army, and Navy, who had only very vague and indefinite concepts concerning its capabilities. Nevertheless, Luftwaffe commanders, confident because of their past victories and wide combat experience, entered battle against the Russian Air Force with a secure feeling of superiority.

Before the campaign, German air commanders were briefed on Russian air power and its probable employment. In this orientation the Intelligence Digest on the Soviet Union,² mentioned at the opening of the previous chapter, played a large role. In view of the gigantic scope of the successes achieved against the Soviet air forces in the first months of the campaign, however, it is understandable that German commanders paid little further attention to the appraisal given them on Soviet air power at the beginning of the campaign, or to whether or not it had proved correct.

During the first year of the campaign three points evolved which conflicted with the briefing and caused a great and unpleasant surprise. These points were: 1) the numerical strength of the Soviet air forces at the opening of the campaign; 2) the strength of Soviet antiaircraft artillery forces; 3) the unexpectedly quick recovery of the Soviet air forces around the end of 1941 and the beginning of 1942 in spite of the annihilating blows it had received during the preceding summer.

Thus, Major a. D. Guenther Rall³ writes that at the beginning



A German sketch showing the direction of the German air attacks in Russia and the operational areas assigned to the air fleets (Luftflotten) and the air corps (Fliegerkorps).

of the campaign the German estimate of Russian fighter forces was extremely vague and a precise knowledge of the types of aircraft involved or of numerical strengths was lacking. Therefore, the appearance of a Soviet fighter force with an incredible numerical superiority came as a surprise, although soon afterwards the technical superiority of the Luftwaffe was clearly demonstrated.

Major a. D. Manfred von Cossart⁴ reports that German flying personnel were briefed on the basis of the Intelligence Digest, according to which Soviet anti-aircraft artillery and fighter defenses were "hardly worthy of mention." Von Cossart's opinion is that the briefing under no circumstances did justice to the numerical strength of the Russian air forces. He leaves it open to question whether the intention existed at the briefing to depreciate the effectiveness of the Soviet defenses, and concludes that the German field forces entered the campaign carrying the burden of these preconceived notions.

It has been definitely established that the Luftwaffe Command had no intention whatever of misleading its forces by such means, but von Cossart's statements show what conclusions commanders at lower levels might draw from a false appraisal of the capabilities of an enemy.

It is not possible from the material available at this writing to determine in what form command personnel in the Army and Navy were briefed on the Soviet air forces, but it can probably be assumed that their briefing was even less thorough than that given to Luftwaffe personnel. Later statements by Army and Navy command personnel concerning the relatively weak air forces committed by the Soviets and the small results obtained by them in the first months of the campaign indicate that these two branches of the Armed Forces were not surprised as the Luftwaffe had been because, unlike the Luftwaffe, they did not encounter large numbers of Soviet aircraft. Their experience thus confirmed the briefing they had been given and they were, therefore, unaware of its inaccuracies.

The German air attack on 22 June took the Soviet air forces completely by surprise. Hundreds of Soviet aircraft of all types were destroyed on the first days of the attack. Many of them were destroyed on their airfields without any defensive action, others were shot down in air combat. The numbers destroyed on the ground were many times

more than those shot down while airborne. One fact which should have been borne in mind, however, and which was not given enough attention by the German Command, was that in these circumstances Soviet losses in personnel were far smaller than in materiel. This explains in part the unexpectedly rapid recovery of the Soviet forces.

German commanders are unanimous in their views on the effects of the concentrated German air attacks during the first few days, which were well organized and soundly conducted. Thus, Captain a. D. Otto Kath,⁵ who at the time was a pilot in the 54th Fighter Wing in the northern area, writes that on their first mission the units of his wing dealt annihilating blows to Soviet air units still on the ground on the Kovno [Kaunas] airfield. The German bombs hailed into the SB-3 and DB-3 bomber aircraft closely packed along the runway and in front of the sheds. The German Me-109 escort fighters dived with the dive bombers or, after accomplishing their escort mission, searched out Soviet fighters in other areas of the airfield and destroyed most of them on the ground. Those that did manage to take off were destroyed in their take-off or immediately thereafter.

Major von Cossart, a flight leader in the 3d Group, Hindenburg Bomber Wing (committed in the northern area) writes⁶ that in its first attack on 22 June 1941 his group dropped its bombs onto long rows of completely uncamouflaged aircraft standing in close formation as though on parade along the edges of the Libau [Liepaja] airfield. The only defense was from one antiaircraft gun at the airfield and a few guns in the port area, which did no damage at all. Later attacks on the afternoon of the same day and on the next morning encountered just as ineffective defenses. The few Soviet fighters which were in the air flew around singly with no signs of unit integration, and flew off as soon as the German Ju-88s opened fire. Typical of the situation was an intercepted radio message from the Soviet air command at Libau to Riga: "Can give no support, my fighter regiment has been destroyed by bombs."

Lieutenant Colonel a. D. Horst von Riesen,⁷ Commander of the 2d Group, 30th Bomber Wing, on the Polar Sea front, describes the Soviets' complete lack of awareness at the opening of the campaign as a pleasant surprise. The first German attack on Murmansk, 22 June 1941, encountered neither fighter nor ground defenses. Even aircraft making low-level attacks--after the dive-bombing was over--



Improved method of transporting wounded with a U-2



Russian aircraft destroyed on the ground by the German surprise attack (Kovno airfield, 1941)

were not taken under fire. German aircraft were able to operate completely unchecked over this hostile territory. Von Riesen describes the Soviets as having been "rolled over" and the overall air situation as a classical example of complete air supremacy. As he puts it: "Literally, no hostile air force was in existence."

Any number of such examples from the first days of attack could be quoted for the entire eastern theater to prove that the Soviet air forces were taken completely by surprise and to a large extent destroyed on their airfields. Thus, Captain H. Pabst, squadron leader in a dive-bomber group operating in the southern area, writes⁸ that on 28 June 1941 he landed on a former Soviet airfield which was strewn with Soviet aircraft that had either been shot down or destroyed on the ground.

According to a report by Generalleutnant a. D. Hermann Plocher, the first attacks by units of the First Air Fleet found the Soviets completely unprepared.⁹ The greater part of the Soviet air units was destroyed by these attacks and by the continued attacks on the days which followed. After the territory was occupied by German ground forces, checks carried out on the ground resulted in the same picture of inconceivable destruction as in the southern and central areas of the eastern front. Hundreds of wrecked aircraft were found burned out and shattered by bombs of all calibers on the ploughed-up airfields. The installations, mostly wooden structures, were burned or otherwise destroyed. The results achieved by units of the First Air Fleet in the 22 June to 13 July period are given at 1,698 Soviet aircraft destroyed--487 downed while airborne and 1,211 destroyed on the ground. In an outline report by the Luftwaffe, Soviet losses in aircraft for the period of 22-28 June 1941 are given at approximately 700 in the northern area, 1,570 in the central area, and 1,360 in the southern area of the eastern theater.

The result of this first devastating blow against the Soviet air forces was that for the time being the Germans had uncontested air superiority in the entire eastern theater, amounting in some parts to absolute air supremacy.

However, it was less from this surprise success during the first days of the campaign that German air commanders derived confidence in their own superiority than from their experience gained

with Soviet flying personnel and aircraft in combat. It was soon found that the Soviet air forces in spite of their pronounced numerical superiority--both in personnel and materiel--were no match for the Luftwaffe. Soviet aircraft crews completely lacked combat experience, a deficiency which could not even be compensated for by their frequently evident aggressiveness and obstinacy. Their training had not kept pace with modern requirements, and their operational and tactical principles were outdated and inadequate. Soviet air force personnel were thus far inferior in combat efficiency to German aircraft crews with their extensive combat experience. Another factor was the largely obsolete aircraft of the Soviets, which were no match for German aircraft types.

The experience of German air commanders was also fairly uniform on this subject, as is borne out by the following German officers quoted. Lieutenant Colonel a. D. Helmut Mahlke,¹⁰ commander of a dive-bomber group in the central area of the eastern theater, concludes that at the opening of the Russian campaign the Soviet air forces were equipped primarily with outdated materiel, which could meet the requirements of modern air warfare only conditionally or not at all. Thus equipped, Soviet air units found themselves opposed to an air force far superior in technical and tactical aspects. In addition, Luftwaffe personnel had gained wide combat experience in operations against Great Britain, whose Royal Air Force units were equipped with highly developed technical materiel.

Generalmajor a. D. Klaus Uebe,¹¹ described 1941 as the period in which the Soviets conducted air warfare with inexperienced personnel and inferior materiel almost to the point of complete annihilation of the entire Soviet potential for air warfare. Soviet airmen in general were found to be not only inferior, but vastly inferior, to their German opponents. This inferiority was not due alone to the shock effect of the first hammering German blows and inferior Russian aircraft. It was due rather to a lack of the feeling for aviation, the absence of uniform thought, and to mental inertia and inadequate training. Inadequate training also caused the generally evident and exaggerated caution, which often bordered on cowardice. In spite of their numerical superiority, the Soviet air forces were thus not a dangerous opponent.

Colonel a. D. Freiherr H. H. von Beust, commander of a bomber group in the southern area, gives a particularly lucid

appraisal of the period under discussion, from which the following lines are quoted:¹²

At the beginning of the campaign the Soviet air forces had a numerical superiority of approximately 6 or 8 to 1 over their opponents. However, they had failed to keep pace with the times in respect to their organization, training, and technological development. The entire Soviet air forces were thus nothing but a large and cumbersome instrument of small combat value, all elements of which the Luftwaffe was able to destroy within a few weeks so far as they were within striking range. Lacking the large territories of the Soviet Union, which made reorganization, training, and reinforcement possible in safe areas beyond the reach of the Luftwaffe, and without the large personnel and materiel reserves available, the Soviet air forces would probably not have recovered.

Colonel von Beust considered the average Russian as:

. . . an opponent completely incapable of independent air attack operations and representing only a small threat in defensive action. In contrast to German airmen, the impression was often received that Soviet pilots were fatalists, fighting without any hope of success or confidence in their own abilities and driven only by their own fanaticism or by fear of their commissars.

The Russian airman's lack of aggressiveness seems understandable to von Beust, who asks:

And how could one expect real enthusiasm in combat from airmen with aircraft, weapons, and other equipment so hopelessly inferior, who themselves were so vastly inferior in techniques, tactics, and training to their opponents, and who were aware of the terrific reverses the Soviet Union had just suffered? It is well known that Soviet units frequently had to follow their unit leader into action, suiting their actions to his, like machines, without any knowledge of their target, route, or the enemy situation.

While discussing the psychological aspect of aviation

performances, it remains to be said that over their own territory and in defensive action the performances of Soviet airmen were in general far better than in attack and over German-held territory. This was without doubt due primarily to the mentality of Russian airmen and soldiers in general, which differed very widely from that of the average German.

Von Beust's summation expresses essentially the views held by most German air commanders in the summer and autumn of 1941 on the Soviet air forces, although it was emphasized occasionally by some writers that, despite the inadequacies of their combat flying, Soviet airmen often evidenced extreme courage, adhered rigidly to what they had learned and to their orders, and were adept at improvising. It was also pointed out by some that Soviet resistance was steadily growing, and that the Russians of World War II were very different from those with which the German Army had had to reckon in World War I.¹³

The behavior of Soviet fighter, reconnaissance, ground-attack, and bomber pilots will be dealt with in detail in a later chapter.

In connection with the severe losses suffered by the Soviet Air Forces at the beginning of the campaign, the statement of Colonel Wanyushkin,¹⁴ commander of the Russian Twentieth Air Army, Smolensk, who was captured on 2 November 1941 is of interest. He considered that the heavy losses of the Soviet air forces in the first days of the campaign were due to: 1) the very clever timing of the attack by the German Command; 2) the critical weakness of the Soviet air units at the time because of the re-equipment program then being carried out; 3) the fact that this re-equipment was carried out on front area airfields; 4) the fact that in their strategic assembly the Soviet air forces were based so close to the border; 5) the poor development of Soviet airfields; 6) the masses of aircraft sent into action by the Luftwaffe; 7) Russian negligence; 8) the failure of the Soviet Command.

First signs became evident near the end of 1941 that the Soviet air forces were beginning to recover from the severe defeats suffered in the past summer. The Luftwaffe still managed to maintain its air superiority during this period, but it realized that the

desired complete annihilation of Soviet air power had not been achieved. In fact, strong Soviet air units, equipped with modern aircraft types, gradually began to appear. This slow recovery of Soviet air power did not take place uniformly in all areas, nor was it evident in all sectors simultaneously, so that German commanders only gradually realized that they were witnessing a general recovery. It was in areas of main effort, such as Moscow, Leningrad, and Demyansk, that Soviet resistance in the air became most evident.

This recovery of Soviet air power was favored primarily by three factors: 1) the fact that large numbers of personnel had escaped when their materiel was destroyed in the summer of 1941 plus the existence of fairly numerous personnel reserves deeper inside Russia and in the Far East; 2) the transfer (in spite of enormous difficulties) of air armament industries to eastern territories where they were beyond German air attack; 3) the early arrival of an exceptionally severe Russian winter, which hampered the Luftwaffe in the execution of its missions in a manner which could not have been predicted. This provided the Soviet Command with a long period of quiet for the reorganization of its air forces.

Major a. D. Heinz Joachim Jaehne,¹⁵ air observer in a strategic reconnaissance squadron in the central area of the eastern theater, reports that during the initial stages of the campaign his unit suffered no losses whatever due to Soviet fighter defenses, but that from approximately August 1941 on the Soviet fighter airfields within his unit's reconnaissance area, particularly around Moscow, developed steadily into more and more difficult obstacles.

Dr. Karl Bartz¹⁶ reports that during the battle of envelopment at Demyansk in the winter of 1941-1942, Soviet aircraft were once again beginning to appear in large numbers, and that the Soviet fighter defense at high altitudes was remarkable.

Finally, Colonel a. D. Hans-Ulrich Rudel* points out¹⁷ that in the battles for Leningrad Soviet fighters attacked the approaching

* Editor's Note: Colonel Rudel, one of the most highly decorated German pilots in World War II, was credited with destroying 500 Russian tanks--enough to equip a tank corps--and countless vehicles of different types. On 22 September 1941 he achieved his greatest victory by sinking the battleship "Marat" in the harbor of Kronshtadt.

German air formations as far forward as the coast. He also states that in the battle for Moscow the German aircraft crews found it more difficult to fight the cold than to fight their Soviet opponents. Rudel expresses the opinion that the Soviets could not have hoped for a better ally than their winter, which, in his opinion, saved Moscow.

The above observations of German air commanders had not yet become common knowledge toward the end of 1941, but they indicate that a change was taking place in the behavior of the Soviet air forces.

Brief mention of Soviet antiaircraft artillery is also necessary. As already stated, Soviet antiaircraft artillery was organic to the Army and not to the air forces. It was only natural, however, that the arm was employed primarily against German aircraft.

German commanders differ in their opinions of the effectiveness of the Soviet antiaircraft artillery forces, which is understandable because their opinions are based on personal experience gained in different areas of the theater. On the whole, however, their views can be summarized more or less as follows: During the first surprise attacks by the Luftwaffe, the effectiveness of Soviet antiaircraft artillery was small. The arm recovered very quickly from the initial shock, however, and developed into a very serious opponent, particularly in areas of main effort along the front. On one point German commanders are fairly agreed: they were all the more surprised at the operations and effectiveness of the enemy's antiaircraft arm because the estimate given them by the German Command had presented Soviet antiaircraft artillery as obsolete and hardly effective. Opinions are also almost unanimous that defensive fire by light weapons, and particularly by the ground troops, was highly effective and disturbing and caused numerous German losses.

Major von Cossart¹⁸ expresses the opinion that, contrary to information on the Soviet Union in the Intelligence Digest, the Soviet antiaircraft artillery arm must have been highly effective even prior to the campaign, since the antiaircraft artillery units were very successful in their fire against German air units flying in formation. It would have been impossible for the Soviets to develop such effective ground defenses within so short a time. Although Soviet antiaircraft artillery was also taken by surprise and heavily stricken at the outset

of the campaign, well organized antiaircraft artillery centers soon reappeared.

Usually, the heavy antiaircraft units succeeded in placing their first salvos at the correct altitude; frequently the first shells fired struck into the middle of the German formation. From August 1941 on the ground defenses around Leningrad were exceptionally strong and included balloon barrages up to an altitude of 15,000 feet. During their approach to Leningrad, Ju-88 units encountered fire from heavy antiaircraft guns, and after their dive attack they ran into dense fire by medium and light guns. Owing to the well organized fire by machine guns and infantry weapons, low-level air attacks on ground targets were frequently exceedingly costly. Von Cossart gives the causes for German losses in aircraft in the following order of sequence: antiaircraft artillery fire, infantry fire, fighter attack.

Colonel Rudel¹⁹ also considered the Soviet antiaircraft artillery exceedingly effective around Leningrad, where in one area of 38 square miles 1,000 antiaircraft guns were deployed. To quote his words: ". . . the zone of massed antiaircraft guns begins as soon as one flies over the coastal zone . . . the antiaircraft artillery fire is murderous The smoke puffs from bursting antiaircraft shells form whole banks of clouds." He also thought the Soviet ground defense with infantry weapons and light antiaircraft guns highly effective.

Heavy antiaircraft artillery and other ground defenses are referred to repeatedly by Captain Herbert Pabst,²⁰ who states that the effects were often considerable and frequently damaged or destroyed aircraft.

Colonel von Riesen²¹ reports that in the initial stages the antiaircraft artillery defenses at the Polar Sea front at Murmansk failed completely, but that the units were quick to adapt themselves and within a few weeks they constituted a serious hazard to attacking German aircraft. Their effectiveness could be compared in every respect with that of antiaircraft artillery in similar concentrations on the British Isles. To defend the important rail routes and roads in the rear areas, the use of light antiaircraft artillery and machine guns was stressed. These weapons proved particularly effective against low-level attacks on trains. The attackers rarely escaped damage, due in large measure to the determination of the Soviet machine-gun crews.

It is evident that Soviet anti-aircraft artillery and other ground defenses made a quick recovery and proved a serious deterrent to attacking air units.

As for Army and Navy command personnel, they also acknowledge that in the early stages of the campaign the Luftwaffe had clearly established air superiority. German Army personnel state unanimously that the Soviet air forces played no role whatever in operations at the opening of the campaign in June 1941. It was a source of surprise and satisfaction that extremely worthwhile targets for Soviet air attacks, such as dense troop concentrations, long columns of troops on the march, bridges and other traffic bottlenecks, and supply installations, were rarely attacked and then only by small numbers of planes and with little effect. This was something inconceivable to the troops and unfortunately often resulted in a certain degree of carelessness in matters of unit air raid protection and camouflage measures.

This appraisal of Soviet air power by army command personnel remained practically unchanged in 1941, although it is admitted that with the progress of German operations Soviet air activities increased and revealed more careful planning. In certain sectors and during certain battles the effectiveness of Russian air power in fact increased quite considerably, mounting occasionally even to local superiority.

From the experience of German army command personnel in the southern area of the eastern theater,²² and particularly in the Kiev battle of encirclement, it is obvious that Soviet air power, at times and in certain areas, was used effectively here and was only weakened when Moelder's* fighter wing commenced operating in the area.

It is interesting to note that Soviet air action in the south was restricted almost exclusively to attacks on the forward German

* Editor's Note: Colonel Werner Moelders, commander of the 51st Fighter Group, and unofficially credited with having shot down 115 planes (14 of these date from the Spanish Civil War), was one of the Luftwaffe's best-known aces (one of 29 high-scoring German aces, each of whom was credited with having shot down 100 planes or more--the highest single number being 352 claimed by Major Erich Hartmann). Colonel Moelders was killed in an airplane crash on 22 November 1941.

panzer divisions. This was also the case in the northern area of the eastern front, where the infantry divisions following up the advance were not molested. A good example of this occurred at Kiev, where the panzer units forming the eastern prong of the envelopment were attacked repeatedly and fiercely by air units, while the infantry divisions forming the enveloping force in the west were not troubled at all from the air.

In their attacks, Soviet airmen gave evidence of willingness, aggressiveness, courage, and appreciable standards of training, as is emphasized by Colonel Pelsmueller. Pelsmueller summarizes his experience by stating that time and again the Soviet air forces hampered the German ground forces in their movements and inflicted heavy losses, particularly during critical situations. In his opinion, the Luftwaffe failed to achieve the destruction it had wrought in other campaigns. Moreover, he felt that a large number of Soviet airfields, owing to the nature of their construction, their location, and excellent camouflage, had escaped detection by German reconnaissance.

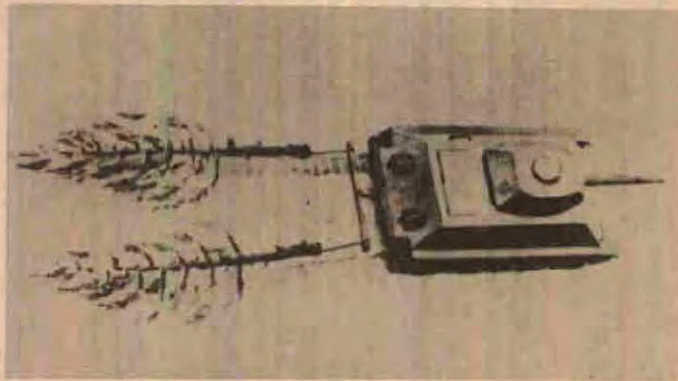
Generalleutnant a. D. Helmuth Huffmann, Commanding the V Corps Artillery Group, Army Group Center, states²³ that after the first devastating German attacks, the Soviet Command concentrated in the south larger numbers of the aircraft which had escaped destruction, and that although these forces at no time developed a real power concentration they did at times achieve absolute air superiority. However, after the arrival of Moelders and his fighter wing, Soviet air power was again completely eliminated in this area. The same appraisal is arrived at by Field Marshal Erich von Manstein,²⁴ at that time Commanding General, Eleventh Army.

Whereas Soviet air power in the southern area seriously hampered German ground operations--particularly so during the battles around Kiev and on the Crimean Peninsula--its effects in the central and northern areas were hardly noticeable. Huffmann²⁵ goes into great detail in evaluating the views expressed by army command personnel, and his findings show that the Soviet air forces were far inferior in these areas to the German air forces committed, and that the German ground forces fully realized this fact. Occasional Soviet air attacks--for example against German bridgeheads across the Dnieper, Seim (Seym), and Dvina Rivers and against marching columns and troop assemblies--cannot alter this overall impression,

although they sometimes inflicted grievous losses on German ground forces. On the whole, German army commanders in the central and northern areas consider that the Luftwaffe maintained absolute superiority in their areas up to the end of 1941. Even the difficult retrograde movements at Kalinin and Moscow, though seriously vulnerable to air attack, were hardly interfered with by the Soviet air forces.

Huffmann²⁶ considers that this was due largely to: 1) the excellent cooperation between the Luftwaffe and German ground units, particularly in the quick seizure and destruction of Soviet air bases; 2) the large-scale destruction of Soviet aircraft by German fighter and anti-aircraft artillery forces; 3) the failure of the Soviets to develop proper power concentrations; 4) their failure to penetrate deep behind the German lines; 5) their clumsy methods of reorganization after the loss of most of their airfields. He is not far wrong²⁷ in ascribing the greater successes secured by Soviet air power in the southern areas not only to the development of power concentrations, but probably in even larger measure to the entirely different characteristics of the terrain. In the wide, open plains of the south, the advancing German panzer and infantry columns found far less cover and protection than those operating in the forest terrain of the central and northern areas. This facilitated the operations of attacking Soviet air units.

Air support given to the Soviet Navy, particularly in the form of air action against German naval units, was so negligible throughout the war, and especially so in 1941, that German naval commanders found it hardly possible to form any opinions about the Soviet air forces on the basis of combat experience. A study by Captain (now Admiral a. D.) Wilhelm Moessel (Navy)²⁸ reveals that the Soviet Command apparently considered naval air reconnaissance, coastal air patrols, and air combat operations at sea of secondary importance. This applies equally, with only a few reservations, to the Polar regions, the Baltic, and the Black Sea. At no time did properly planned operations conducted by large air formations interfere with German naval operations during the German advance in the summer and autumn of 1941. The use of aircraft in coastal defense missions was more pronounced in the Black Sea than in other coastal areas. Broadly speaking, however, the onus of supporting ground operations was so heavy and the naval operations were so unimportant in comparison that the Soviets apparently considered it hardly worthwhile or necessary



Drawing of a Russian tank
erasing its tracks in the snow



Aircraft camouflage with a simulated dwelling

to conduct sizable air operations against the German Navy or German sea routes. Possibly this attitude is due in some measure to the Russian mentality, which is directed primarily to land warfare and its problems. Whatever the causes, it can be stated conclusively here that their negative experience, namely their lack of experience, necessarily influenced German naval commanders to infer that the Soviet air forces in 1941 were in no way a dangerous opponent for the German Navy. These views are supported by Admiral L. Buerkner. 29

B. Command and Operations.

In appraising the command and operations of the Soviet air forces in 1941 the views expressed by almost all German commanders concur on two points: 1) that Soviet air power was employed exclusively to support ground operations and had no strategic air missions to perform; 2) that the activities of the Soviet air forces, whether bomber, ground attack, or fighter, during this period were primarily of a defensive nature.

In addition, various German commanders mention the lack of planning, the obstinacy, and the lack of versatility and flexibility in the Soviet conduct of air warfare.

Major Rall,³⁰ commander of a fighter squadron in the southern area, finds that the main emphasis in Soviet air activities in 1941 was on ground support, and that the operations of air units at any given time were directly connected with the tactical movements of ground units.

Thus, even roving fighter operations were intended primarily to support the operations of ground forces, with the fighters frequently participating in ground action through low-level attacks. Their technological inferiority, and the heavy losses they had suffered also caused the Soviets to restrict themselves chiefly to providing protection for their ground operations. In addition, they confined themselves to the defensive, never seeking battle with German aircraft. Continuous air attacks against ground targets from dawn to shortly before night-fall with large numbers of aircraft were a characteristic feature of Soviet air activities. No attempt was made, however, to form real concentrations of force defined in time or place.

The caution displayed by Soviet airmen when flying a mission

is confirmed, among others by Major a. D. Egon Stoll-Berberich,³¹ squadron leader in a dive-bomber group in the southern area. Quoting a downed Soviet pilot, Stoll-Berberich reports that an order existed for all Soviet ground-attack and bomber units to avoid any combat with German dive-bomber, ground-attack, and bomber units and to cease their own current attack mission if German units appeared in order to resume their attack after departure of the German aircraft. The reason given for the order was that German formations were always escorted by fighters, and the intention was to avoid the heavy Soviet aircraft losses resulting from German fighter action. In Stoll-Berberich's opinion, the lack of aggressiveness in Soviet airmen was due, in some measure, to this order.

Major von Cossart³² supports this view, mentioning that the Soviet Command hampered the operations and the aggressiveness of Soviet fighters. He believes that this was due not solely to the initial heavy Soviet losses from the first German attacks, but also to the Soviet realization that the defensive power of their air units was no match for German fighters, that Soviet airmen were not good at independent air combat, and that the Soviet air forces, although they were numerically strong, could not measure up to the standards of modern air warfare.

Colonel von Beust,³³ however, arrives at somewhat different conclusions. According to his view, the operational doctrines of the Soviet air forces emphasized the performance of the mission above all else. The chances of success or the losses which might be incurred were, by comparison, of no importance. The main requirement was that Soviet airmen be in the air and achieve contact with the enemy, no matter what the circumstances or results. That the Soviet Command desired and endeavored to achieve more tangible results is, however, taken for granted. Von Beust also remarks that Soviet air operations were the result less of deliberate planning than of currently existing circumstances and the exigencies of current situations. Inadequate versatility and flexibility under these circumstances frequently resulted in the stereotype repetition of operations with the same tactics, at the same times of the day, and in the same areas, even when the necessity for such operations no longer existed. This was due to deficiencies in commanders at intermediate and higher levels, who had not been able to give the front units adequate training and an adequate knowledge of tactics.

Von Beust's view is supported by Generalmajor a. D. Fritz Morzik,³⁴ who remarks that the manner in which Soviet bomber, fighter, and ground-attack units executed their attack missions revealed inconsistent training.

Numerous commanders concur in the view that Soviet air operations in general were designed only to support the operations of the ground forces.³⁵ Many observers also state that the Soviets, both in the performance of assigned missions and when in pursuit of German aircraft, did not penetrate beyond the German front and the near-front areas.³⁶ The formation or unit leader was frequently the only one who possessed a map and had any knowledge of the target to be attacked, and if he were shot down it was often impossible for the rest of the attacking force to complete its mission.³⁷

A brief resume of what Generalmajor Uebe has written on the command and operations of Soviet air forces during 1941 follows:³⁸

Essentially, Uebe confirms the general views of German air commanders that the tactics of the Soviet air forces reflected Stalin's demand for harmonious cooperation between all arms and services, and Stalin's opinion that attacks on industrial targets far in the enemy interior could have no important effect on the outcome of a war. In view of the weakness of their infantry, the Russians employed an almost completely tactical use of air forces in support of the Army.

Russian air tactics, Uebe finds, were rigid and stereotyped; once a decision was made it was adhered to for a long time. Occasional variations in details and occasional diversionary maneuvers represented no real changes. Large formation operations were a rare occurrence, because the Soviets lacked the flying and command ability to conduct such operations.

The targets of attack were infantry and artillery positions, or troop concentrations and reserves, with penetrations of usually only six to nine miles and rarely over twelve to fourteen miles behind the German front lines. Such attacks were directed primarily against targets which could not be taken under artillery fire; in other cases they were intended to support artillery fire.

Daylight attacks usually commenced sixty or ninety minutes after full daylight and ceased well before dusk; night attacks usually

lasted from early dusk until shortly after midnight.

The flying altitudes preferred were under 17,000 feet. Only a few reconnaissance aircraft operated at higher levels, bombers and fighters only very rarely.

In 1941 the Soviet air forces were still very dependent upon weather conditions, usually restricting their missions to fair weather.

Operational orders for the Soviet air forces were frequently transmitted by radio and, therefore, often intercepted. This enabled the German command to employ its fighter forces in concentration and inflict heavy losses.

Uebe's views are largely confirmed by the opinions of numerous German Army command personnel.³⁹ Time and again these sources state that the attack objectives of Soviet bomber and ground-attack units, and in part also of fighter units, included advancing columns, artillery positions, troop concentrations and assemblies, command posts, reserves, tank units, bridge sites, and supply installations. Mention is also made of the frequent repetition of attacks and the stereotyped and determined manner in which they were carried out. Army commanders, like Luftwaffe commanders, were rarely able to discern any development of real power concentrations.

The outstanding feature in the appraisals given by army command personnel, with very few exceptions, is their surprise at the relatively rare and ineffective operations of the Soviet air forces and the meager results they obtained in 1941.

None of the appraisals by German naval commanders contradict the views of Luftwaffe and Army commanders presented above. Furthermore, the activities of the Soviet air forces in cooperation with the Soviet Navy and against the German Navy were so insignificant in 1941 that it would hardly be possible to draw any worthwhile conclusions from them.

C. Organization and Chains of Command.

Generally speaking, German field commanders had no opportunity to develop any picture of the organization and chains of command in the Soviet air forces. Prisoner of war statements and

the results of other intelligence activities reached them too late, or not at all. Thus, only a few Luftwaffe commanders have expressed themselves on this subject, and command personnel of the German Army and Navy have not commented at all.

The few reports available serve to confirm the ideas of the Luftwaffe High Command, as already set forth in Chapter I. According to Major Jaehne,⁴⁰ several air units were organized into regiments consisting of approximately 20 aircraft.⁴¹ Air regiments were often based alone on an airfield, and were controlled by air divisions, which received their directives from the appropriate army headquarters. Air corps and air armies were also known to exist and it was known that they were under the command of army command staffs. Furthermore, information was available on the employment of fighter units under the home defense commands.

Colonel a. D. R. von Heimann,⁴² a former expert adviser in the Luftwaffe High Command, considers that in spite of frequent improvisations, the organization of the Soviet air forces was in general sound, and that the command techniques in use apparently caused no serious difficulties. The number of air units assigned to an army command depended on the size of its command zone, the existing or intended areas of main effort, the intended conduct of operations, and in part on intentions to deceive the enemy.

Generalleutnant a. D. Adolf Galland^{*43} regarded the Soviet air forces not as a separate service but as an integral part of the Red Army. As such, he considers that they were perhaps more appropriately and more uniformly organized and employed than the units of the Luftwaffe.

Soviet Colonel Wanyushkin⁴⁴ generally confirms the views of the Luftwaffe High Command on the organization and chains of

* Editor's Note: In American military circles Galland is certainly the best known of all the German fighter Aces of World War II. Credited with having shot down 103 enemy planes, he eventually became Inspector of the Fighter Forces. After the war he worked for the United States Air Force on the Von Rohden Project, authored a widely read book (The First and the Last, Henry Holt & Co., New York, 1954), served as an adviser to the Argentine Air Force, and is now reportedly representing an American aircraft company in Germany.

command of the Soviet air forces. He also confirms the stated average authorized strength of the air regiment as 60 aircraft. The actual strengths, however, were far lower after the initial weeks of the campaign. Thus, Colonel Wanyushkin's division on 25 June 1941 actually had only 60-70 aircraft in the two bomber and three fighter regiments it controlled, and by the end of August the division's units had a total effective strength of only 20 aircraft.

D. Strength and Strategic Concentration.

German field commanders in all three branches of the Wehrmacht had no way of ascertaining the numerical strength of the Soviet air forces. Their knowledge was naturally restricted to their specific command areas. Nevertheless, all German field commanders agree unanimously that the Soviet air forces far outnumbered German air forces.

The number of Soviet aircraft shot down or destroyed on the ground also soon revealed that the Luftwaffe High Command was far below the mark with its estimate of 5,700 Soviet front line aircraft in European Russia. In an address before the Reichstag on 11 December 1941 Hitler placed the number of destroyed or captured Soviet aircraft at 17,322.⁴⁵ This figure appears inordinately high. Possibly the results achieved were intentionally exaggerated in the address for the purposes of propaganda. There can be no doubt that the figure included large numbers of other than combat aircraft. Nevertheless, the figure does serve to show clearly that the Luftwaffe High Command had considerably underestimated the numerical strength of the Soviet air forces.

Information is available from a small number of Luftwaffe unit commanders concerning the strategic concentration of the Soviet air forces. Colonel von Beust,⁴⁶ for example, considers the Soviet strategic concentration to have been primitive, describing it as follows:

Almost parallel with and at a distance of not more than 30 miles from the border, all fighters, ground-attack, and tactical reconnaissance units were in position on airfields in an almost linear disposition, without any organization in depth, without outposts, without defined areas of main effort, and with their sub-units loosely distributed. The disposition of the heavier air forces was very similar, in areas between

60 and 120 miles farther back. Even the services farther in the rear, the reserve and training units, and the industrial air services, showed clear signs of rigid schematism. The results of this defective plan of concentration are generally known: within the first two weeks of war they were to cost the Soviet air forces more than 50 percent of their total front-line strength and were to lead later to almost complete annihilation.

The Luftwaffe High Command and Luftwaffe commanders, with one exception,* confirm the reports that Russian air units were massed on airfields close to the border. This fact and the resultant destruction of a large percentage of the units of the Soviet air forces on their airfields at the beginning of the Russian campaign were major factors which contributed to the superiority of the numerically weaker Luftwaffe in the eastern theater in 1941.

E. Aircraft Types, Weapons, Equipment.

Field commanders of the Luftwaffe are unanimous concerning the quality of Soviet aircraft, their weapons and other equipment. They considered the Soviet air forces, with their largely obsolete materiel, to be definitely inferior to the Luftwaffe.

This advantage was soon discovered by German aircraft crews in battle. The knowledge increased their feeling of superiority considerably and must also be considered as one of the important factors which contributed to the almost complete ineffectiveness of the Soviet air forces during the first months of the campaign.

Numerous German commanders admit, however, that the modernization program of the Soviet air forces, which began to take shape in some areas as early as the autumn of 1941, came as a sharp surprise to the Luftwaffe after the important German successes of

* The exception is Major Jaehne, who operated in the central area. In his opinion the Soviet air concentration was of a defensive pattern, without noticeable massing, and--on the whole--with the air units widely dispersed.

the summer months.

The serious inferiority of Soviet aircraft types in technical development, in the materials used in the construction of fuselages and engines, in their general flight performances, and in their weapons and equipment, is emphasized time and again by a large number of Luftwaffe field commanders.⁴⁷

The disadvantages of Soviet models and their hopeless inferiority in combat against German aircraft are very clearly illustrated by Captain Kath.⁴⁸ Kath goes on, however, to emphasize the astonishment on the German side as the first modern Soviet aircraft models made their appearance in the late summer of 1941, when I-18 fighters and P-2* bombers were first encountered, and in the autumn when IL-2† ground-attack aircraft first entered combat.

Similar conclusions are drawn by Generalmajor Uebe,⁴⁹ who notes the early introduction of considerably improved Soviet models and of large numbers of aircraft received under the Lend-Lease Agreement. Uebe also gives first place to the IL-2, which, after its first appearance at the front in the autumn of 1941, was soon available in large numbers and proved an ideal plane for ground-attack operations.

Colonel Wanyushkin,⁵⁰ stated under interrogation that Mig fighters were introduced in field units in early 1941, and Lagg fighters in September of the same year. P-2 bombers and IL-2 ground-attack aircraft were introduced in Military Area Orel in May and April 1941, respectively. Judging by the appearance of these types of aircraft in front areas, however, the dates given by Wanyushkin can refer only to initial and isolated deliveries, since the aircraft were not encountered at the front in noticeable numbers before the autumn and winter of 1941.

F. Consolidated Appraisal.

In an attempt to summarize the general impressions of German

* The P-2 (or YAK-4) was a twin-engined, monoplane, bomber, employed as a dive bomber, light bomber or reconnaissance plane.

† The IL-2 was the well-known Ilyushin "Stormovik," a ground-attack aircraft. This single-engine, low-wing, cantilever monoplane was armed with 2 cannon, 2 machine guns and equipped with bomb racks.

Luftwaffe, Army, and Navy command personnel concerning the Soviet air forces in 1941, the following picture evolves:

1) Soviet air power was used exclusively to support the operations of the Soviet ground forces, and the air units thus employed demonstrated commendable aggressiveness and frequently considerable energy in attempting to fulfill this mission. Their partial failure was due, primarily, to the fact that the Luftwaffe achieved air superiority.

2) The Soviet air forces during this phase of the campaign were inferior and were forced to restrict themselves to defensive operations. Nevertheless, Russian air superiority did exist in specific areas and during specific periods, a fact which naturally was felt more severely by the German Army commanders concerned than its significance merited within the overall situation.

3) The inferiority of the Soviet air forces was due primarily to: a) the destruction of innumerable Soviet aircraft on the ground and in air combat during the first surprise German air attacks; b) the tactical, flying, and general training inferiority of Soviet aircraft crews and their lack of combat experience; c) the stereotype methods of the Soviet conduct of air operations and rigid operational doctrines; d) obsolete aircraft models, weapons, and other equipment at the outset of the campaign; e) the destruction of the Soviet ground service organization through German air attacks and the loss of airfields through the rapid advance of the German armies.

4) That the Soviet air forces proved several times superior in numbers to the Luftwaffe came as a complete and unpleasant surprise to German commanders. In this respect the Luftwaffe High Command had gravely underestimated the situation. The numerical superiority of the Soviet air forces, however, did not produce the logical results because of the factors listed under item 3, above.

5) Toward the end of 1941 signs that the Soviet air forces were gradually recovering from the losses suffered in the past summer increased. The early arrival of a severe winter greatly helped their recovery.

6) The Soviet anti-aircraft artillery arm, together with all other branches of ground defense, was frequently exceptionally effective, and recovered quickly from the first surprise. It proved

far more capable of performing its missions than the Luftwaffe High Command had assumed.

Section II: Reconnaissance Units⁵¹

A. General.

To assess the performances of Soviet air reconnaissance forces was no simple matter for German field commanders, for they came into contact with these units far less frequently than with fighter or ground-attack units, so that the results of Soviet air reconnaissance, or, in other words, the success or failure of Soviet air reconnaissance units, frequently remained obscure to German eyes. Nevertheless, the number of opinions by German commanders on Soviet air reconnaissance units in 1941 is adequate to form a probably accurate picture of this arm of the Soviet air forces.

A characteristic feature of all reports on the subject is the opinion that the air reconnaissance arm was seriously neglected by the Soviets in all respects, including methods of operations, performance, training, and equipment. This is all the more surprising in view of the fact that the exclusive use of Soviet air power in support of the Army would have made it seem logical that the reconnaissance arm would merit particular attention. For this neglect no satisfactory reasons have been found. Occasionally the view has been expressed that the Soviets could afford to dispense largely with air reconnaissance because of their excellently functioning system of espionage and general intelligence, but this can hardly be considered a sufficient cause. Two possible explanations are that: 1) in building up their air forces, the Soviets could not devote equal efforts to the development of all branches of air power; 2) the fact that reconnaissance aviation requires particularly thorough and careful training. Another reason of primary importance might be that the nature of the duties of a reconnaissance pilot at that time, who had to rely largely on his own initiative in operations, was not consonant with the innate characteristics of the average Russian.

B. Organization and Chain of Command.

German commanders were able to obtain only a very general but fairly accurate impression of the organization and chain of command of the Soviet air reconnaissance arm.

Colonel von Beust⁵² admits that the operational controls governing the Soviet reconnaissance arm were not known in detail, but that the Soviets had found a solution favorable for the Army. Colonel von Heimann⁵³ points out that actual air reconnaissance units in the German sense existed only in isolated cases, an opinion which is shared by other German commanders.

Major Jaehne⁵⁴ mentions that Soviet reconnaissance units were consolidated in regiments, but not in divisions. The strength of twenty aircraft per regiment quoted by him is understandable in view of the low effective strengths of Soviet air units in general after the initial German attacks.

The finding that air reconnaissance units were assigned to higher air command headquarters and were governed in their operations by the controlling surface forces headquarters is correct. In Jaehne's opinion the organization of the Soviet air reconnaissance arm, seen from the Soviet side, was probably a practical solution.

C. Air Reconnaissance Operations.

1) General. The opinions of German commanders concerning Soviet air reconnaissance operations in 1941 coincide, particularly in the following points: a) the conduct of air reconnaissance was irregular, unsystematic, inadequately adaptable, and did not extend deeply enough into the German rear areas; b) generally speaking, cooperation with the ground forces on the field of battle was awkward, and reconnaissance results were not translated into action speedily enough; c) owing to inadequate tactical and aviation training, inferior types of aircraft, and the lack of individual self-reliance, Soviet reconnaissance pilots ceased operations prematurely or carried out their missions incompletely when they encountered German air units, unfavorable weather conditions, or any other difficulties; d) air reconnaissance was conducted sometimes by single aircraft--particularly strategic air reconnaissance--sometimes by a number of aircraft simultaneously--particularly in the case of battle reconnaissance (in operations over the battlefield reconnaissance aircraft were frequently given strong fighter escorts); e) particularly in the case of tactical and battle reconnaissance, specific reconnaissance aircraft types were replaced largely by fighter and ground-attack aircraft types. This occurred at an early stage in the campaign.

2) Long-range. The long-range reconnaissance arm of the Soviet air forces is considered to have been generally poor. According to Uebe⁵⁵ the personnel lacked resiliency. Thus, if unfavorable weather conditions or German defenses were encountered en route, or if even minor technical difficulties occurred, the crews would discontinue their flight and return to their bases; if they encountered defenses in the target area, they would carry out their reconnaissance mission too hastily and with too little precision.

Visual observation was not thorough enough, and the processing of air photos was too cumbersome. In neither case were the results obtained properly interpreted. It can be stated definitely that important German operational movements were recognized too late or not at all by Soviet long-range air reconnaissance.

Colonel von Beust⁵⁶ also arrives at the conclusion that the Soviet long-range air reconnaissance arm was in no way equal to its task, and regards inadequate training in aviation and in tactical and operational subjects as the causes. Obviously lacking the ability to conduct real strategic reconnaissance, the units restricted their activities to the front areas and other target areas within the tactical reconnaissance zones. For this reason the higher levels of the Soviet Command remained ignorant of German preparations and were unable to recognize German assembly movements, or, at a later stage, to keep track of the German advance and envelopment movements. The method of assigning reconnaissance missions was tactically inappropriate. Planes were dispatched on a direct course to their reconnaissance areas, and the timing of operations and the routes to be followed were never changed. This resulted in disproportionately heavy losses. Employing these methods there was no possibility of conducting systematic and promising reconnaissance operations.

Major Jaehne⁵⁷ supplements what has been said above by the statement that the operations of Soviet long-range air reconnaissance units were restricted principally to reconnaissance missions flown for the Army and did not serve the purpose of determining strategic targets, since the Soviets rarely employed long-range bomber units. To countercheck the results obtained in air reconnaissance, the mission was apparently frequently assigned to two aircraft separately. Single-plane missions were, in any case, not popular with the Soviets.

3) Short-range. German air commanders comment more

favorably on the performance of the Soviet short-range air reconnaissance arm than on the long-range reconnaissance arm. Contributors repeatedly emphasize the efforts of Soviet aircraft crews to cooperate very closely with the Army. A number of sources confirm that fighter and ground-attack air units, at an early stage during the war, were required to assume major responsibility for battlefield and other short-range reconnaissance.⁵⁸

Captain a. D. von Reschke,⁵⁹ observer in a short-range reconnaissance squadron operating in the southern area, reports that already on the fifth day of the campaign a modern (Mig-1 ?) plane was observed on reconnaissance missions, and that in the period approximately four to six weeks after the opening of the campaign two I-16's (Rata) flew early morning reconnaissance missions daily in addition to frequent surprise battle reconnaissance missions. These planes operated at low levels, took clever advantage of terrain conditions, and also carried out strafing attacks along the roads if favorable opportunities arose. The Soviets lost relatively few fighter aircraft in reconnaissance missions, and from the attacks flown by their bomber and ground-attack units it appears that the units employed in reconnaissance activities produced useful results.

Generalmajor Uebe⁶⁰ reports that obsolete aircraft models were withdrawn from battlefield reconnaissance missions during 1941, and that from then on this type of reconnaissance was conducted principally by fighter and ground-attack aircraft. These aircraft operated singly at middle altitudes and were protected by strong fighter escorts, or they operated in flights of two or three IL-2 aircraft at low or tree-top altitudes without fighter protection. It was only on exceptional occasions that artillery spotter planes were employed, or that other reconnaissance planes operated at high altitudes.

Tactical reconnaissance extended to a depth of ten or fifteen miles behind the German lines, and the areas were frequently only very incompletely covered. In a steadily increasing measure P-2 aircraft were employed on this type of mission, flying at altitudes of 26,000 feet and higher, and often following the same course day after day at the same time of the day. On the approach of German fighters, aircraft usually endeavored to escape attack by diving down toward their own front lines. In exceptional cases the Soviets employed IL-2 units for tactical air reconnaissance. These units operated at medium altitudes and were usually shot down easily by German

fighters.

Little experience was gathered in 1941 on the subject of Soviet night air reconnaissance. It was generally known that type U-2 aircraft were primarily employed for the purpose, but the results obtained must have been extremely meager, since they were at no time translated into tactical action.

4) Views of German Army and Navy Command Personnel.

The views of German Army command personnel on Soviet air reconnaissance operations coincide with the views of German air commanders on the subject: they consider that the effects of Soviet air reconnaissance activities on German army operations in 1941 were small.

The only area in which some views differ is the south. Thus, Generalleutnant Huffmann⁶¹ writes of lively Soviet reconnaissance activities in the southern areas whenever German fighter units were absent. In most cases missions were flown here by from one to three aircraft, which usually returned to their own lines quickly on the appearance of German fighters.

The bombing activities of Soviet reconnaissance units had a particularly harassing influence on German troops. Although the material damage which these bombings inflicted was small, the influence on troop morale was frequently serious. In these raids, the reconnaissance planes usually made their bombing run from the rear of the marching German column.

Air reconnaissance was a simple matter in the southern areas of the eastern theater; the terrain was level and almost completely devoid of cover so that no movements could remain concealed. In spite of this, it was rarely noticed that the Soviets made good use of the reconnaissance results obtained or that they translated this information into tactical action.

During the battles along the Dnieper River and on the Crimean Peninsula, however, it became obvious that the Soviet Command was interpreting air reconnaissance results quickly and accurately and applying the information thus obtained to plan and conduct attacks by bombers and ground-attack aircraft. It is clearly discernible that close and sound cooperation existed in these areas between the

Soviet ground and air forces.

In contrast with the above observations concerning the southern area, Generalleutnant Huffmann⁶² reports that Soviet air reconnaissance activities were rare in the northern and central areas, where there were no indications that the Soviet Command made any use of the information obtained through this medium. Even on the first day of the campaign there were complete sectors in which not a single Soviet reconnaissance plane was sighted.

In a similar manner Generalleutnant a. D. B. Frankewitz, who commanded an artillery regiment in the northern area,⁶³ comes to the conclusion that the Soviets lost the battle on 22 June because they had no air reconnaissance. During the further course of the campaign he remarks with astonishment and satisfaction--in common with other German Army commanders--that the Soviets had practically no artillery observation aircraft. According to Huffmann, it was not until late November 1941 that Soviet air reconnaissance activities increased in the northern area.

It is thus obvious that from the viewpoint of German army command personnel the Soviet air reconnaissance arm on the whole was not considered a serious threat in 1941.

Concerning the experience of German naval personnel on Soviet air reconnaissance activities in 1941, the following is summarized from a report by Admiral a. D. Wilhelm Moessel:⁶⁴ generally speaking, Soviet strategic reconnaissance against the German coastal areas and sea routes was not very lively and was not conducted systematically. It was only during periods of increased German supply movements and during the periods of approach and departure of Allied convoys in Polar waters that Soviet air reconnaissance activities increased. The same applied to the Rumanian coastal areas in the Black Sea prior to occupation of the Crimean Peninsula by German forces.

On the whole, no remarkable operations by Soviet air reconnaissance units in 1941 are on records.

D. Aircraft Types, Weapons, Equipment.

The almost unanimous opinion of German commanders is that

at the outset of the Russian campaign the aircraft, weapons, and equipment of the Soviet air reconnaissance arm were on the whole obsolete, so that the force as such was inferior to the Luftwaffe. After the loss of their old types of reconnaissance aircraft, the Soviets brought about a gradual improvement of the situation by an increasing use of P-2 aircraft for long-range air reconnaissance, and fighter and ground-attack aircraft for tactical reconnaissance.

Major Jaehne,⁶⁵ on this subject, expresses himself somewhat as follows: Battlefield and other tactical reconnaissance was conducted primarily by IL-2 aircraft, produced as a two-seater for the purpose. The IL-2 had good armor plating, its technical and flight performances were good, and it was suitable for employment in reconnaissance missions over the front. For long-range reconnaissance the Soviets employed P-2 aircraft, the two-seater version of which can be considered useful in respect to its technical and general flight performances. Types R-5 and U-2 aircraft were used for night reconnaissance; both were slow and of primitive construction, but highly maneuverable and easy to handle. For photo reconnaissance the Soviets had too few appropriately equipped planes available, and those available had photographic equipment far below the standards of German equipment. This may have been due to production difficulties.

It was noted that during this phase of the campaign Soviet reconnaissance aircraft were armed exclusively with machine guns.

Jaehne concludes that, with the exception of the IL-2 and P-2 aircraft, the aircraft, weapons and general equipment of the Soviet air reconnaissance forces were below standard.

E. Consolidated Appraisal of Soviet Air Reconnaissance Activities.

Appraisal of the Soviet air reconnaissance services in 1941, based on the experience of Luftwaffe, Army, and Navy command personnel would read somewhat as follows: 1) Soviet air reconnaissance served the purposes of the Army almost exclusively. It was restricted to the near front areas, was incomplete and unsystematic. No reconnaissance was carried out to identify strategic targets for attack by long-range bomber units; 2) The Soviet long-range air reconnaissance arm was unable to perform its appropriate mission because of operational, training, and technological weaknesses. The large initial successes of the German armed forces and the catastrophic conditions which

resulted for the Soviets during the first months of the campaign were partly due to the failure of the Soviet's long-range air reconnaissance arm, which produced no intelligence data for the Soviet Command concerning the movements of the German armies. 3) After recovering from the initial heavy reverses suffered, the Soviet tactical air reconnaissance arm gave a better performance, particularly after the introduction of modern types of aircraft for battlefield and other tactical reconnaissance. Apart from exceptional cases, however, the Soviet tactical air reconnaissance arm failed to achieve any really major and decisive results in spite of serious efforts in cooperation with the army. The reasons for this failure must probably be sought to a large extent in the inadequate training of both air force and army personnel for the purpose. 4) Naval air reconnaissance was incomplete in its coverage and generally unsatisfactory. Apart from the lack of suitable long-range aircraft, the failure here was probably due to a general underestimation of the importance of naval warfare and a consequent neglect of coastal air reconnaissance activities in favor of reconnaissance for the Army. 5) The organization and chain of command for the Soviet air reconnaissance arm and the dependence of its units on the Army were suited to the existing circumstances. 6) The aircraft types, the weapons, and the general equipment--including air photo and radio equipment--were not suited to the requirements of modern warfare. The situation improved only gradually through the introduction of more modern types of aircraft.

In summary, Soviet air reconnaissance in 1941 was little in evidence. With the exception of German troops in the southern areas, the advancing Germans paid no attention to Soviet air reconnaissance activities.

The Luftwaffe High Command prewar appraisal of the small value of the Soviet air reconnaissance services was confirmed by the course of events.

Section III: The Fighter Arm⁶⁶

A. General.

In contrast with reconnaissance units, Soviet fighter units were well known to Luftwaffe commanders because they came into contact with them frequently. Consequently, numerous statements concerning

Russian fighters are available. These reports vary according to the time, place, and circumstances under which the fighters were encountered, but in all essential points, they are in agreement. Thus, all Luftwaffe commanders consulted agree that the Soviet Command had given particular attention to the development of its fighter arm. The fighter arm was therefore far ahead of the other arms, not only in numerical strength but also tactically and technologically, so that it played the most important role in the struggle against the Luftwaffe. Personnel for the fighter arm were specially selected and trained, and represented an elite body within the Soviet air forces.⁶⁷

In spite of their privileged position and their numerical superiority, however, Soviet fighters in 1941 did not succeed in seriously challenging German air superiority. On the contrary, in the autumn of 1941 the Soviet fighter arm suffered such terrific losses that its units were hardly ever encountered in strengths which could have constituted a serious threat.

The battle against the Soviet fighter arm in 1941 was characterized by the effects of the devastating German attacks against the Soviet airfields, by the superior combat experience of German fighter personnel, and by the superior quality of German fighter aircraft. As a result of these factors German fighters, during the initial stages of the campaign, had no difficulty in shooting down their Soviet opponents by the hundreds. Together with the general inadequacies and faultiness of the entire Soviet fighter arm, which will be described later, these circumstances soon produced uncontested German air superiority, which in parts amounted to absolute air supremacy.

Nonetheless, German hopes that the Luftwaffe would succeed in completely eliminating Soviet fighter activities for a considerable time and thereby secure complete air supremacy failed to materialize. On the contrary, as early as the end of 1941 the Soviet fighter arm had passed through its worst stage and was beginning to recover. An effort will be made in the present section to uncover the reasons for these developments.

B. Organization, Chain of Command, Strength, and Strategic Concentration.

Only a few comments by German commanders are available concerning the organization and chain of command of the Soviet

fighter arm. What information is available from these sources confirms the views of the Luftwaffe High Command according to which fighters were organized in regiments and divisions,⁶⁸ although some of the officers come to the conclusion that the organization of⁶⁹ Soviet fighter units was very similar to the German organization. In arriving at this latter conclusion the German officers in question do not appear to have grasped fully the fundamental difference between the German and the Soviet organizational structure, namely, that in spite of all apparent similarities between the two organizations, the Soviet fighter forces, in contrast with their German counterparts, were controlled by the Army and not by an air force high command. For the persons involved this basic problem of organization was also of minor importance. What was of more importance to them was the organization of Soviet fighter forces for combat and other operations. Owing to the rapid German advance in the summer and autumn of 1941 German command personnel had little time to devote to such subjects, and owing to the existing German air superiority they were only conditionally interested.

All German commanders realized the numerical superiority of the Soviet air arm, which undoubtedly was an unpleasant surprise to many of them. Later factual evidence confirmed that Soviet fighter aircraft had outnumbered German fighters many times over in 1941. A Luftwaffe High Command report of 1945,⁷⁰ for example, places the overall Soviet output in fighter planes for 1941 at 7,300, in addition to which 500 fighters were imported from the USA and Britain. In comparison, the German output in fighters for the same year was only 2,992. However, at the front in 1941 the numerical ratio in fighters was undoubtedly considerably more favorable for the Soviets than the above production ratio. On this subject the Luftwaffe High Command's prewar appraisal was, therefore, very much in error.

German commanders confirm the strategic concentration of the Soviet fighter forces with main concentrations in the near front areas. Colonel von Beust⁷¹ considers such a disposition of forces to have been unwise. Stationed near to the front and without any disposition in depth, the Soviet fighter forces were extremely vulnerable to German air attack and were also constantly exposed to observation by German fighters. Quite apart from the fact that the close proximity of the Soviet fighter airfields to the front made it extremely difficult to intercept German units penetrating at high

altitudes, this disposition of the fighter forces placed an exceptionally heavy strain on the Soviet supply and signal systems. It even happened occasionally that Soviet fighter airfields were so close to the front that they were exposed to direct action by German ground forces and were simply overrun by German troops.

C. Fighter Operations.

1) Fighter Pilots. According to their varying experience the opinions of German commanders differ concerning the behaviour of Soviet fighter pilots in combat. Some German commanders describe them as lacking in aggressiveness,⁷² and consider their morale in attack and general combat low even when they had clear superiority.⁷³ Others considered the average Soviet fighter pilot as the toughest opponent hitherto encountered and describe him as aggressive and courageous.⁷⁴

This apparent disparity of opinions can probably be explained by the circumstance that, conscious of their own inferiority and influenced by the German surprise attack and the retreat of their own forces, Soviet fighters in general fought a defensive battle, but fought with desperate and self-sacrificing determination once they became involved in battle. The characteristic features of the average Soviet fighter pilot were a tendency toward caution and reluctance instead of toughness and stamina, brute strength instead of genuine combat efficiency, abysmal hatred instead of fairness and chivalry. These features can be explained by the mentality of the average Russian.⁷⁵

If the innate sluggishness and lack of initiative of the average Russian, and the inclination towards collectivism induced by his training--all characteristics which logically reduce the value of a man as an individual fighter--be taken into account, a careful evaluation of all factors would probably produce the overall impression that the Soviet fighter pilot was an opponent who had to be taken seriously even though he was no match, as an individual fighter, for his German counterpart.

2) General Operational Principles. From the opinions offered by German Luftwaffe command personnel the general principles governing the operations of Soviet fighter forces in 1941 can be outlined roughly as follows:

a) Basically, all Soviet fighter operations were geared to defensive action. This applied not only to operations against German bomber and dive-bomber units, but also to operations against German fighter units. Possibly because it realized within the first few days of the campaign that its forces were inferior in tactics, technical performances, and training standards, the Soviet Command appears to have issued fairly unequivocal directives restricting fighter activities to defensive action.

b) The primary purpose of fighter operations was to serve the requirements of the army directly or indirectly. In this connection direct support in the form of low-level attacks, in which fighters were employed as fighter-bombers, still played a subordinate role in 1941. Far more importance was attached to the mission of indirect support through establishing air superiority over the front areas and through escorting ground-attack and bomber units.

c) It was in consonance with this doctrinal concept that Soviet fighters rarely penetrated beyond the front areas into the German rear and that they always endeavored during air combat to draw their opponents to Russian territory or to escape German attack and withdraw to their own lines.

d) From the viewpoint of assigned numerical strengths, tactics employed, and technical quality, the fighter defenses for important targets in the home defense system were inadequate.

The above and similar thoughts recur time and again in reports from Luftwaffe commanders. Major von Cossart,⁷⁶ for example, expresses the opinion that operational doctrines and tactical considerations, or in other words the Soviet Command, intentionally restricted the activities of the Soviet fighter arm. The reasons are to be sought not only in the annihilating reverses of the initial stages of the campaign but even more so in the fact that the Soviet fighter arm was not yet capable of meeting the requirements of offensive warfare.

In a similar sense Captain von Reschke⁷⁷ suggests that the Soviet Fighter Command undoubtedly realized the weaknesses of its forces and therefore endeavored to conduct a defensive war. Even within the scope of its essentially defensive missions, however, the Soviet fighter arm secured hardly any successes.

Major Rall⁷⁸ elaborates on this subject:

Air activities took the form of continuous operations, with very strong numerical superiority, which lasted from earliest dawn until shortly before dark. No indications were observed of any special system in the form of efforts to develop points of main effort. Broadly speaking the intention was evident to maintain aircraft in the air at all times on "constant roving missions over the field of battle." In addition, special areas for purely protective fighter missions existed at focal points of ground combat, such as Kiev (battle of encirclement), * bridges (Kremenchug, Dnepropetrovsk) and the Tatar Ditch[†] in the Crimea. In these areas fighter forces flew continuous protective missions at altitudes between approximately 3,300 and 13,000 feet.

Independent fighter sorties into the German rear for the purpose of attacking and challenging German fighter units were a rare occurrence. From the heavy losses suffered in combat against German fighters, the Soviets had probably realized the futility of such action.

The Soviets did little to develop fighter defenses systematically for protection of targets in their homeland, because the bulk of all fighter forces were employed in the near front areas for combat missions over the field of battle on the ground, leaving

* See note, p. 118.

† Editor's Note: The Tatar Ditch, originally constructed in the 15th century by the Tatar khan of the Crimea, is now a thirty-foot high rampart running from west to east across the Perekop Isthmus. The latter is a land bridge, from two (at Ishun) to twelve miles wide, which connects the Crimea to the Ukranian mainland. Since, in the fall of 1941, General von Manstein's 11th Army which invaded the Crimea had to pass this way, the Russians incorporated the Tatar Ditch into their extensive fortifications on this flat, treeless, step-like isthmus, in an effort to stem the German advance. In spite of the fortifications, the difficult terrain and the stubborn Russian ground and air defense, the German forces were able, after ten days of hard fighting, to break through the isthmus and secure this gateway to the Crimea. See note, p. 133.

only unsuitable and numerically weak forces for home defense. Owing to their poorly developed reporting system, the Soviets had to depend in their operations almost exclusively on visual observation. It was therefore possible to fly over long distances in the Russian rear and take the defenders by surprise in the target area.

The behavior of Soviet fighters in air combat, in operations against German fighter, reconnaissance, bomber, and dive-bomber units, in air defense of fixed installations, and in roving missions reflected the fundamental concepts of the Soviet Fighter Command discussed above.

3) In Combat with German Fighters. Numerous opinions are available on the behavior of Soviet fighters while airborne, particularly on the subject of their action in combat against German fighters. The more important of these opinions now follow.

According to the experience of the 54th Fighter Wing,⁷⁹ operating in the northern area under Major Trautloff, Soviet fighters restricted themselves primarily to defensive action, usually operating in small units over various sectors and without developing special areas of main effort in time or space. Under threat of attack by German fighters, the Soviets immediately attempted to form a defensive circle, which was hard to break up because of the excellent maneuverability of their aircraft. As a rule they maintained this formation and flew back to their own lines, where they usually first curved at low altitudes over their own antiaircraft positions and then slowly returned to their bases, always maintaining their circle formation. The heavy losses inflicted by German fighters on Soviet fighter units over their own territory seriously affected the combat morale of the fighter pilots: almost 90 percent of all Soviet fighters downed were shot down over Soviet-held territory. If German fighters succeeded in breaking up the Soviet defensive circle or in taking them by surprise, the first losses frequently resulted in confusion. Most of the Soviet pilots were then helpless in air combat and were easily shot down by their German opponents with their superior Me-109 aircraft.

From the same source,⁸⁰ particularly with reference to the area around Leningrad, we learn that during the German advance, German-Soviet fighter battles were a rare occurrence. When these

did take place, the Soviets were usually surprised and shot down; if they recognized the intention of German fighters to attack, they immediately tried to avoid battle and escape. When they outnumbered the Germans, however, they usually accepted battle. German commanders in this area were therefore able to form a valid appraisal of the operations and behavior of Soviet fighters, particularly since all types of Soviet fighter aircraft were encountered.

Soviet fighters usually operated in small formations tightly organized in flights (3 aircraft) or pairs. Toward the end of 1941, however, they were frequently encountered in swarms (usually five aircraft--not a standard organization). Similarly to German units, the swarms, usually I-18 and I-26* planes, maintained proper battle spacing between the individual aircraft during operations, a sign that the Soviets were attempting to adopt German combat methods.

In the Leningrad area Soviet fighters usually operated in units of three to five aircraft and only rarely in squadrons of eight, ten, or twelve. These squadrons usually flew wedge formation. Whereas the units included various types during the first months of the campaign, mono-type units were encountered later.

When engaged in combat, Soviet fighter units immediately formed a defensive circle, with the occasional exception of I-18 and I-26 units. Owing to the inferior climbing ability and speed of the Soviet aircraft and the inadequate combat experience and modest flying skill of the Soviet pilots, German fighters frequently managed to break up the circle in curving maneuvers and then shoot down the Soviets individually. Broadly speaking, this was the case not only with the older types of Soviet aircraft but also, although in a somewhat lesser degree, with modern types.

Most engagements with Soviet fighters were fought at altitudes between 3,300 and 10,000 feet. Engagements at higher altitudes were rare; usually Soviet fighters avoided combat at higher levels by diving away.

In general, the Soviets only accepted battle when they

* The I-26 was a low-wing, cantilever monoplane with retractable landing gear.

outnumbered their German opponents. However, even then they almost always flew in a defensive circle, which frequently deteriorated into what might be called a merry-go-round. This was the stage at which it was easiest to separate individual planes from the circling unit and shoot them down, since the rest of the unit rarely came to the assistance of a plane thus separated.

The only units which attempted offensive action in air combat--for example through maneuvering for height--were those equipped with I-16 or I-26 aircraft. In such cases the aircraft would exploit the momentum of a dive to then approach the opposing plane at a steep climbing angle. However, they opened fire at extremely long ranges.

Major Rall,⁸¹ who commanded a fighter squadron in the southern area, adds that although Soviet fighters in the early stages of the campaign approached, fought, and departed in close formation, they soon changed their tactics and adapted their formations to the German pattern of quadruple organization with each squadron divided into two swarms, and each swarm divided into attack and defensive planes. If at all possible, the Soviet fighter pilot avoided offensive air battle. In 1941 the Soviets had apparently not yet established a system to control their fighters by radio from the ground. It is also probable that while airborne the unit leader controlled his unit by means of visual signals, since air to air radio traffic was at no time observed. Because of their excessive losses, Soviet fighter units soon ceased operating in flights of three and changed to a four-plane formation, with the entire unit flying in close order in which no clear-cut organization was discernible. Owing to the peculiarly irregular manner in which they flew, Soviet units were easily identifiable at a great distance. At an early stage in the engagement the Soviets would form their defensive circle, from which they would make brief and unsystematic attacks, exploiting their better maneuverability and ability to curve sharply. In close formation the fighters usually flew at staggered altitudes. The return flight was carried out in the same irregular and constantly curving formation as the approach. Aircraft separated from the circle frequently attempted to escape the German attack by curving away at low altitudes.

Generalmajor Uebe⁸² supplements the above observations with the remark that in dogfights the Soviets frequently neglected

even the most primitive basic rules, lost their heads after a brief period of combat and then reacted so unwisely that they were easy to shoot down. However, they preferred to dive down to ground level and effect a timely escape over their own territory.

The above experiences of German fighters concerning their encounters with Russian fighters in 1941 are confirmed by other sources.⁸³

4) Operations against German Bombers. All reports by the commanders of German bomber units confirm that in 1941 Soviet fighters constituted no danger to German bomber formations. In fact, Soviet fighters frequently avoided battle with German bomber units.

Major von Cossart,⁸⁴ flight leader in a bomber wing operating in the northern area, reports that members of his unit never considered Soviet fighters to be a serious hazard for German bombers flying in formation. His opinion is that the reasons were not so much the annihilating German successes of the first few days or the inadequate aggressiveness or training of the Soviet fighter pilots, but the defensive nature of the Soviet operational doctrines and the fact that the Soviet defense preparations were not completed. Because the Soviet air reporting system was extremely primitive and functioned very slowly, air battles with Soviet fighters usually only developed after the German bombers had released their loads, sometimes even when the target was a Soviet fighter base. When battle did develop German crews had the impression that the Soviet fighters had orders to keep their losses as small as possible when attacking. The only tactic observed in attack was the approach from above and rear, usually by single planes and less frequently by a small number of planes simultaneously. Sizable Soviet fighter formations remained at a safe distance from German bombers flying in formation. Even when they did attack, they frequently ceased action before reaching favorable positions close to the German bombers.

In sixty missions in which von Cossart participated up to 9 September 1941 his unit encountered Soviet fighters on only ten occasions. Soviet fighter defenses were encountered over Soviet airfields or over especially important target areas, such as Leningrad, or over major rail junctions, but not over the Soviet withdrawal routes and even less so over areas farther in the rear. At the opening of the campaign, von Cossart was assigned the mission,

with his unit, of attacking the Libau [Liepaja, Latvia] airfield twice on 22 June and a third time on the next day. Although a large number of fighters were stationed on the airfield, the first and third attacks encountered no fighter defenses. In the case of the first attack this was probably due to surprise, in the third attack to the destruction done to the field and to the large number of fighters destroyed on the ground. In the second attack, the Soviet Rata fighters were apparently only alerted by visual observers. There were no signs at all that they were operating in formations, not even in such small units as pairs or flights. In the few cases where the Soviets actually attacked the German bomber unit, they opened fire when still 550 yards distant and attempted to escape in a dive immediately their fire was returned. On another occasion, on 11 August, von Cossart's unit had dispersed in thunder clouds after accomplishing its mission; flying alone he encountered eight Rata fighters. At irregular intervals each of these attacked him in succession. Each plane flew in to the attack only once, diving downward to escape counterfire while still at a safe distance. As a result, von Cossart's plane received only a few harmless hits. This almost inconceivably passive behavior von Cossart also attributes primarily to the defensive nature of Soviet operational doctrines.

In a description differing somewhat from the above, Colonel von Beust,⁸⁵ group commander in a bomber wing in the southern area, reports that owing to the inadequacy of the Soviet warning and reporting system it was hardly necessary to reckon with any serious opposition by Soviet fighters in the Soviet rear, and that it was only on exceptional occasions that defenses were encountered in the target areas. Consequently, it was primarily in bombing missions against targets in the near front areas that air battles developed. Owing to their poorly developed combat tactics, Soviet fighters were unable to achieve any results against German bomber units, even when they had numerical superiority. Soviet fighters were even less of a threat, of course, if German fighters were assigned to escort the bombers or to patrol the area concerned. There was not only a lack of any logical and firm direction of the attacking units, but in general Soviet fighter pilots frequently lacked the necessary flying ability and firing precision. This situation was aggravated by the heavy initial losses, which had resulted in a large number of pilots with completely inadequate training being employed in fighter missions. Far from being capable of shooting down German aircraft, these men served merely as easy kills for the German fighters, which was one of the main reasons for the rapid increase

in the number of aircraft shot down by the German Air Force.

Under these circumstances Soviet fighters had to restrict themselves to attacks against German planes which had been damaged or separated from their units, and the small number of successes scored here was dearly bought at the cost of numerous Soviet losses. It was only after the bad autumn weather set in that the situation gradually changed in favor of the Soviet fighters. Their operations and the results achieved remained restricted because of their past heavy losses, but they now presented a more serious hazard for German bombers, which during this phase were compelled to fly their missions singly or in very small units, or at low altitudes.

Colonel von Riesen,⁸⁶ group commander in a bomber wing on the Arctic front, considers that the Soviet fighters were a considerably smaller menace than, for example, British or French fighters. Soviet fighters made no effort to adapt themselves to the German bomber tactics of diving at a steep angle from altitudes between 13,000 and 17,000 feet to release their bombs and then making their getaway at very low levels. As a rule, the moment an impending German bombing attack was recognized Soviet fighters on all fields in the area would take to the air, assemble at a low altitude, and remain close to their bases awaiting the attack. Although this placed them in a favorable position to intercept the individual Ju-88 bombers close to the ground, the fighters at no time attacked. Von Riesen reports that he himself on several occasions almost collided with Soviet fighters when flying through their formation in such situations, but was not even fired at. Of the twenty aircraft lost by his unit in 1941 only three or four were not accounted for, and these were the only cases in which the loss may have been due to Soviet fighter action. In all other cases the losses were proved to be due to other causes. Soviet fighters were rarely sighted at high altitudes and never sighted over German-held territory. At no time did they penetrate into the German rear to attack, although German bombers at the time usually operated only in pairs or at the most in flights.

Major a. D. J. Joedicke,⁸⁷ in 1941 a squadron captain in a bomber wing which operated in the northern and central areas, reports of the missions on which he was employed that up to the autumn of 1941 his unit either encountered no Soviet fighters or was not attacked. According to him the activities of Soviet interceptor

fighters first increased during the German attacks on Leningrad and Moscow. Lone German planes in these areas were exposed to persistent attacks and a number of them were shot down.

Major Rall,⁸⁸ then a squadron captain in a fighter wing operating in the southern area, reports that Soviet fighter attacks against German bomber units were not systematically directed and did not provide for protection against German fighters while attacking the German bomber formation. As a result, the German escort fighters usually succeeded in repelling attacks. Although the Soviets had adequate numerical superiority to offset these tactical weaknesses, they did not succeed in their effort to prevent German formations from accomplishing their missions. Attacks by closed swarms or squadrons to disperse the German defensive fire were unsystematic and deteriorated into single-plane action. Their obstinate determination and their indifference to losses also led the Soviets to attack from unfavorable positions. German units were never subjected to continuous attacks during their approach, while over their targets, or during their return flight. Even in attacks far in the Soviet rear, German bombers encountered Soviet fighters only at the target.

The views expressed above are shared and supplemented by other Luftwaffe command personnel.⁸⁹ It was general knowledge that Soviet fighters were reluctant to attack bombers flying in formation, particularly if they were accompanied by fighter escorts. Even single straggler bombers were usually safe from attack by Soviet fighters if German fighters were in the area. Usually, the Soviet fighter units would take off in a scramble start when a German bomber formation was approaching. At some distance from their airfields they would gain altitude and then some elements endeavored to contain the escorting German fighters while other elements attempted to attack the bombers. In pursuit the Soviets often displayed tenacity and endurance.

According to Soviet fighter pilot First Lieutenant Peter Kulakoff,⁹⁰ the heavy repelling fire of German bomber units in formation was feared, but no order existed to avoid such units. As a rule the attack was flown from the rear and below, without regard for the enemy strength. In the first attack all planes followed the unit leader on a given visual signal; from then on each fighter pilot attacked on his own initiative. On encountering a German bomber unit under fighter escort the mission was divided into one of containing

the German fighters and a simultaneous one of attacking the bomber unit.

In summary, however, Soviet fighter operations against German bombers in 1941 were chiefly defensive and ineffective.

5) Operations against German Dive-Bombers. As was the case with normal bomber units, the commanders of dive-bomber units conclude that Soviet fighters presented no serious hazard for German dive-bombers. Entries in the diary of Captain H. Pabst,⁹¹ deceased, who commanded a squadron in a dive-bomber group in the central and northern areas, reveal that he flew 100 missions in the 22 June-10 August 1941 period and encountered Soviet fighters on only five occasions; no serious air combat developed on any of these occasions.

Major a. D. A. Blasig,⁹² in 1941 a group commander in a ground-attack wing operating in the Polar and Finnish areas, reports that when dive-bombers encountered Soviet fighters this was merely a matter of chance, and that Soviet interceptor fighters were rarely met during attacks on targets near the front lines. An exception, however, was Murmansk where numerous Soviet fighters were encountered during dive-bomber attacks. The German dive-bombers were always accompanied by fighter escorts on these missions and the Soviet fighters at no time succeeded in penetrating to attack the dive-bomber squadrons. The bulk of the Soviet fighters would wait at the altitude at which the dive-bombers flattened out after dive-bombing. The fighters did not press their attack resolutely enough, however, and failed to approach to close enough ranges, opening fire too soon and then curving away. For the most part, they restricted their operations to attacks on planes on lone missions and to planes which had become separated from or were lagging behind their formation; the fighters rarely left the vicinity of their bases.

According to Major Blasig, Soviet fighters also showed no persistence in pursuit operations. Thus, he was on one occasion attacked at a low level by two Soviet fighters while returning alone from a mission. After flying in twice to the attack the Soviet fighters ceased their attack although the gun manned by Blasig's radio operator was jammed. After performing their bombing missions the dive-bomber squadrons invariably managed to shake off the Soviet fighters after five minutes of maneuvering in a defensive circle and then set off on their home route at a low altitude. Even the arrival

of American and British (Curtiss and Hurricane) aircraft toward the end of the year brought no change in the Soviet tactics against dive-bombers or in the results achieved by them.

The Soviets realized that the critical moment for a dive-bomber was from right after the dive until it rejoined its unit. This is confirmed by the experience of the 54th Fighter Wing⁹³ in the northern area. In frequently attacked areas, therefore, Soviet fighter units would wait at the altitude at which the dive-bombers flattened out after their dive in order to attack and shoot them down individually.

From the same area Major Rall⁹⁴ reports that during the German advance in 1941 the Soviets constantly had to defend themselves against dive-bombers, and therefore gained considerable experience with this type of attack. During continuous German raids, the Soviet defense fighters restricted their activities to the target areas. German bombers were rarely attacked during their approach or return flight, but air activity was intense over the field of battle. During the first few weeks of the war the Soviets usually employed modern (Yak) aircraft to intercept the German bombers at their approach altitude, and stationed older aircraft types (I-153* and I-16) at the leveling out altitude to pursue and attack the dive-bombers as they came out of their dive. In spite of their massed fighter tactics, however, the Soviets failed to prevent German dive-bomber attacks, particularly if the dive-bomber unit was escorted by fighters.

6) Operations against Reconnaissance Units. The reports of German tactical and strategic reconnaissance pilots and observers reveal that on the whole the operations of Soviet fighters against German reconnaissance aircraft were not very effective and that serious resistance was encountered only in particularly vital combat or protective areas, such as Leningrad and Moscow.

Major a. D. H. E. Schlage,⁹⁵ in 1941 an observer in a strategic air reconnaissance group operating in the northern and

* Editor's Note: The I-153 was a further development of the I-15 (see note, p. 21). Like its predecessor, it was a biplane with gull wings. It differed from the I-15 in being a little faster and having a retractable landing gear.

central areas, reports that fighter defenses were hardly noticeable at the outset of the campaign, even in the far interior of the Baltic areas. The Soviets possessed no suitable aircraft to employ against the high-quality German Ju-88, which attained an altitude of 16,500 to 20,000 feet by the time it crossed over the front areas. In addition, the Soviet aircraft reporting system was incapable of getting fighters off the ground in time to intercept German reconnaissance planes during their approach. Thus, Major Schlage flew twenty-one strategic reconnaissance missions far into Russian rear areas up to the end of 1941, and encountered Soviet fighters only once. On that occasion a squadron of I-16 (Rata) fighters were unable to attack at the altitude of 20,000 feet. All they could do was follow the reconnaissance plane 660 to 1,000 feet lower down and about 500 yards to the side, while showing a serious tail drag. The only remarkable feature in this incident was the astonishingly short time the fighter unit, which the reconnaissance crew saw taking off, required to get this close to the German reconnaissance plane.

Major Jaehne,⁹⁶ air observer in a strategic reconnaissance group in the central area, reports that on missions over Soviet airfields, German reconnaissance units had to expect Soviet alert fighters to attack either in pairs or singly during the return flight. German reconnaissance planes usually flew in along the rail routes, and the impression existed that the Soviet aircraft reporting service reported their approach quickly, since the reconnaissance planes on reaching the airfield involved found the Soviet fighters either already in the air or just taking off. Fighter defenses were particularly strong around Moscow, where the Soviets apparently had their best reporting and control system. The Soviet fighters operated singly or in units of three or four aircraft and endeavored to achieve surprise by attacking from the direction of the sun from below or above. The pilots of modern fighter aircraft attacked from above and the rear in an effort to force German planes down. These aircraft had superior maneuverability and could easily follow German planes in a dive.

Captain von Reschke,⁹⁷ who served in the southern area as air observer in a tactical reconnaissance squadron and as an air liaison officer, supplements the above presentations with his report that no Russian fighters were encountered at altitudes above 13,000 feet, and that the Rata fighters usually employed in escort missions did not attack single German tactical reconnaissance planes, even

when sighting them at close range. It was only during the battles for the Dnepropetrovsk bridgehead* that the Soviets for the first time became more active in air patrols and in attacks on German tactical reconnaissance units; these attacks caused heavy losses in reconnaissance aircraft and periodically prevented German air reconnaissance on the battlefield.

7) Night Fighter Operations. Up to the end of 1941 Soviet night fighter operations were rare and, according to Colonel von Beust⁹⁸ no Soviet night fighters were reported shot down. Major Jaehne gives an even more negative report,⁹⁹ in which he states that up to the end of 1941 Soviet night fighter operations were completely unknown and only developed later.

Of all the Luftwaffe command personnel interrogated only one officer personally experienced a night attack by Soviet fighters, which he describes essentially as follows:¹⁰⁰ During an attack against the Riga airfield on a fairly light night the aircraft crew was surprised at suddenly seeing green tracers passing nearby, followed by the unmistakable sound of projectiles striking their plane. The attacking plane, recognized as a Bf 109 fighter, disappeared after its one pass. The crew members would have thought themselves the victims of a hallucination if a subsequent examination had not clearly proved the reality of their experience.

The assumption seems justified that in 1941 no plans for the systematic employment of night fighters existed and that they were committed only in isolated cases.

8) Cooperation with Other Arms of the Air Forces. Soviet fighter cooperation with bombers, dive-bombers, and fighter-bombers in escort and other protective missions proved inadequate to the task. Generalmajor Uebe,¹⁰¹ for example, reports that when on direct or indirect escort missions, the latter in the form of operations ahead of the escorted unit, Soviet fighter units remained in the same area as the escorted unit, but maintained no real contact with it and frequently abandoned it. A report of the 54th Fighter Wing¹⁰² similarly

* Editor's Note: This was one of the last of the battles fought for control of the great bend of the Dnieper River in 1941. As soon as they had won control of the bend the Germans were able to begin their two-pronged offensive in the South, towards the Crimea and Rostov.

concludes that when Soviet fighters on escort missions were engaged by German fighters they frequently left the unit they were to protect and endeavored to reach Soviet territory flying in a defensive circle.

Captain von Reschke¹⁰³ reports that Soviet Rata fighters cooperated with ground-attack units from the outset of the campaign, but rarely with bomber units. I-15 ground-attack units with attack missions over the field of battle were assigned Rata (I-16) fighter escorts, which frequently participated in the ground action. It was only after four weeks of warfare that Rata fighter escorts were observed with Soviet bomber formations. As a rule the fighters flew approximately 1600 feet above the escorted unit in formations of 15 to 25 aircraft. If German fighters attacked the bombers the Soviet fighters rarely dived down, were themselves engaged in combat, and proved of little use in attempting to execute their mission. It was generally observed that the escort fighters were not very flexible and adhered rigidly to their assigned mission.

Major Rall¹⁰⁴ reports that Soviet ground-attack aircraft with fighter escorts were frequently in evidence over the battle area. The fighters on such missions flew in an echeloned formation. Owing to their inferior speed, however, they were not very effective. In the Battle of Kharkov massed missions of this type were flown two to three times daily. In concentrated attacks German fighters succeeded in penetrating the fighter screen, shooting down the ground-attack aircraft before they could reach their target areas, and then destroying the Soviet fighters in their headlong flight. When escorting bomber units the behavior of the Soviet fighters was similar and they were unable to protect the clumsy and inadequately armed bombers against heavy losses.

The above statements reveal the following defects in the operations of Soviet fighters supporting other units of the air forces in direct escort, patrol, or interception missions at the front:

1) Soviet fighter operations were not flexible enough to master the difficulties encountered on escort missions; 2) the technical inferiority of Soviet fighter aircraft made it impossible for the pilots to take effective action against attacking German fighters; 3) well-directed German fighter attacks inflicted extraordinarily heavy losses on the Soviet fighters as well as on the bomber or ground-attack forces they were escorting.

9) As Fighter-Bombers in Direct Support of Army Operations.

The impact of Soviet fighter direct-support operations was felt more by Army than by Luftwaffe command personnel. The reports of German Army commanders reveal that Soviet fighters were rarely in evidence during the initial phase of the campaign, but that they became increasingly active in later months, particularly in focal areas of combat. Still, they had no important influence on the German ground troops in 1941.

Thus, Lieutenant Colonel a. D. F. Wolff,¹⁰⁵ commander of an artillery battalion in the central area, reports that no Soviet fighters were seen in the early stages, and that the first Rata fighters were sighted, usually in groups of two to three, during the crossing operations at the Dnieper River on 10-11 July. Apart from repeated fighter attacks on marching columns on 13 July, which caused numerous delays, the next air attacks were by single fighter-bombers in mid-August and mid-September and the last attack recorded was on 30 November 1941. The losses inflicted on the German forces in these attacks were insignificant.

Generalleutnant Frankewitz,¹⁰⁶ commander of an artillery regiment in the northern area, reports the first Soviet fighter activities on 17 July. Later, fighter strikes increased in intensity in the Reval [Talinn, Estonia] region. There, attacks by I-16 fighter-bombers were a daily occurrence. German losses in these attacks varied. Thus, a light artillery battalion lost almost 50 percent of its horses--dead or injured--in a single low-level attack by two flights of Rata fighters, while in a heavy battery only a few horses were slightly injured in three repeat attacks by seven Rata fighters. In general, however, the fighter-bombers achieved no major successes and were not taken very seriously by the troops. In later operations of 1941, including the battles for the Baltic Islands, for Narva, and for Tikhvin,* no sizable Soviet fighter actions occurred.

In 1941, during his assignment in command of an artillery unit in the central area, Generalleutnant Huffmann had no personal experience with Soviet fighters.¹⁰⁷ From his contribution to the present study, in which he consolidates the reports of five Army

* Editor's Note: These were all objectives along the route of the northern offensive, which was aimed at Leningrad. The final goal of the northern offensive was to stop the flow of Allied supplies coming from Murmansk.

commanders from all areas of the eastern theater, it can be gathered, however, that Soviet fighters operating as fighter-bombers or in fighter missions over the combat areas had no real influence on the advance of the German Army. He remarks quite pertinently that Generaloberst a. D. Heinz Guderian (C. G., Second Panzer Group) only twice makes mention of Soviet fighters in 1941, and considers this a sign that the Soviet fighter arm made no impression whatever on the German troops or Army commands.

Thus, in 1941, fighter operations, particularly in the form of fighter-bomber missions in support of the Soviet Army, were on a very small scale and had practically no effect on the Germans.

10) Operations under Special Weather Conditions. German commanders are not in full agreement on the subject of Soviet fighter operations under special weather conditions. While some express the view that Soviet fighters were able to continue operating in bad weather, others deny this. Possibly this disagreement stems from the circumstance that all-weather aviation is largely a matter of training, and training varied widely in the Soviet fighter arm. On one point, however, all German commanders agree: Soviet fighter personnel were better able than their German counterparts to master the difficulties of Russian weather conditions and the Russians exploited this ability in their efforts to recuperate.

Whereas Major Jaehne¹⁰⁸ finds that Soviet fighters displayed little zest for action in bad weather--which he considers quite natural because of their inadequate instruments--and that therefore cloudy weather provided good cover for German air reconnaissance, Majors Rall and Blasig¹⁰⁹ express the view that the technical characteristics of Soviet aircraft enabled them to carry out fighter missions in the battle area during weather conditions which made it almost impossible for German fighter units to operate.

The experience of the 54th Fighter Wing¹¹⁰ indicates that Soviet fighters operated when there was a solid cloud cover and that they cleverly flew in the lower cloud fringes, emerging for surprise attacks. Special caution therefore had to be exercised during such weather.

Colonel von Beust¹¹¹ maintains that the bad weather which commenced in the autumn of 1941, and even more so the difficult

conditions of winter--snow, ice, intense cold, poor visibility, and fogs, for instance--produced certain advantages for Soviet fighters. They were accustomed to these conditions and were better able to cope with them--both in respect to aviation and their ground services--than German fighters who were experiencing their first Russian winter.

Rall¹¹² reaches similar conclusions. With a certain measure of surprise he finds that Soviet fighters were extremely active over the battle area even during extreme cold, while German fighter units were still busy trying to start their engines. There is no doubt that the Soviets had wider technical experience in starting their engines during severe cold, and they soon recognized this weak point of the German fighters. It was thus by no means rare that while a German fighter group could hardly ready three of its aircraft for action by 1100 hours, Soviet fighter-bombers were able to attack the unit airfield at 0900.

D. Aircraft Types, Weapons, and Other Equipment.

Luftwaffe command personnel declare unanimously that Soviet fighter aircraft (particularly with respect to their climbing ability and speed), their weapons, and other equipment were inferior to German fighters at the beginning of the campaign; and that they represented no serious hazard for German bomber or dive-bomber units flying in formation. Even lone German aircraft, if expertly handled, could defend themselves against Soviet fighter attack. With the appearance of the newly introduced more modern Mig, Lagg, and Yak aircraft in the autumn of 1941, the performances of Soviet fighters admittedly improved, but the German BF 109-F* aircraft then in use were superior even to these modern models.

In detail, the various types of Soviet fighter aircraft were evaluated as follows:

- 1) Rata (I-16) Aircraft. Initially, this was the standard

* Editor's Note: This is an early designation of the Me 109. "BF" stands for Bayerische Flugzeugwerke (Bavarian Aircraft Industries) which later became Messerschmitt A.G. The plane was a single-seat fighter, designed by Messerschmitt and put into production during the second half of 1938.

fighter of the Soviet air forces. In a Luftwaffe study,¹¹³ the superior maneuverability of the Rata as compared with that of the BF 109 is emphasized, with the qualification, however, that in combat the Rata was soon forced over to the defensive because of its inferior speed and climbing and diving performances. Only very experienced airmen were able in combat to take full advantage of the I-16's superior maneuverability. This maneuverability was seriously reduced at high speeds, and the plane easily caught fire if struck from above or from the sides. According to Captain Kath¹¹⁴ the Rata was 60 miles per hour slower than the German BF 109, and trapped itself in the narrow circle of its own sharp curves. The moment it went into a straight course, German fighters were in position above its tail. Major Rall¹¹⁵ comes to very much the same conclusions, and mentions that from the outset of the campaign to the end of 1941 the majority of all Soviet fighter units were equipped with I-16 (Rata) and I-153 (Rata biplane), both powered with air cooled radial engines, and that the re-equipment of the units with Lagg 3, La 5, and Yak 3* aircraft from the autumn of 1941 on was very noticeable. The opinions of other commanders on the Rata are similar,¹¹⁶ one of whom, Generalingenieur a. D. Otto R. Thomsen,¹¹⁷ adds that the equipment of the plane and the arrangement of the pilot's seat were extremely primitive. The open cockpit was completely obsolete and the windscreen met neither technical nor tactical requirements.

2) I-15 and I-153 Aircraft. The slowness of these models, according to a report of the 54th Fighter Wing,¹¹⁸ put them at a serious disadvantage in air combat. Their high maneuverability, however, did much to compensate for this weakness. Both models could be downed by fire directed at the center from the rear, while a few rounds fired into the sides were often enough to set them on fire. These outdated models gradually disappeared during the winter months. Captain Kath¹¹⁹ describes the I-15, with its slow speed of 150 to 168 miles, as inferior from the outset to German fighter models and also considers its fire power, with only two machine guns, to have been inadequate. Nevertheless, aircraft of this type were mounted on skids for winter operations in 1941. Other German commanders

* Editor's Note: The Lagg 3, the La 5 and the Yak 3 were all single-seat, low-wing, cantilever monoplanes. Whereas the Lagg 3 was employed both as a fighter and a fighter-bomber, the other two were essentially fighters.



The Lagg-3, a one-place Russian fighter



A Russian Yak-3 fighter

give very much the same appraisal of these types. ¹²⁰

3) Mig I-3 (also known as I-200, I-6I, I-18), Yak 1 (I-26), and Lagg 3 (I-30I) Aircraft. These more modern aircraft, which appeared in steadily increasing numbers from autumn 1941 on, are more favorably evaluated in a report of the 54th Fighter Wing, ¹²¹ although the German BF 109F was considered superior to them.

The Mig aircraft (I-18) showed better climbing and speed performances than the Rata, but it was not as maneuverable as the BF 109F. It is to be presumed that rudder pressures were heavy in these aircraft at high speeds, since they were then very maneuverable. The planes easily caught fire if hit from any direction.

The Yak model was considered the best Soviet fighter plane. It had even better climbing performance and was faster than the I-18, and approached the performances of the BF 109F although it was not as fast. It was more difficult to set on fire in attack from the rear than was the Mig 3. Up to 19,100 feet it still climbed well but showed poor maneuverability. For this reason, pilots encountered at these altitudes dived down to avoid combat.

Major Rall¹²² confirms the above statements on the properties of the more modern Soviet fighter aircraft and also mentions their water-cooled engines and their closed cockpits. He also considers the German fighter models superior. Major Jaehne,¹²³ however, admits that the new Soviet models were superior to the German Ju-88, and Colonel von Heimann¹²⁴ supplements the picture with the statement that the new Soviet fighter models were of simple construction, fast, and maneuverable, and on the whole not much inferior to the German BF 109F.

4) American and British Aircraft. Finally, a number of Luftwaffe commanders¹²⁵ mention that American and British fighter aircraft (Curtiss and Hurricane) supplied under the Lend-Lease Agreement entered the scene toward the end of 1941--which made things more difficult for the German fighters--but that Soviet pilots were unable to obtain better performances from these models than from their own. In appraising the American P-40 model, the report of the 54th Fighter Wing¹²⁶ states that it was equal to the German BF 109F in turning, but that its climbing and speed performances were inferior to those of the German plane. According to prisoner

of war statements it was unpopular with Soviet fighter pilots.

5) Weapons. Reports by German commanders¹²⁷ concerning the weapons of Soviet fighter aircraft are fairly uniform. In 1941 they were as a rule armed with a number of machine guns, and a few had cannon mounted in the wings. Although the fire power appeared weak, the weapons are described as good, with the qualification that their effectiveness was reduced considerably by factors such as the Soviets' tendency to spray their fire, to commence firing at too long range, and their reluctance to approach closely enough to their German target. Occasionally Soviet fighter aircraft, particularly the more modern types, were also armed with rockets with which they attempted to repel German fighters attacking them from the rear.

6) Other Equipment. Apart from those previously mentioned, no opinions by German commanders are available on other items of Soviet fighter aircraft equipment. The only item which is mentioned specifically is the excellent armor plating which protected the pilot against weapons fire from the rear.¹²⁸ Otherwise, general mention is made time and again of the technical inferiority of the Soviet fighter aircraft to German fighters, which may have been due in part to the limited technical facilities available to the Soviets to maintain operability.

On this subject the statements of captured Soviet fighter pilot 1st Lieutenant Kulakoff¹²⁹ are of interest. Among other things, Kulakoff ascribes the poor technical condition of Soviet aircraft partly to the circumstance that the aircraft had been in operation too long, and states that numerous failures occurred in operation even without the effects of enemy action. Important causes of mechanical failure were the frequent stoppage of the oil vents in the crank-shafts, and the seizure and burning out of bearings. In general, Kulakoff comments favorably on the weapons of the Soviet aircraft types just dealt with, particularly the wing-mounted cannon of the I-16. In contrast with the machine guns, these cannon rarely jammed. He finds that the rockets, of which each plane carried four and which shattered into innumerable fragments after covering a distance of 2,000 feet, were of little use in air combat but highly effective against ground targets.

E. Overall Evaluation of the Soviet Fighter Arm in 1941.

An analysis of the most important features of Soviet fighters as revealed by the above numerous and varying opinions of German Army and Luftwaffe command personnel produces approximately the following picture:

1) As a result of the initial surprise action and the following continuous air attacks against Soviet airfields at the outset of the campaign, the loss of forward ground service installations, and the large number of aircraft shot down by German fighters, the Soviet fighter arm was seriously crippled and remained so until the autumn of 1941. From then on the arm made a gradual recovery, in which it was favored considerably by the early arrival of the Russian winter.

2) Soviet fighter pilots showed little adaptability, but were courageous to the verge of stupidity, which at times even led them to carry out ramming attacks. As an individual fighter, the average Soviet fighter pilot often lacked self-confidence and was frightened; fighting in formation, in contrast, he was a tough opponent. The personal inferiority of the average Soviet fighter pilot was perhaps less due to traits of character than to a lack of combat experience and adequate training, which lack produced a feeling of uncertainty. Really high grade performers were rare but those who did exist were almost equal to the best German fighter pilots.

3) The basic feature in the conduct of fighter operations by the Soviet Command was one of defensive combat. The reasons for this were to be found in the previously mentioned heavy losses in aircraft and personnel incurred in the first weeks and months of the campaign, technical inferiority, inadequate training, inherent Russian traits of caution and reserve, and occasional cases of inferiority complex.

4) The fighter aircraft used by the Soviets at the outset of the campaign were hopelessly inferior. Although this condition improved through the increasing introduction of more modern aircraft from the autumn of 1941 on, the new types were still no full match for the standard German fighter, the BF 109F. The situation was somewhat relieved in this respect by the numerical superiority which the Soviet fighter units almost always had.

5) In operating against German fighter forces, Soviet fighters

did their utmost to avoid air combat. If engaged in combat by German fighters, they as a rule formed a defensive circle and endeavored to withdraw to their own territory.

6) In operating against German bombers, Soviet fighters showed a reluctance to attack, particularly if the bombers were escorted by fighters. They also failed to take advantage of the weak moment of dive-bombers, namely the moment when they pulled out of their bombing dive. In general, the defensive fire from German bombers flying in formation deterred Soviet fighters from attacking.

7) Over the battle area, German reconnaissance planes from autumn 1941 on encountered increasing, and at times highly effective, fighter defenses. In contrast, German strategic reconnaissance operations, which were conducted at great altitudes, encountered almost no interference from Soviet fighters.

8) Soviet fighters showed little ability to cooperate with other arms of the air forces. When on escort missions they were unable to repel attacking German fighters.

9) Soviet fighters were not very active in operations in direct support of ground forces or in fighter-bomber missions in 1941; no direct support operations in cooperation with naval forces are on record.

The Soviet fighter forces suffered exceptionally heavy initial losses and until the arrival of winter conditions were unable to prevent German air superiority. Nevertheless, the Soviet Command successfully preserved its facilities for the manufacture of fighter aircraft, the training of fighter pilots, and the functioning of the replacement and supply services. It thereby created the necessary conditions for the rehabilitation of its fighter arm. At the same time the Soviet fighter pilots gained combat experience and through their personal efforts contributed to the achievement of the same goal.

Colonel von Beust¹³⁰ summarizes his opinion on the Soviet fighter forces in the period up to the end of 1941 in words which reflect the findings of almost all German command personnel:

Concerning the Soviet fighter forces in this period it can

be said that they suffered unprecedented reverses. Through their tenacious determination and their almost inconceivable personal sacrifices--the reader is reminded here of their efforts to ram German bombers--they nevertheless succeeded in preventing a total collapse and in creating conditions which made a later recovery possible.

Section IV: The Ground-Attack Arm in 1941¹³¹

A. General.

The general opinion of German Army and Luftwaffe command personnel is that the ground-attack forces were the most logically developed and employed arm of the Soviet air forces. Also, the ground-attack arm came closest to conforming with Soviet air doctrine, according to which the major mission of air power was to support the operations of the Army.

Although the arm as it existed in 1941 had not yet achieved its later high tactical and technical standards of performance--certain missions of the ground-attack arm at that time were performed by fighter or similar units--its strong development was already beginning to take shape.¹³²

In reports on the first weeks and months of the Russian campaign German Army and Luftwaffe commanders make little mention of Soviet ground-attack operations and consider that the ground attacks carried out with obsolete aircraft models had little effect. The situation changed radically, from approximately August 1941 on, after the appearance of the IL-2 (Stormovik) model.

The entire first year of warfare in the east was dominated by German air superiority, and German Army commanders have emphasized repeatedly that Soviet ground-attack units were closely restricted in their operations, the effects of which were correspondingly small. Nevertheless, in spite of extremely heavy losses, the Soviet ground-attack arm improved in technical performances, grew in numerical strength, and toward the end of the war was employed logically in close cooperation with ground forces. Beginning with the winter of 1941-1942 it was capable of affecting German troop morale and destroying materiel. The Soviet ground-attack arm thus grew steadily in importance and eventually became the "backbone of

Soviet air power."¹³³

B. Organization, Chain of Command, Strength, and Strategic Concentration

German field commanders had no opportunity to gain an insight into such matters, because they were rarely directly affected by them. They learned very little from prisoner of war interrogations, since captured Soviet aircraft crews usually were immediately evacuated to the rear without previous interrogation. Furthermore, what they could have learned would have been of little importance to them in the performance of their missions.

Major Jaehne,¹³⁴ one of the few contributors to mention this subject, states that ground-attack units were organized in regiments of thirty aircraft and were assigned to ground-attack divisions, which were primarily responsible for the conduct of ground-attack operations. He also assumes that they were controlled occasionally by corps, which, however, were composed of mixed units.

According to Generalmajor Uebe,¹³⁵ the smallest standard ground-attack unit was the squadron of 10 aircraft, organized in regiments of approximately 25 aircraft.

C. Ground-Attack Operations

1) Personnel. German field commanders¹³⁶ describe Soviet ground-attack aircraft personnel as aggressive, courageous, and determined.

Uebe¹³⁷ is one of the few who endeavor to examine the causes for the behavior of Soviet ground-attack airmen. He reaches the conclusion that they also were not quite free of the characteristic Russian weaknesses--inadequate initiative, stamina, and versatility; and evidence of inferiority complexes and inferior training--, but that these weaknesses were somewhat modified by unit cohesion. Since these units were as a rule employed collectively and within direct view of the ground forces, the personal defects and weaknesses of the airmen did not have their full effect. The airmen carried out their clearly defined missions stolidly and with determination. Thus, as an example, rear gunners of damaged and burning aircraft continued firing until their planes crashed. Generally speaking, Uebe describes

Soviet ground attack units as "unpleasant opponents."

It is evident that the average Soviet ground-attack airman was a courageous and utterly fearless opponent.

2) Basic Principles. The doctrines governing the control and operations of Soviet ground-attack units during the first year of the campaign are generally described by German Army and Luftwaffe command personnel as follows: a) employment chiefly in operations over the battlefield and against targets in the battle area within range of approximately six miles; operations in German rear areas primarily directed against German airfields; b) exploitation of the element of surprise; c) continuous attack missions over centers of main effort on the field of battle, frequently with direct or indirect protection by fighters; d) integrated action with bomber units in attacks on particularly important and lucrative targets; e) avoidance of air to air combat during the performance of assigned missions.

There was evidence that the Soviet commands actually endeavored to employ ground-attack units in consonance with the doctrines stated above. However, existing conditions were vastly different in 1941 than those anticipated, and the inadequate capabilities of airmen and their lack of experience often made it impracticable to carry out the attacks for which the arm was designed. The essential concentration of effort was also often lacking.

Summarizing his experience with Soviet ground-attack operations, Major Stoll-Berberich¹³⁸ reports that up to the winter of 1941-42 the Soviet commands frequently made unwise use of the arm and therefore hardly achieved appreciable results. Instead of concentrating on a restricted number of defined areas of main effort and carrying out continuous attacks there, the commands dissipated the power available to them in ground-attack air units. They thus not only achieved no favorable results, but incurred heavy losses, which were increased by the wrong tactics employed in attack operations.

Furthermore, Stoll-Berberich mentions that a downed Russian ground-attack pilot confirmed the existence of a Soviet order, according to which all bomber and ground-attack units were to avoid all combat action with German dive-bomber, bomber, or ground-attack units. On encountering German air units, the Soviets were to cease their attack mission in order to resume it after departure of the German

units. The Soviet pilot stated that the reason for this order was that when German bombing units of any type were encountered in an area, strong German fighter forces could also be expected in the vicinity. By returning to their bases the Soviet units would avoid the losses they would have incurred in combat under these conditions. However, the order allegedly applied only to Soviet units operating against targets within the main line of resistance. Stoll-Berberich thinks that this explains in part the lack of aggressiveness frequently observed in Soviet airmen and concludes with the statement that he personally noticed no change in the tactics of Soviet ground-attack forces up to the end of 1941.

Generalleutnant Frankewitz,¹³⁹ an army commander, also observed that Soviets failed to mass their ground-attack units adequately and employ them in tight formations. His impression was that they were experimenting, still feeling their way without experience or firmly established principles for the conduct of operations, and that this explained the small effects of their operations.

Generalleutnant Huffmann,¹⁴⁰ another army commander, states that the frequent Soviet combined employment of ground-attack and bomber units usually occurred when the Soviets had detected German preparations for offensive ground operations. Combined ground-attack and bomber forces then attacked German troop assemblies, troop movements, concentrations within the battle area, artillery positions, bottlenecks, and supply movements and installations. In brief, they were directed against all targets whose destruction might interfere with or even prevent the German attack. These Russian air attacks never penetrated farther than sixteen miles behind the foremost German positions, and it was often found that the panzer divisions in the forward areas were affected, but that the infantry divisions following farther in the rear escaped attention. The Soviets usually repeated their attack after two or three hours.

Huffmann also finds that Soviet ground-attack units only accepted battle with German fighters when they had numerical superiority; in such cases they proved remarkably trigger-happy, firing far too soon and too heavily. They usually avoided battle with German fighters, however, and endeavored to escape to their own lines at ground altitudes.

In 1941, according to Huffmann, the ground-attack units did everything possible to avoid areas protected by German anti-aircraft artillery, and rarely attacked antiaircraft positions as such.

Major Jaehne¹⁴² amplifies the above with the information that Soviet ground-attack units showed a marked preference for surprise attacks, securing surprise through approaching at ground altitudes or by the timing of their attacks. Very early morning and late dusk attacks were the rule. Thus, he reports that Soviet ground-attack aircraft were frequently still over the German front in the evening hours, when German fighters were already on the way to their bases. However, his opinion that the Soviet command of ground attack forces "was at that time sound both from higher to lower levels and vice versa," is probably too favorable.

In general, the Soviet ground-attack air arm, in 1941, failed to accomplish the primary missions for which it was intended. These missions were: 1) by employing strong units, to render direct support to the ground forces during combat; hold down the enemy ground forces; create breaches for the attack by friendly ground forces; and eliminate hostile centers of resistance; and 2) as long-range artillery to prevent the approach of hostile troops and the concentration of reserves in the far rear of the main battle area.

3) Flying Conduct of Soviet Ground-Attack Air Units. German Army and Luftwaffe command personnel dealt in close detail with the tactics and general behavior of Soviet ground-attack air units during operations. Generalleutnant Huffmann,¹⁴³ for example, writes that the attacking Soviet units varied in strength between three and twelve aircraft, that they usually approached at altitudes between 300 and 1,000 feet, attacked with bombs and weapons fire, and frequently flew in to repeat attacks, sometimes diving at an oblique angle.

Generalmajor Uebe,¹⁴⁴ in contrast, states that Soviet ground-attack units usually approached at medium altitudes, around 10,000 feet and higher, and whenever possible with the sun behind them. In attacking targets not directly within the main defense area, they approached in a flat curve, ending in a head-on attack. Line and circle formations were the most favored forms for attack. Units did not change their formation during the target approach or within the target area. In executing the attack, the planes descended to low levels, and at times to ground levels. Bombing and strafing were

done while in horizontal flight. Light bombs were usually used, including phosphorus incendiaries, and at times the attacking planes fired rockets. Occasionally, the attacking unit would fly in attack circle formation over the target area without evasive maneuvers of any type. From the circle, the aircraft would dive down to repeat their attacks until their ammunition was exhausted. However, repeat attacks remained the exception rather than the rule. When attacking in waves, units flew in line formation, the individual squadrons spaced approximately one minute's flight apart. On leaving the target area, the units usually dispersed, each plane immediately flying at top speed toward its base. Less frequently the aircraft would assemble at a medium altitude, rarely above 1,600 feet, immediately after the attack, and then fly at top speed across the front.

A certain measure of reluctance was noticeable just prior to low-level attacks. It was also clearly evident that the pilots desired to remain at an altitude which would enable them to reach their own line if they were forced to make a crash landing or bail out. On encountering German fighters or antiaircraft fire, Russian ground-attack pilots frequently released their bomb loads prematurely. Whether their escorting fighters waited for them or not, ground-attack air units made no change in the execution of their mission. Employing the above tactics they were able to achieve successes but they also suffered heavy losses. IL-2 units maintained good flight formation but lacked flexibility and carried out no evasive maneuvers even when under extremely heavy antiaircraft fire. This led to exceptionally high losses. Occasionally, units were observed moving into closer formation when under fighter attack.

A German army officer, General der Infanterie a. D. Hans von der Groeben¹⁴⁵ mentions that Soviet ground-attack air units suffered severe losses in battle with German fighters but nevertheless tenaciously continued their attacks, that they continued doggedly on their course when under antiaircraft fire, that when threatened by German aircraft they would descend to ground levels, and that as a rule they were escorted by fighters.

According to the experience of the 54th Fighter Wing,¹⁴⁶ IL-2 units frequently dispersed for their attack, each plane seeking out its individual target. The moment at which they dispersed was the most favorable moment for German fighters to attack.

The various tactics of R-10* and IL-2 units are described by

* A single-engine, 2-3 seat monoplane.

Captain von Reschke,¹⁴⁷ As a rule, he writes, R-10 aircraft attacked in units of eight to ten, usually at very low levels with clever exploitation of existing cover, so that the German ground defenses could only go into action at a relatively late stage during the approach. Under anti-aircraft artillery fire R-10 units generally continued obstinately on their course. Operating at such low levels and in such close formation they had little opportunity to carry out evasive movements. IL-2 aircraft, generally in units of 15-20, usually approached at around 1,300 feet and then dived down to the attack, releasing their bombs in sticks while firing simultaneously with their mounted weapons. They were nearly always escorted by fighters. However, the escort fighters failed to follow down low enough.

Major Stoll-Berberich¹⁴⁸ and Captain Pabst¹⁴⁹ describe attacks by Soviet ground-attack units from their own experience. Their illuminating and stirring accounts of the inexplicable and suicidal behavior of the units when attacked by German fighters or when exposed to German anti-aircraft artillery fire relate how the Russians would continue stolidly on their way without changing their course, without any form of evasive action or defensive maneuver, in some cases until the entire unit was destroyed.

4) Ground-Attack Air Operations over the Field of Battle.
In 1941 the main mission of the ground-attack arm of the Soviet air forces was to operate over the field of battle and support the operations of the ground forces. Numerous reports are available from German Army and Luftwaffe field commanders on the methods adopted by Soviet ground-attack units to accomplish this. Since Army commanders were most effected by these Soviet operations, their views will be given first.

Writing of the northern area, Generalleutnant Frankewitz¹⁵⁰ states that attacks by Soviet ground-attack units were first noticeable in the Reval [Tallinn, Estonia] area, where their use of weapons fire and demolition and fragmentation bombs were a daily occurrence. The usual targets were marching columns, resting units, vehicle concentrations, and command posts. The attacks were carried out by single planes or by units up to squadron size. On the whole, the damage done was small. As operations progressed during the seizing of the Baltic Isles and during later battles around Narva and Tikhvin, ground-attack aircraft were rarely encountered.

Lieutenant Colonel Wolff¹⁵¹ reports that in the central area Soviet ground-attack air units were not encountered before August 1941. The Soviets always attacked at low levels, single planes usually flying in to bomb and then strafe the attacked area with machine-gun fire, later also with aircraft cannon. Soviet ground-attack air operations, however, remained on a small scale in 1941 and inflicted little damage. From 25 August to 4 December 1941 Wolff experienced a total of eleven attacks by Soviet ground-attack aircraft. The largest number of aircraft mentioned by him in any single attack is three and he makes mention on only three occasions of a few German personnel wounded and small damage done. In most cases the attacks had no effect whatever.

According to Generalleutnant Huffmann,¹⁵² Soviet ground-attack air operations were generally only on a small scale and not very effective in the northern and central areas but were very active and effective in the south. Frequently, for example, the lead aircraft of an attacking unit would first carry out careful reconnaissance and then lead the actual attack, with the rest of the unit following. The approach was habitually flown at altitudes between 1,000 and 2,200 feet, and the targets attacked were always in the near front area and within the combat zones. The Soviets often employed IL-2 units as what might be called airborne artillery. Thus, a case is mentioned in which approximately twenty ground-attack aircraft operated against a German column moving along a highway in the south area. Flying in from the rear, the aircraft repeated their attack four or five times with fragmentation bombs and cannon fire, inflicting twenty casualties and killing or injuring sixty horses. Another case worthy of mention is that of the commander of an artillery battalion in the south area, who reports an attack by forty ground-attack aircraft in 1941. Quite apart from the casualties, attacks of this type in the bare flat terrain of the Ukraine undoubtedly imposed a severe strain on the morale of the troops.

In many cases bridges over the numerous rivers were also heavily attacked. It is reported, for example, that the Dnieper River bridges were attacked daily at daybreak, and that these attacks repeatedly caused grave ammunition and other supply crises. In contrast, Soviet attacks against the Dvina River bridges are mentioned in which squadron after squadron flew in at low altitudes with astonishing obstinacy, only to be shot down. In these attacks 64 Soviet aircraft were downed on a single day.

Army circles also confirm the sensitivity of Soviet ground-attack airmen to attack by German fighters and to German anti-aircraft fire. Whenever possible, it is reported, Soviet ground-attack units avoided areas strongly protected by anti-aircraft artillery. Nevertheless, German fighters and anti-aircraft artillery took a heavy toll of ground-attack aircraft, particularly over the main line of resistance, owing to the stubbornness of Soviet airmen's flight tactics and their lack of flexibility during anti-aircraft fire.

General der Infanterie von der Groeben¹⁵³ confirms the view that the Soviets employed their ground-attack aircraft in heavier concentrations against those areas of the battlefield which their artillery could not reach, and thus particularly against the areas behind the main German defense area.

Both von der Groeben and Luftwaffe General F. Kless reject the views expressed by certain circles that the Soviets employed their artillery and their ground-attack aircraft simultaneously against the same targets. General der Flakartillerie a. D. Walther von Axthelm¹⁵⁴ agrees, but notes that it did happen that after an artillery fire concentration the Soviet IL-2 units would follow up with bombing and strafing attacks on the same target, as happened in the Yel'nya salient* in 1941.

The views of German army commanders concerning the operations of Soviet ground-attack aircraft over the field of battle are substantiated and supplemented by Luftwaffe reports on the subject. Thus, Generalmajor Uebe¹⁵⁵ writes that the attacks of Soviet ground-attack aircraft were directed primarily against targets within the main defense area: troop concentrations and movements, firing guns, heavy infantry weapons, and settlements close to the front. In their

* Editor's Note: The Yel'nya salient (named after the city of Yel'nya 45 miles East-Southeast of Smolensk) was a bulge in the German lines and the scene of very heavy fighting in late summer of 1941. This Russian wedge in the lines of German Army Group Center was aimed at the recapture of Smolensk, which had just fallen to the Germans in the second of the seven great battles of encirclement executed by the Germans in Russia in 1941. Total Russian losses in these battles (2,256,000 POW's, 9,336 tanks and 16,179 artillery pieces) give some insight into the magnitude of operations in this first year of the campaign in the East.

firing plan the Soviets utilized their ground-attack aircraft as a long-range, high-trajectory arm of the artillery.

Major Stoll-Berberich¹⁵⁶ reports that in attacking German columns on the march, the Soviets usually only employed flights of about five aircraft, and at the most squadron sized units. The tactics employed were primitive. Instead of flying lengthwise over the highway under attack, the planes usually attacked at right angles to the moving column so that the results achieved were small. Individual targets were usually attacked from altitudes between 2,000 to 2,600 feet by planes spaced between 600 and 1,000 feet apart. Usually all planes attacked from one direction and not with the sun in their rear, and the attacks were very costly for the Soviets. The inadequate maneuverability of the IL-2 aircraft proved a serious handicap in attacks on the main line of resistance or targets in the rear, since the planes were unable to quickly change their direction to attack a more profitable target. It was observed as early as 1941 that Soviet ground-attack air units were directed by radio and air directing teams on the ground, but it was not possible to determine whether these teams were organic to the Army or the air forces.

Both Army and Luftwaffe command personnel concur in the following summary appraisal of Soviet ground-attack air operations over the battlefield and in cooperation with army forces: a) the main mission of the Soviet ground-attack air arm in 1941 was to operate over the field of battle and to support the operations of the Army; b) this mission the Soviet ground-attack air forces attempted to perform with commendable courage and aggressiveness; c) the personnel lacked adequate combat experience, however, and their equipment was technically too inferior to secure telling and decisive results, although the effects secured in local instances cannot be denied; d) the targets for attack were situated primarily within or in the immediate vicinity of the main defense area. The Soviet ground-attack air arm represented the long-range artillery of the Army; e) attacks were executed from low altitudes, and lacked variety and flexibility, so that the attacking units suffered unnecessarily heavy losses. Power concentrations were not developed; f) whereas ground-attack air operations in the northern and central areas were relatively insignificant, they were on a considerably larger scale in the south, where they occasionally produced a feeling of inferiority in the German troops.

5) Soviet Ground-Attack Air Operations in the Communications

Zone. The operations of Soviet ground-attack air units in the communications zone were directed primarily against settlements in which German troops were quartered, supply installations, and airfields. Attacks of this type were experienced and are described by almost all Luftwaffe commanders.

Among others, Captain von Reschke¹⁵⁷ reports that the airfield on which his unit was stationed in the Ukraine was attacked by R-10 and IL-2 units. R-10 units usually attacked in strengths of eight to ten aircraft, which approached at ground levels from the direction of the front. The approach flights were cleverly carried out and every advantage was taken of available cover. As a result, the German fighter interceptors usually only took off when the attacking unit was over the field, which seriously complicated the operations of the ground defenses. The attacks habitually took the form of stick bombing with 22-pound bombs, which were poorly aimed and only inflicted minor damage. When they encountered fire from light antiaircraft guns the Soviet ground-attack pilots showed little initiative, due probably to the difficulty of carrying out evasive maneuvers at low altitudes and while flying in close formation.

The first attacks against von Reschke's airfield by IL-2 ground-attack units in strengths up to fifteen and twenty aircraft occurred in mid-July 1941. The Soviets glided down from altitudes of approximately 1,300 feet to attack simultaneously with machine guns and light bombs up to 110 pounds. The attacks were almost always directed at German aircraft on the ground; the results achieved were insignificant. Even when under fire by antiaircraft guns the IL-2 units continued obstinately on their course and therefore suffered considerable losses. In most missions of this type the ground-attack units were escorted by fighters. The fighters remained too high up, however, with the result that heavy losses were inflicted by attacking German fighters.

The obstinacy and lack of flexibility described above are also mentioned by Major Stoll-Berberich¹⁵⁸ as the particularly characteristic feature observed during a Soviet ground-attack strike against the Orel-West airfield, in which all attacking aircraft were downed by German antiaircraft fire and fighters. The attack also revealed the limited combat experience of Soviet ground-attack airmen and their lack of adaptability. They could easily have approached

unobserved from the direction of the sun and could have achieved complete surprise by attacking directly from their approach flight. Instead, they skirted the airfield on the south at an altitude of 2, 500 to 3, 300 feet and then attacked from the west. It is only natural that by the time they flew in to the attack the German anti-aircraft batteries and interceptor fighters were alerted and ready to give them a hot reception.

This seemingly inexplicable behavior is easily understood when one realizes that the Russians, when attacking German airfields, almost always approached in such a way that they could fly back over the front by the shortest route immediately after their attack. Such tenacious adherence to established patterns, even when they are out of place, illustrates clearly the Soviet unit leaders' lack of versatility and initiative.

Captain Pabst,¹⁵⁹ in his diary, gives a highly graphic description of a far more cleverly executed attack repeated by successive waves of aircraft. Exploiting the cloud cover, the ground-attack aircraft flew in on their target, the Kiev* airfield, at close to ground level. Although almost 50 percent of the attacking aircraft were shot down and the light Russian bombs dropped in sticks did relatively little damage and caused comparatively few casualties, some parked German planes which were hit were exploded by their own bombs. It must be admitted that the entire pattern of the attack was by no means inept or careless.

Generalingenieur Thomsen,¹⁶⁰ in describing a Soviet attack against the Pleskau (Pskov) airfield, and Colonel Rudel,¹⁶¹ both confirm that Soviet attacks against airfields were only of short duration, that the Russians very often released their bombs without aiming, and then immediately dived down to a ground level getaway.

Reporting on Soviet ground-attack air operations against the Smolensk-North airfield, Major Jaehne¹⁶² states that on the whole the Soviets rarely attacked, approximately once per month, and then

* Editor's Note: The city of Kiev was the center of the German Army's fifth and largest battle of envelopment (16 Sept 1941) in the Russian campaign.

usually in the late evening. One of these strikes in September 1941, was directed against aircraft parked along the edge of the airfield. Instead of flying over the city area, which was protected by antiaircraft batteries, the attacking force of ten IL-2 aircraft cleverly approached across a wooded area. In a number of repeat low-altitude attacks, the force finally succeeded in exploding an ammunition depot.

In the light of what the above Luftwaffe commanders have to say the most prominent features of Soviet ground-attack forces in the German communications zones can thus be considered to have been as follows: a) operations in the German rear were directed primarily against airfields; b) in attacking German airfields, the approach and actual attack were so arranged that the planes could immediately fly to their base at a downward angle and by the shortest route; c) the approach was always carried out at low or middle altitudes; if the whole attack action was not carried out at ground level, the planes always attacked in a sloping dive; d) as a rule the attacking unit only flew in for a single attack; repeat attacks were a rare occurrence; e) owing to lack of experience, the Soviets displayed little flexibility in the conduct of operations and as a result suffered heavy losses when they encountered antiaircraft fire or were attacked by fighters; f) for the above reasons the results achieved by Soviet ground-attack units in missions against targets in the German rear, which were flown with commendable vigor, were usually entirely disproportionate to the losses incurred.

6) Night Ground-Attack Air Operations. Most probably Soviet ground-attack air units did not operate at night in 1941. According to Generalleutnant Huffmann¹⁶³ it appears from the statements of the majority of Army commanders interrogated on the subject that no night attacks by Soviet ground-attack aircraft were reported up to the end of 1941. The same conclusion can be drawn from reports by Luftwaffe command personnel.

In 1941 there were no specific night ground-attack air units in existence. The numerous and constantly repeated harassing raids at the time were carried out by outdated models (U-2) and will be dealt with in Section V: The Bomber Arm.

7) Operations under Special Weather Conditions. According to available reports by German Army and Luftwaffe commanders Soviet ground-attack aircraft were relatively independent of weather

conditions in their operations. In view of the general training standards of Soviet airmen and their lack of adequate instruments, this is surprising. German commanders have little to say on this subject, but not a single statement is available that the Soviet units at any time failed to fly their missions because of weather conditions. On the contrary, Major Jaehne,¹⁶⁴ for example, states that IL-2 units were frequently observed attacking at times when German aircraft were grounded because of weather conditions, and that in this respect the training of Soviet ground-attack airmen was so surprisingly high that they could even be assigned missions during unfavorable weather.

Generalleutnant Huffmann¹⁶⁵ writes that Soviet ground-attack aircraft flew in all weather, including rain and snowstorms, and that neither wind nor storm, rain nor temperatures as low as -22° F. prevented their operations. In this connection Huffmann mentions an episode from the battles for Kerch* in November 1941: the city of Kerch was already under German control, but the Soviets were still loading ships in the port. In this situation, in which they had no possibilities for observation, and in spite of heavy snow flurries and the extreme cold, the Soviets employed ground-attack aircraft in an effort to slow down the German pursuit, a mission which the air units valiantly endeavored to accomplish.

8) Integrated Action with Other Arms of the Air Forces. Cooperation was almost always evident between ground-attack and fighter units in missions flown by ground-attack units. As a rule, ground-attack units, when they attacked targets in the German rear, were accompanied by a fighter escort. Sometimes, however, the assigned fighters would patrol within the area in which the ground-attack aircraft were operating rather than fly close escort. This latter form of fighter protection was practiced only in the immediate

* Editor's Note: Kerch is a port on the Kerch Peninsula which stretches out east from the Crimea (between the Sea of Azov to the north and the Black Sea to the south) toward the Taman Peninsula and the Caucasus beyond. Kerch's strategic importance, as the eastern gateway to the Crimea (see note, p. 86), as a stepping stone to the Caucasus and because it controls the entrance (Kerch Strait) to the Sea of Azov and access to several important ports, was recognized by both the Germans and the Russians. In 1941 it changed hands twice.

front areas.

German commanders criticize this type of cooperation because the escorting fighters flew too high while the ground-attack aircraft were carrying out their actual strike. In consequence, the ground-attack aircraft were exposed to attack by German fighters at the most critical moment, namely, the moment after they had completed their attack. Occasional mention is also made of the mistake Soviet fighters made by accepting battle with German fighters, thereby neglecting their protective mission.

Cooperation with bomber units was frequently observed in 1941, although it was not as pronounced as later in the campaign.

Captain von Reschke¹⁶⁶ reports that in his command area the first combined ground-attack, bomber, and fighter attacks were carried out by the Soviets in July 1941. In these operations the ground-attack aircraft approached their targets while gliding down from an altitude of between 350 and 1,300 feet, with the bombers releasing their bombloads from an altitude of 2,000 to 2,700 feet, and the fighters providing cover at altitudes between 3,600 and 3,900 feet. Although these tactics resulted in a dispersal of the German defensive fire, the losses, particularly in bomber aircraft, were considerable. Attacks of this type were repeated frequently and were directed chiefly at the heavily occupied Belaya Tserkov airfield. The results achieved were meager.

Generalleutnant Huffmann¹⁶⁷ finds that cooperation between Soviet ground-attack and bomber units was good, that these two types of aircraft were frequently employed in integrated action in the southern area, and that massed operations of this type dispersed the German defensive effort. It was considered normal practice for ground-attack air units to operate with escort fighters.

The foregoing observation is also confirmed by Generalmajor Uebe,¹⁶⁸ who reports that Soviet ground-attack units were usually assigned strong fighter escorts, but that the fighters were on the whole considered incompetent and therefore ineffective. Soviet fighters were unable to master the difficulties encountered in escorting units of widely varying speeds at altitudes of approximately 5,000 feet and in providing overhead protection for a unit flying at a lower altitude.

9) Ground-Attack Aircraft, Weapons and Equipment. In the early stages of the campaign Soviet ground-attack units were equipped with Type R-10 and occasionally I-16 (Rata) aircraft. Neither type was very suitable for the purpose. German Army and Luftwaffe commanders considered the R-10, a plane of mixed construction, to be primitive, slow and not very maneuverable. It carried only 22-pound bombs and was armed with one rear swivel-mount machine gun and rigidly mounted forward machine guns of an unknown number. It was an obsolete model and could not meet requirements as a ground-attack plane. The I-16 (Rata) aircraft, employed as ground-attack aircraft, was considered hardly suitable for the purpose and vastly inferior to German fighters in the performance of its missions. 169

In contrast, almost all German commanders describe the IL-2 as a highly useful airplane for ground-attack missions. In spite of a number of weak points this type proved highly useful and up to the end of the war rendered good service as the standard type for ground-attack air units. Major Jaehne¹⁷⁰ reports that German troops feared the IL-2 aircraft, which were flown recklessly and tirelessly. Owing to its good armor plating, the plane could only be brought down by very well directed ground fire. It had a speed of 210 miles, and could carry a bombload of 180 to 290 pounds. It was produced as a single-seater with two rigidly mounted machine guns and two cannon, and as a two-seater--which later became the standard model--with two rigidly mounted machine guns and two cannon forward and one machine gun on a swivel mount in the rear. Both models had rocket attachments.

General der Flakartillerie a. D. Wolfgang Pickert¹⁷¹ adds that the IL-2 was impervious to light 20-mm armor-piercing or 37-mm shells. The same views are expressed by General der Infanterie von der Groeben,¹⁷² who emphasizes the nose armor and remarks that direct hits with 20-mm shells frequently had no effects on the plane. The wings, where the fuel tanks were mounted, were considered the most vulnerable parts.

The experience of the 54th Fighter Wing¹⁷³ also shows that it was hardly possible to shoot down an IL-2 aircraft in an attack from the rear, because of its excellent armor protection. The best chance was to take its top surface under fire in a steep dive, or to fire into its sides.

Major Stoll-Berberich¹⁷⁴ is more critical in his appraisal

of the IL-2 and lists the following disadvantages of the plane: it was sluggish, unstable, lacked maneuverability, its power reserve was small--a handicap in climbing--its construction was primitive, and since it could only carry light bombs up to 110 pounds its carrying capacity was inadequate. Stoll-Berberich considers that the plane had only one advantage: its strong armor plating.

E. General Summary of the Soviet Ground-Attack Air Arm in 1941:

1) Badly battered and hardly in evidence during the early stages of the campaign, the Soviet ground-attack air arm made a relatively quick recovery and gained visibly in importance and effectiveness. This was due in no small measure to the introduction of the IL-2, a modern aircraft suited to the purpose of ground-attack missions.

2) Soviet ground-attack airmen were personally courageous and aggressive. The characteristic weaknesses of the Russian mentality were less evident in these personnel than in Soviet fighter pilots.

3) The specific mission of the ground-attack air arm was to support the operations of the army. It was thus in every respect consonant with the basic concepts of the Soviet Command. All other missions were considered of secondary importance. There can be no doubt that the activities of the ground-attack air arm provided a steadily mounting measure of support for the Soviet army in 1941, even though the operations of the arm remained relatively restricted in comparison with the overall war effort. The material results achieved were admittedly small, but the support to Army morale was unmistakable.

4) In consonance with their main mission, Soviet ground-attack units were employed primarily over the main defense areas, where they sought out their targets. Owing to lack of experience, and technical inadequacies, however, the tactics employed were not always suited to the purpose. This resulted in disproportionately heavy losses and small achievements.

5) Attacks on targets in the German rear played only a secondary role and were directed mainly against airfields. Here,

also, the German fighter and anti-aircraft artillery defenses inflicted heavy losses because the Soviet attack tactics were inappropriate.

6) In the execution of their attacks the Soviets frequently showed a lack of flexibility and experience. Escort fighters were usually assigned but were not proficient enough for their protective mission. Cooperation with bomber units increased during the year 1941 but failed to produce appreciable results.

7) Whereas the ground-attack aircraft employed by the Soviets at the beginning of the campaign were of inferior quality and by no means suitable, the Soviet air forces from the summer of 1941 on had in their steadily increasing numbers of IL-2 aircraft a machine which was tactically and technically suitable for the performance of ground-attack missions both in the immediate battle area and in the rear areas.

The progress made by the arm is appropriately expressed by Major Jaehne:¹⁷⁵

The Soviet ground-attack air arm was considerably more capable than had been assumed prior to the campaign. In spite of their excessively heavy losses at the beginning of the campaign, the regiments were able to recuperate and build up their strength in an astonishingly short time. As early as by the end of 1941 training reached commendably high standards.

The aggressiveness of ground-attack personnel also deserves special mention. The dogged calmness with which they flew their attacks, also when in unit formation, was surprising. As a result, these units strongly supported the morale of the Soviet ground forces and contributed largely to the successes achieved by them in their winter offensive.

Section V: The Bomber Arm in 1941¹⁷⁶

A. General.

The opinions of Luftwaffe and German Army command personnel vary widely concerning some aspects of Soviet bomber

arm operations and effectiveness. Whereas Army commanders report that Soviet bombers were remarkably effective, at least in some front areas and during certain periods,¹⁷⁷ Luftwaffe commanders declare almost unanimously that the results achieved by Soviet bombers in 1941 were very small.¹⁷⁸ Probably this disparity between the views of Army and Luftwaffe commanders is due to the Soviets employing their bomber forces preponderantly in support of the operations of their ground forces. As a result, bombers operated almost exclusively in the vicinity of combat areas or against advancing German troops. Bombing attacks in the German rear were a rare occurrence and the Soviets made no strategic use whatever of their bomber arm. The effects of Soviet bomber activities were thus felt primarily by the German Army and not by the Luftwaffe.

For the above reasons Colonel von Beust is basically correct in remarking¹⁷⁹ that an air force which fails to apprehend, or misapprehends, or rejects the concepts of strategic air warfare gives the lowest priority to the development of its bomber arm. This was true of the Soviet bomber arm: at the outset of the campaign the bomber types in use were obsolete, and the command and operational doctrines of the arm, its training standards, and its equipment were faulty.

Another reason the Soviet bomber arm made such a poor impression was that it suffered extraordinarily heavy losses in aircraft destroyed in air combat and on the ground in the first few days and weeks of the campaign. The basic attitude of the Soviet Command toward bombing operations and the increased emphasis placed on the development and re-equipment of the fighter and ground-attack air forces in the autumn of 1941 combined to prevent the Soviet bomber arm from achieving any appreciable combat effectiveness by the end of the year.

The fact must nevertheless be borne in mind that within its limited capabilities, and in cooperation with the ground forces, the bomber arm did achieve remarkable local successes.

B. Organization, Chain of Command, Strength, and Strategic Assembly

Little was known to German commanders concerning the organization, chain of command, strength, and strategic assembly

of the Soviet bomber arm. Apart from very general information to the effect that at the outset of the campaign the Soviets had a large number of bombers ready for action,¹⁸⁰ and that a strategic air regiment--the Stalin Regiment--was stationed on an airfield near Moscow with a mission which was only surmised,¹⁸¹ the notes of German commanders contain no details on these subjects.

Concerning the strategic assembly of the Soviet bomber units, Colonel von Beust states¹⁸² that, so far as any appraisal can be formed, the units were stationed in areas from 60 to 180 miles behind the frontier. Light and heavy units were echeloned successively to the rear, some of them on airfields of the peacetime ground service organization and some on tactical airfields of better construction than the forward airfields.

C. The Soviet Bomber Arm in Combat.

1) Behavior of Personnel. The conduct of Soviet bomber crews, according to German commanders,¹⁸³ was similar to that of Soviet ground-attack airmen: they were aggressive, courageous, and frequently rashly determined and obstinate. In many cases special mention is made of the rear gunners, many of whom continued firing fearlessly even while their plane was burning and crashing.

Generalmajor Uebe,¹⁸⁴ who subjects the behavior of Soviet bomber crews to a particularly critical examination, places the above favorable points in juxtaposition to a number of weaknesses: a) inadequate adaptability in reactions to changing weather conditions on long-distance flights and to defensive action and other conditions in the target area; b) inadequate powers of endurance, which became evident in the cessation of flight under unfavorable meteorological conditions, if enemy defenses were encountered during the approach, or if even minor mechanical defects developed; and c) indecision and nervousness when defensive action was encountered at the target, which resulted in the premature and inaccurate release of bombloads.

Uebe finds that the behavior of Soviet bomber airmen was essentially influenced by collective action, both within the individual aircraft crews and within entire units. Each individual crew member lived and flew in fear of the other crew members. Even the reestablishment of officer responsibility brought no basic change in this situation, because officers were also subject to the same

weaknesses and influences as their crew members. This "lukewarm" behavior was at least condoned by responsible officers in all ranks.

Uebe's partial explanation does not alter the fact that these airmen, although they realized their hopeless inferiority, usually flew their missions courageously and fearlessly.

3) General Operational Doctrine. The view of the Soviet air command that bomber units support the operations of the Army first, and that operations against strategic targets in the rear or industrial targets be considered secondary is confirmed by all German commanders. According to them, the essential features in the operations of Soviet bomber forces were approximately as follows: a) attacks within or in the immediate vicinity of the battlefield and against marching enemy columns, always in direct support of the Army; b) isolated attacks in the rear areas, particularly against German airfields; c) attacks executed without fighter escort in the first weeks of the campaign, later with fighter escort; d) bomber units committed together with ground-attack units against particularly important targets and against German forces and installations in areas of main effort; e) during daylight, attacks flown in closed unit formation, at night by single aircraft; f) as far as possible bombers avoided combat with German fighters and also endeavored to avoid areas with particularly strong antiaircraft defenses.

Consonant with these operational principles, the activities of Soviet bomber forces were seriously curtailed from the very outset and were restricted mainly to attacks on tactical targets. Even within this restricted scope, however, the Soviet bomber forces secured no major successes because of existing flaws in their tactics, their technical equipment, and their training.

Captain von Reschke¹⁸⁵ reports from the southern area that even in the first few days of the campaign the Soviets flew large-scale bombing attacks against German columns in the German rear areas, against the Southern Bug River bridges, and--with special concentration--against the advancing German panzer divisions. The attacks were flown frequently and at regular intervals, initially without, but after four weeks with fighter escorts, which, however, hardly proved effective. It was only after a few weeks that operations were extended to include German airfields

in intensified attacks lasting through the day and flown in successive waves. Soviet bomber units suffered heavy losses in their operations, particularly in the first few weeks of the campaign when they operated in very small units, without fighter escorts, and always employing the same tactics.

Von Reschke reports further--and his statement is corroborated by other sources--¹⁸⁶ that only the Soviet unit leaders were furnished maps and informed concerning the unit mission. Consequently, the execution of a mission frequently became impossible if the lead plane was shot down or if the unit was scattered.

Lieutenant Colonel Mahlke¹⁸⁷ reports from the central area that in the first few days of the campaign Soviet bombers sustained such heavy losses in attacks against such targets as airfields, rail junctions, and supply installations in the German rear, that from then on attacks were flown only by a few twin-engine bomber units with tactical missions and only limited penetration depths. Primarily because of poor bomb aiming, these attacks produced only small results and at no time had any decisive effects. This observation is also confirmed by Major Jaehne.¹⁸⁸

Soviet bombers rarely flew strategic missions. The main reason for this was the attitude of the Soviet Command. Other contributing causes were the defective training of aircraft crews and their aversion to incursions far into the German rear areas. Soviet bomber operations of a strategic nature could therefore be disregarded. This finding is corroborated by Lieutenant Colonel von Riesen,¹⁸⁹ who, on the Polar Sea front in July 1941, experienced a high-altitude attack against the German base at Banak* by nine Soviet bombers,

* Editor's Note: Banak, Norway, located about 300 miles north of the Arctic Circle at the head of the Porsang Fjord. Two German airfields were located in northern Norway: one at Banak and the other approximately 175 miles to the east at Kirkenes, near the Finish-Norwegian border. German and Finish operations on this northern front had three purposes: 1) to defend the Finish town of Petsamo (now Russian - Pechenga) near the Russian border and important because of its strategic nickel mines; 2) to protect the northern Norwegian coast and interdict Allied shipping en route to the Russian port of Murmansk; and 3) to invade Russia and seize Murmansk.

the only attack against this tactically important German operational base in 1941.

On the strength of the above experience of German commanders it can be stated that: a) in consonance with the views of the Supreme Soviet Command, Soviet bomber forces were employed almost entirely on the field of battle to support Army operations; b) employment in strategic missions was the exception rather than the rule; c) no systematic pattern was noticeable in the execution of attacks; and d) for these reasons the results achieved by the Soviet bomber forces, tactically and technically inferior as they essentially were, were disproportionate to the losses they incurred.

3) Flying Characteristics of Bombing Missions. Numerous statements by German commanders are available concerning Soviet methods of approach, attack, and home flight. Although they vary according to the tactical areas, the type of targets, the time periods, and other details, these statements taken as a whole present a very clear picture.

Certain fundamental differences existed between the execution of bombing attacks on the field of battle and attacks on rearward targets. These differences were particularly noticeable in respect to the altitudes at which the various missions were executed, and the numbers of aircraft employed. Von Reschke,¹⁹⁰ for example, reports that on tactical missions, Soviet bombers usually approached and left the target area at altitudes of between 2,000 and 2,700 feet, and that the attacks were usually flown by forces of six to eight and rarely more than ten aircraft. In almost all cases the units flew and attacked in flight formation. Although they operated in tight unit formation, and in spite of attempted evasive maneuvers, the units were quickly scattered by German fighters. On encountering anti-aircraft fire, a unit would continue doggedly on its course without increasing the distances between individual aircraft. Particularly heavy losses resulted from the slowness and inadequate maneuverability of aircraft, and from the lack of flexibility in aircraft crews and unit leaders. An Army source, Generalleutnant Huffmann,¹⁹¹ fully confirms these findings.

Captain Kath¹⁹² reports similar behavior of Soviet bombers attacking the bridges over the Dvina River on 27 June 1941. Throughout the day the Soviets attacked in flight-sized units from various

directions, operating without fighter escorts at altitudes up to 7,000 feet. Because of the overhasty plotting of bombing runs, the bombs were widely scattered around the bridges and caused no damage. On this one day and within this area 69 Soviet bombers were downed without the loss of a single German plane.

Captain Pabst¹⁹³ records a similar situation. On one of the first days of the campaign he witnessed Soviet bombers attacking the German approach area throughout the day in small units of two to four aircraft. Not one of the attacking bombers escaped destruction by German fighters. Pabst describes the execution of these operations as inconceivably stupid and primitive by German standards.

That Soviet bombers usually operated in units of three to nine aircraft in the front areas but in larger units when attacking the German rear is mentioned by Colonel von Heimann,¹⁹⁴ who states that as a rule the bombers attacked during daylight, flying in for the bombing run from the direction of the sun. He adds that the Soviet habit of adhering obstinately to a course without regard for German defensive action resulted in losses which could have been avoided.

According to von Heimann, attacks on airfields and other targets in the German rear were usually flown at altitudes of between 10,000 and 13,000 feet by units varying in size between 3 and 25 aircraft. The usual formation was the flight, frequently widely spaced, with the aircraft flying at slightly different altitudes--a most unfavorable formation when the unit was attacked from the rear by German fighters. Bombing, usually with medium caliber bombs, was carried out while the plane was in horizontal flight, and the units sometimes left the target area at low altitudes.

Von Heimann mentions two remarkably good features observed in the conduct of Soviet bomber personnel. These were their firm maintenance of formation order and their efforts not to desert a crippled plane of their unit. If a damaged plane could maintain a reasonable cruising speed, every effort was made to keep it in the middle. Except in the first few weeks of the campaign, attacking Soviet bombers were always protected by escort fighters.

These observations on the operations of Soviet bomber aircraft are confirmed by a number of German commanders who served assignments in all areas of the eastern theater.¹⁹⁵