If the attack has produced successful results before antiaircraft fire zone is reached, the fighters will cease their attack, gain altitude above the hostile formation, take up unit formation, and move into favorable attack positions in such manner that, as soon as antiaircraft fire ceased, they will be able to take advantage of the dispersion of the enemy formation caused by the antiaircraft fire and renew their attack with increased chances of success.

Heavy Fighters.

Generally speaking, heavy fighter units will have the following missions:

1. Pursuit of hostile units engaged in attack operations over friendly or enemy territory;

2. Protection of friendly bomber formations over their target areas;

3. Attack against hostile defenses.

Tests with heavy fighter forces have not yet been brought to a close.

C. Antiaircraft Artillery.

The antiaircraft artillery arm serves the purposes of defense. (Note by present Author: The rest of the text of the pamphlet is a literal repetition of what is said in

Field Manual 16: Conduct of Air Operations, discussed above in the chapter on 1935-36).

The views of the Luftwaffe General Staff on the subject of air defense are also formulated in a study prepared by Major Josef Schmid, GSC, in the autumn of 1937, which deals with the missions and organization of the air forces.

In that study the following appears under the title of Fighter Forces (Jagdfliegerverbaende):

The main mission of the fighter is air combat with purpose of destroying the enemy.

A concurrent mission is to attack ground targets with weapons fire and with light bombs with the object of destroying enemy aircraft and annihilating enemy forces on the ground.

In the operational sense, fighter forces, together with antiaircraft artillery, are the main means of defense against attacking enemy air forces. In accordance with thei their diverse uses of fighter forces, various countries have developed quite a number of different types of fighter aircraft.

The light fighter, fast and highly maneuverable, must be able to protect vital targets against air attack.

Its mission is to protect friendly reconnaissance

aircraft and bombers over the Army zones of operations against attack by hostile fighters....

Another type of fighter, usually a two-seater, is to be encountered in the air forces of all countries in addition to the light fighter plane. In accordance with the missions for which it is designed, this type of fighter is designated a twin-emgine fighter, a pursuit fighter, or a cannon fighter.

this type of fighter must be able to attack even the

heaviest types of bomber aircraft, to pursue enemy formations returning from an attack far into enemy territory in order to prevent their return to their bases and destroy them....

Direct cooperation between fighter units and antiaircraft artillery forces, also in night operations, and the aircraft reporting system are a matter of decisive importance.

These quotations from three different sources, completely independent from one another, clearly reveal the absolute harmony ruling in respect to the principles of air defense. This harmony resulted from experience and from the directives formulated in Field Manual 16.

In one respect, however, it will be noticed that the generalized principles formulated in the manual concerning the missions of the fighter arm had assumed a more definite form, namely, in the subdivision of fighters in light fighters and heavy fighters according to their dual mission of defense and attack. Here it must be stated, however, the light fighter was not intended for locally restricted air defense alone, but that it also had to assume responsibility for the protection of friendly bomber formations against hostile fighter attack within the Army zones of operations.

It is here that the impact of the experience gained in the Spanish Civil War becomes evident. There, experience in the spring and summer of 1937 had shown that even modern and fast types of bomber aircraft, such as the He-111 and the Do-17 when they encountered fighter aircraft such as the Curtiss double-decker and the Rata required protection by friendly fighters in the execution of their missions.

There can be no doubt that this experience also had a decisive influence on the development of the concept of a heavy fighter, since the realization of the concept of strategic air warfare seemed possible only with a long-range fighter escort to protect the bombers involved.

The concurrent use of the heavy fighter in combat against the heaviest types of bombers apparently was due to the still prevalent German ideas of the role of a 4-engine bomber in strategic warfare, even though the development of such bombers had been halted temporarily some time after the death of General Wever, Chief of the Luftwaffe General Staff, in June 1936 in favor of the development of a fast medium bomber of the He-111, Do-17, and Ju-88 types.

Nevertheless, a departure from the idea of locally restricted use of the fighter arm in air defense is inherent in the idea of a heavy fighter as a pursuit plane, a change of thought which was made possible only because of the

increased range it was expected that the heavy fighter would have.

Concerning the planning done in preparation for the implementation of this concept General Deichmann, former Chief of the Operations Division, Luftwaffe General Staff, in a contribution entitled Air Defense Measures of the German Air Force (Luftverteidigungsmassnahmen der deutschen Luftwaffe)[71] and submitted on 10 June 1955 writes as follows:

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71. Source 17.

Approximately in 1936 the doctrines for the fighter forces were compiled by the Operations Division of the Luftwaffe General Staff. According to these doctrines, fighter units units in adequate numbers were to be stationed in Germany in times of peace in such a manner that a fighter defense line would be established extending along the entire length of the frontiers, backed by further fighter units stationed in a chequerboard pattern throughout Germany, with proper regard for areas of main effort in air defense, so that any enemy air force penetrating into Germany in a surprise attack would encounter fighter defenses everywhere and would come under constantly repeated attacks....

A source of concern in planning this system of an air defense network was caused by the small striking range of the existing fighters....

Full emphasis was placed by the Command on the necessity to increase the range of fighters, but concurrently the requirement was stated to develop a heavy fighter capable of extremely long range operations and armed with very heavy weapons to serve as a backbone in the air defense system. The units to be equipped with heavy fighters were to be so distributed in the chequer-

b board peacetime distribution of fighter forces that any any enemy air force which penetrated into Germany could be intercepted by at least one heavy fighter unit. Farther inside Germany it then would have been possible for a number of heavy fighter units to attack the enemy ....and to take the enemy under continuous attack both during the approach and the return flight....

In 1937 there was no possibility to fulfill these requirements, however, apart from the organization of a heavy-fighter group as part of the training wing, and this group had only a token value because of the lack of a suitable type of aircraft

Materialization of the concepts of light and heavy fighters depended entirely on the production of T ypes Bf-109 and Bf-110 aircraft, both of them still in the stages of development for serial production.

Numerically fighter groups increased by 1 April 1937 from seven to fifteen, plus the J-88 group still in Spain, but, apart from the two squadrons with the J-88 group--which were being reequipped with Bf-109 planes--all squadrons were still equipped exclusively with He-51 and Ar-68 planes.

The armament plans of the Technical Office in the autumn of 1937 provided for the following reequipment:[72]

Type	To receive	by	Number of units
Light Fighters	Bf-109s	1 Nov 37	6 groups
		1 Jan 38	8 groups
Heavy Fighters	Bf-110	1937	No Bf-110s were available.

In practice it even proved impossible, however, to meet deadlines for the equipment of light fighter units because serial production of the Bf-109 model was delayed and because the few aircraft of this model available were needed for testing and training purposes and to maintain the combat strength of the two squadrons in Spain.[73]

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72. Source 44.

73. Sources 18 and 46.

94 a

Photo

Model Me-109 Single-Seater Fighter

94b

Model Me-110 Twin-Engine Fighter

INITIAL EXPERIMENTS IN NIGHT FIGHTER OPERATIONS

1937

The views established in the manual THE CONDUCT OF AIR OPERATIONS on the subject of defense against air attack at night resulted, after the experiments which had commenced already in May 1935, in concrete measures based on the experience gained in these experiments.

On 28 April 1937 General Kesselring, at the time Chief of the Luftwaffe Command Staff, ordered the above tests carried out, and also ordered that experiments in night fighter operations were to continue on a broader scale.[74]

Instructions were thereupon issued as follows:

Luftwaffe Administrative Area Command II was to conduct night fighter tests in combined with searchlitht ope rations.

The Senior Commander of Instruction Troops was to conduct experimental night fighter operations, primarily without searchlight support.

Luftwaffe Administrative Area Commands IV and VII were to conduct night fighter exercises in the summer of 1937.

Orders specified that the tests were to be carried out also with Bf-109 planes, and that He-111 planes were to be used as target planes.

The outlines sent forward with the order prescribed the following basic system:

74. Source 47.

A particularly conspicuous approach lane, marked by natural or artificial features, will lead from the tactical airfield of the night fighter to a prescribed waiting area athwart the approach route of the attacker.

The searchlights will be emplaced outside of the waiting area in the direction of the enemy. If an enemy aircraft is sighted, the night fighter will fly towards it to attack in a curve from the rear.

If a hostile aircraft is caught in the beams of three searchlights, the other searchlights will switch off.

The searchlight sites must be so selected that, both in width and in depth, an area can be lighted, which the enemy presumably cannot avoid crossing, and to cross which he will require long enough to enable the night fighter to carry out one or several systematic attack runs.

It will be noticed that in the above system the searchlight area and the waiting or stand-by area are forward of the antiaircraft artillery fire zone and together make up the night fighter zone. This is in complete conformity with the views expressed on the subject in the manual on the subject, which specify a complete separation of the antiaircraft artillery fire zone from the night fighter zone.

Whereas daylight fighters were permitted to continue their attack even within the antiaircraft artillery fire

zone, the danger which the night fighter incurred of being struck by fire from friendly antiaircraft guns appeared too great. The reasons were that the only possibility to differentiate between hostile and friendly aircraft at night was by the sounds of their engines, and this was considered too difficult. Furthermore, it was assumed that in night bombing hostile aircraft would operate at lower altitudes than normal, which would increase the probability of hits by the antiaircraft guns quite considerably.

It can be stated here already that in the later development of the night fighter arm during the war these views still remained valid.

In practice, the development of a night fighter arm in 1937 and 1938 did not proceed beyond the stage of tests with a few squadrons.

It was only in 1939 that a start was made with the organization of night fighter groups, which, however, were changed to daylight fighter groups, because of the outbreak break of the war, even before they could commence their originally planned mission.

REORGANIZATION OF THE DAYLIGHT FIGHTER ARM IN 1938

In the field of daylight fightar forces 1938 brought the subdivision in light and heavy fighters, a change long due in view of the theoretical concepts of the missions of the fighter arm as a whole.

This change was part of a significant organizational change, which neutralized the priority of the air attack concept over the air defense theory. This change was the redesignation of the headquarters known as the Antiaircraft Artillery Command within an air district. Such headquarters from now on were designated Air District Commands, as the combined command authority controlling the antiaircraft artillery as well as the fighter forces within the districts.

This measure, which took place as part of a larger reorganization of the Luftwaffe Administrative Area Commands as air squadron commands, entailed the assignment of the entire fighter arm to the various air district commanders, who at the same time were responsible for the entire ground service organization of the Luftwaffe.

This created the appearance that the fighter arm was intended primarily for commitment in locally restricted missions of air defense, and criticism of the measure was not lacking in fighter arm circles.

Thus, Colonel von Doering, Commanding Officer, 134th Fighter Wing, which was stationed in the Ruhr region, addressed a memorandum to the Commander in Chief of the Luftwaffe expressing the opinion that defense of German territory against hostile air attack could never be achieved if the fighter arm were restricted exclusively to defensive operations. The reasons he adduced were as follows:

1. An attacker can commit the bulk of his offensive forces at a time and in an area which he can decide of his own free will, whereas the defender is compelled to distribute his defending forces over his entire territory, and here due regard must be given to the fact that the possibilities for timely movement of his fighter forces to current areas of main effort are limited by the

factors of distance, weather conditions, and time-in-air capabilities of his aircraft.

This insures the attacker numerical superiority. In air warfare the attacker is thus always superior to the defender.

2. As happened in World War I and in the Spanish Civil War, the attacker can restrict his offensive operations to nights, which would eliminate the defending daylight fighters.

3. The primary objective of air warfare, namely, the achievement of air superiority, presupposes continuous operations to annihilate the hostile air forces.

The only way to achieve this is by means of bomber attacks directed at the hostile air forces and their armament producing centers.

Since the German Air Command adheres entirely to the principle of employing the bomber arm in precision-bombing daylight attacks, the bombers thus employed in the execution of their missions will require protection by friendly fighters against attack by hostile fighters.

4. Employment of the fighter arm for such purposes would produce results far more damaging for the hostile offensive air forces, would complicate the execution of their missions, and thereby would render the best possible services in the interests of air defense of friendly territories.

The memorandum goes on to recommend consolidation of the fighter units in commands comprising a number of wings (in brigades) and that for purely operational missions they should be assigned to the commanders of bomber forces at division level. It also states the requirement for aircraft with longer time-in-air capacities, capabilities in instrument flying, and navigational instruments for radio direction finding at great distances.[75]

The contents of the memorandum gave rise to much discussion

75. Source 48.

discussion in the Luftwaffe General Staff. After lengthy deliberations the Commander in Chief adopted the views of the Operations Division of the Luftwaffe General Staff that it was necessary to organize the fighter forces in depth. This decision was taken on the basis of the following views:

1. Employment of the fighter forces in the manner recommended in von Doering's memorandum would, by reason of the striking range requirements, necessitate a disposition in which the entire fighter arm would be in the frontier or near frontier areas.

2. In such case the danger would exist that

a. Hostile air units would avoid the land front and would penetrate into German territory from the sea, in which case the defending fighters, because of range restrictions, would not be able to intervene in time.

b. Hostile air units would cross the frontier at altitudes above the clouds, in order to attack far in the rear in areas with favorable weather conditions. The defending fighters might in such case be prevented from participation in the defensive battle because of their limited striking range and by weather conditions.

c. Even a commitment of bombers in concentrated attacks might not be able to prevent the enemy commiting elements of his bomber forces in attack operations,

which then would have to be repelled by antiaircraft artillery fire alone.

d. If all fighter units were committed in the near frontier areas, their limited striking range would make it impossible to attack a penetrating hostile bomber force systematically and continuously to prevent the plan-bombing if the target were far in the hinterland and beyond the range of the fighters.[76]

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76. Source 17.

The fighter forces therefore remained assigned to the various air district commands. The farreaching consequences of this newly formulated air defense doctrine are evidenced by the fact that in the event of war it was even planned to discontinue the organization in wings and distribute the groups singly among the various points of main effort in air defense, assigning them to the locally responsible antiaircraft artillery commanders.[77]

Under this planning, the thought that an air district command was not able to direct the operations of a number of fighter groups within its command area and at the same time control the operations of its antiaircraft artillery forces resulted in the establishment of special air defense commands controlling the fighter and antiaircraft artillery forces assigned in specially large defense regions. This measure was in consonance with the directive contained in the manual on the conduct of air operations that large contiguous defense areas should be consolidated to form air defense regions, a requirement which without question implies the establishment of a central command agency in such regions.

It is worthy of note here, that all officers assigned in command of these air defense regions came from the

antiaircraft artillery arm and had practically no knowledge on the subject of fighter operations. It is due to this fact that, in practice, and contrary to the theoretical concept, the fighter forces remained under the direct control of the various air district commands, while the defense region commanders controlled all antiaircraft artillery forces within their command areas.

77. Source 48.

The events just described, which occurred between February and 1 August 1938, can only be understood in the light of the political factors involved.

The invasion of Austria in March 1938 entailed the risk of military conflict with Germany's western neighbors insofar as the German political leaders were by no means certain that such a conflict would not develop. This possibility had to be taken into account.

Since the offensive air forces were intended at the time for use to break any resistance which might be offered in Austria, defensive dispositions had to be given priority against the West.

The measures introduced in the summer of 1938, namely, the assignment of the fighter forces to the air district commands and the establishment of air defense commands, must also be regarded under the aspect of the union of Sudetenland with the German Reich, a plan which was realized in October 1938.

The invitation extended to General Vuillemin, Chief of the General Staff of the French Air Force, to visit the Luftwaffe in mid-August 1938 was motivated by intentions to demonstrate. Besides the inspection of the factories manufacturing bomber aircraft, such as the Heinkel factory at Oranienburg, the guest was conducted on a tour of a number

base airfields of the fighter arm. The fighter arm at that time comprised fifteen groups, of which number not more than five groups had been reequipped with modern Bf-109 planes in place of their old He-51 and Ar-68 models and were ready for commitment. An enormous bluff was organized: The operable Bf-109 planes of a number of groups were flown each day to the field to be visited that day, where they were set up for inspection and where the experts accompanying the French General were free to seat themselves in any one of the planes and convince themselves of the operability of the weapons.

The picture thus presented to the general was that of an armada of factory new Bf-109 distributed over a number of airfields. He could not know that he had already seen the same planes before on a number of other fields. He was deeply impressed both by the bombing equipment of the most up-to-date bomber types presented and, particularly, by the strength of the fighter arm, whose modern types of aircraft foreign powers had nothing comparable to meet.

Since Hitler's planning was directed against the East, a visible demonstration of the strength of his air defenses to the West was essential.

However, the bluff carried out in August 1938 was backed by the true fact that at the time the reequipment

of all fighter units with Bf-109 planes was already in full swing.

In consonance with the requirements stated by the Luftwaffe General Staff the operable range of the Bf-109 planes in addition had been doubled through the construction of reserve fuel tanks in the wings, so that they now had an overall in-the-air capability of 2 hours and 30 minutes. These fighter were thus suitable for their dual mission of defense and of participation with bombers in strategic operations.

On 19 September 1938 the following units equipped with Bf-109 planes were available to the fighter arm:

1 wing headquarters with three groups totalling
112 Bf-109-B/c planes

1 wing headquarters with thriteen groups totalling
471-Bf-109-D planes

In addition a wing headquarters was in existence with five groups totalling 227 Ar-68 planes. All of these units were intended for employment as heavy fighters,[78] but owing to delays in the serial production of the Bf-110 heavy type of fighter plane authorization was given in December 1938 to reequip them with the Bf-109-B/C planes which had become available through the equipment of other units with Bf-109-Ds. To identify them as units intended as heavy fighters, the middle digit of their identification numbers was changed from 3 (the identification digit for fighters) to 4 (the identification digit for heavy fighter groups). Together with the other fighter forces they were assigned to the various air divisions. Together with these measures the end of 1938 brought a considerable strengthening of the fighter arm.

On 1 December 1938 the following were available:

1. Fighter units: 4 wing headquarters, 16 groups, and
1 group in Spain

2. Heavy fighter units: 1 wing headquarters and 8 groups.

This represented an increase over the 1937 status of nine groups, of which five were activated in the spring of 1938 and the other four on 1 November 1938.[79]

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78. Source 49.

79. Source 18.

It can thus be established that in 1938 the defense concept had received a strong impetus, which found expression in a considerable reinforcement of the fighter arm.

At the same time, however, the concept of the strategic use of fighter forces to protect air operations with bombers was not neglected and materialized in the separation of certain fighter units which were intended for a later re-equipment with Bf-110 two-seater planes and were assigned to the air divisions, the commands designed for the conduct of strategic air warfare.

DEVELOPMENT OF THE ANTIAIRCRAFT ARTILLERY ARM 1937-38

The seven regimental headquarters and eighteen new established battalions (13 composite and 5 light) organized from personnel of the second draft in October 1936 were followed by the influx of recruits from the third draft in October 1937. The increases made possible with these new personnel included the establishment of a new regional antiaircraft artillery command headquarters in Air Defense Region VII, Braunschweig (the air defense region had been established on 6 October 1936), 4 regimental headquarters, 6 composite and 9 light antiaircraft artillery battalions, 1 searchlight battalion assigned to the newly established antiaircraft artillery training regiment, and 14 heavy

antiaircraft artillery cadre batteries.[79a]

In a certain sense this indicated a modification of the existing views on the probable form of hostile air operations.

This modification was due in the first instance to the changed German views on the subject of bombers following the death of General Wever, a confirmed adherent of theories of Douhet on the conduct of strategic air warfare

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79a. Source 24.

with the heaviest types of bombers, and the assumption of control over the Technical Office by General Udet, the proponent of the dive-bomber idea.

Although two models were already under development, the Ju-89 at the Junkers Works and the Do-19 at the Dornier Works, the 4-engine bomber project was called off at the end of 1936 in favor of the development of twin-engine aircraft of the He-111, Ju-86, and Do-17 types, as medium bombers.

Another important cause, in addition to political and economic considerations, was the fact that during the critical period following 1935 the lack of adequate fighter and anti-aircraft artillery forces had compelled the Luftwaffe had to rely on flexible operations and concealment in inconspicuous tactical bases as protection for its air units.

It was argued that the possibility to conceal large 4-engine bombers in tactical bases was small, and the risk of losses involved with such large units was a matterof concern.[80]

Furthermore, during the Spanish Civil War low-level attacks by fighters and medium-altitude attacks by bombers against airfields in operation hadplayed an important role on both sides and had resulted in greater importance being attached to the repelling power of light antiaircraft guns than that of the heavy antiaircraft artillery.

80. Source 25.

Another important contributing factor was the skepticism of Goering and Udet, both of whom, as former fighter pilots, doubted the accuracy of bomb aiming from great altitudes in horizontal flight and therefore considered that the future belonged to the attack tactics of vertical and oblique dive-bombing.[81]

It was the outcome of contributing factors such as those just explained which resulted in a relatively larger increase of light antiaircraft artillery units than heavy units, and which also explains the continuation of this circumstance in later developments.

In 1937 the Goering Regiment was incorporated with the antiaircraft artillery arm as a special purposes unit. In addition to one light antiaircraft battalion this regiment included 1 guard battalion to provide normal guard and guard of honor services in the Reich Capital, Berlin, and 1 battalion of parachute riflemen.

At the end of 1937 the overall strength of the antiaircraft artillery arm was as follows:

7 air defense district antiaircraft artillery commands (including 1 naval antiaircraft artillery command);

11 antiaircraft artillery regimental headquarters;

52 antiaircraft artillery battalions, 35 of them composite and 17 light;

1 searchlight battalion;

14 antiaircraft artillery cadre batteries.

Generally speaking, the composite battalions comprised each 3 heavy and 1 medium caliber gun batteries, 1 searchlight battery, and 1 heavy replacement battery.

The light battalions each comprised 3 20-mm gun batteries and 1 light replacement gun battery.

The unit strength in guns was as follows:

Heavy battery: 4 88-mm guns

Medium battery: 9 37-mm guns plus 4 60-cm searchlights

light battery : 12 20-mm guns plus 4 60-cm searchlights.

Each searchlight battery had 9 150-cm searchlights and 6 sound locators.

Each antiaircraft artillery regiment theoretically thus consisted of

A Regimental headquarters staff plus an air signal platoon and a military band

I Battalion (composite) with battalion headquarters and headquarters battery

(Heavy) Batteries 1st-3rd, with 88-mm guns

4th (medium) 37-mm Battery

5th (serachlight) Battery

Replacement battery (heavy).

II Battalion (Light) with battalion headquarters and headquarters battery

6th-8th (light) 20-mm batteries

Replacement battery (light)

(some battalions had only 2 20-mm batteries).

In actual fact the organization of the various regiments varied widely

The cadre batteries were all heavy units intended for use in the activation of new units or for mobilization activations for the purposes of home defense.

Plans for the fourth sequence of activations in the autumn of 1938 provided for the establishment of the following reinforcement forces:

9 regimental headquarters

10 composite battalions (3 of the existing light battalions to be discontinued)

5 composite battalions intended as fortress antiaircraft artillery battalions

15 searchlight battalions (some of them to include the searchlight batteries currently included in the composite battalions already in existence).[82]

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82. Sources 50 and 54.

This program was in consonance with the high significance attached to the antiaircraft artillery arm as a weapon of air defense. The ruling views on the subject were not an outcome of hypothetical conjecture, but were based on actual experience in combat action, with light and heavy antaircraft forces participating, in Spain, and on the results obtained in firing practise with towed targets. These exercises were conducted from 1935 on at the antiaircraft artillery school, Rerik, on the Baltic Coast, for all antiaircraft units and produced surprisingly good results in point of firing accuracy.

However, the fact that the towing planes which moved the targets travelled only at speeds of between 96 and 120 miles and never any higher than at medium altitudes resulted in an overestimate of the effectiveness of antiaircraft artollery fire, which is the explanation for the marked emphasis placed from then on on promotion of the antiaircraft artillery development program.

AIR DEFENSE ZONE WEST

1938

Closely linked with the circumstances described above went planning for the build up of an Air Defense Zone West, the practical realization of which commenced in 1938.

This planning was connected with the establishment of a ground defense zone along the western borders of Germany: the Westwall or Siegfried Line.

The Westwall was intended as an insurmountable bulwark against offensive operations on the ground; in like manner an antiaircraft zone heavily defended by antiaircraft artillery along the western borders was to constitute an insurmountable obstacle against air attacks.

In the rear of the Westwall this zone extended roughly 360 miles along the western banks of the Rhine River from Muenster along the Dutch border to a point approximately level with Mannheimand then southward along the eastern banks of the Rhine River to the Swiss frontier.

When completed this zone was to have a depth of approximately 12 miles in the north to as far down as Wesel, of between 24 and 30 miles in the sector between Wesel and Bonn, and, through inclusion of the antiaircraft artillery defense areas of Mainz, Mannheim, and Stuttgart was to have depths up to 60 miles in the areas south and southeast of Koblenz.

The purpose of this plan was to close the gaps between the existing antiaircraft artillery air defense areas of Muenster, Dortmund, Duesseldorf, Cologne, Mainz, Mannheim, Stuttgart and in the region extending to Switzerland in such a manner that any hostile air unit crossing the German frontiers would come under exceedingly heavy antiaircraft artillery fire during its approach and return flight.

In addition, the zone was to provide protection against enemy pursuit planes for German bombers returning from strategic missions in the West.

In the event of a war in the West, Air Defense Zone West was also to provide protection against air attack for the strategic assembly areas of the Army as well as for supply routes on the ground.

To achieve these purposes plans provided for the construction of approximately 250 permanent type antiaircraft artillery gun positions, most of them of heavy and super

heavy caliber.

The first step taken towards putting these plans into action was the appointment of General Kitzinger as Commanding General, Air Defense Zone West, on 1 June 1938.

On 28 July 1938 Colonel Dr. Weissmann, Wiesbaden, was assigned to head Fortress Antiaircraft Artillery Command III[83]

This command consisted of Reconnoitering Staff Eifel, in Bonn, and Reconnoitering Staff Schwarzwald, in Stuttgart, and by 15 November 1938 established five Fortress

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84. Source 51

antiaircraft artillery battalions, as follows:

31st Battalion at Traben-Trarbach

32d " " St Wendel

33d " " Kaiserslautern

34th " " Speyer

35th " " Bruchsal.

The organization of these battalions was not uniform but was adapted to local circumstances in the respective areas of operations. As composite battalions they were equipped with heavy, medium, and light gun batteries and searchlights.

AIR BARRAGE UNITS

84

1938

The development of air barrage facilities, which had been making progress as far back as in 1935-36 but had then been halted again entered an acute stage in the autumn of 1938.

At the Bad Saarow training grounds, used for the purpose in 1936, a replacement air barrage battery was established, which was to serve as the parent unit for balloon barrage units to be activated according to the pattern used in Britain.

OVERALL ANTIAIRCRAFT ARTILLERY STRENGTHS IN 1938

At the end of 1938 the antiaircraft artillery arm of

the Luftwaffe had the following units:

Air Defense Commands	: 5	(Berlin, Stettin, Hamburg, Duesseldorf, Leipzig)
Antiaircraft Artillery Regimental Headquarters	: 20	plus Reconnoitering Staffs Eifel and Schwarzwald
Antiaircraft Artillery Battalions	: 59	45 bomposite and 14 light

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84. Source 51.

Searchlight battalions	:	16
Fortress Antiaircraft Artillery Battalions	:	5
Antiaircraft Artillery Cadre Batteries	:	14
Replacement Air Barrage Batteries	:	1
Antiaircraft Artillery Schools	:	1

85

The consolidation in searchlight battalions of the searchlight batteries hitherto assigned to composite antiaircraft artillery battalions as a 5th Battery, resulted in the following general organization of an antiaircraft artillery regiment:

Headquarters with headquarters air signal platoon and military band

I Battalion (composite)

Headquarters with headquarters battery

1st - 3d (heavy) 88-mm Batteries of each 4 guns and 1 light 20-mm gun section

4th-5th (light) 20-mm Batteries of each 12 guns and 4 60-cm searchlights

14th (heavy) Replacement Battery with 4 guns.

II Battalion (composite)

Headquarters with headquarters battery

6th-8th (heavy) 88-mm Batteries (as in I Bn)

9th-10th(light) 20-mm Batteries "

15th (heavy) Replacement Battery (as in I Bn)

III Battalion (Searchlight)

Headquarters with headquarters battery

11th-13th (Searchlight) Batteries of each 9 150-cm searchlights and 6 sound locators

16th Replacement Searchlight Battery with 9 150-cm searchlights and 6 sound locators.

In practice the organization of the various regiments varied.

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85. Source 52.

The organization for the light battalions, as independently operating tactical units, the organization was as follows:

Headquarters with headquarters battery

1st (37-mm) Battery with 9 guns and 4 60-cm search lights

2d and 3d (20-mm) Batteries with each 12 guns and 4 60-cm searchlights

4th (light) Replacement Battery with 12 guns and 4 60-cm searchlights.[86]

These organizational changes which had taken place in the set-up of the antiaircraft artillery arm since 1937 show that a large increase in the number of light batteries had occurred. Instead of the 17 light battalions, each 2-3 batteries strong, of 1937 the arm in 1938 had not only 14 independent light battalions of each 1-37-mm and 2 20-mm batteries, but also 2 20-mm batteries in each of the 45 existing composite battalions.

This fact shows again the great significance attached to defense against low-level and medium-level air attacks, a concept obviously resulting from the opinion that, owing to the accurate aiming results achieved in dive-bombing, the future belonged to the dive bomber.

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86. Sources 53 and 54.

It was a logical consequence of such trains of thought that in the field of bomber production in 1938 the decision was in favor of Ju-88 aircraft.

As will be set forth later, this tendency was also to influence decisively the development of the future heavy (twin-engine) fighter, the Me-210, which was already under development as an improvement over the Bf-110.

Planning also provided for a further considerable increase in antiaircraft artillery strengths in the autumn of 1939, comprising seven new antiaircraft artillery regiments. Under the stress of political developments, however, some of these planned new unit activations took place already in the spring and summer of 1939.[87]

EXPERIENCE GAINED IN THE SPANISH CIVIL WAR in 1937-38

As mentioned previously in the chapter on developments in the 1936-Spring 1937 period, the experience gained in 1937-38 in the Spanish Civil War also had an important influence on the basic concepts of the German Air Command in respect to all problems of air warfare.

In spite of the fact that the Condor Legion in the spring of 1937 was reequipped with modern aircraft in the form of He-111 bombers, He-70 and Do-17 reconnaissance planes, and Me-109 fighters, the heavy/numerical superiority of the

87. Source 55.

Reds had made it impossible during the battle for Brunete in 1937 for German bombers to carry out strategic or tactical missions during daylight.

In spite of the enormously superior performances, the two Me-109 squadrons were not in the position during escort missions to hold upward of 100 Red fighters adequately in check to enable the German bombers to execute their missions.[88]

The realization of this fact compelled the bomber group to confine its operations to nights, a method very little suited for the purpose of rendering direct support to the ground forces and which was contrary to the entire German concept of air operations. These experiences were highly disconcerting for the German Air Command. The measures taken to increase the time-in-air capabilities of Bf-109 units to two-and-one-half hours and to promote development of the heavy Bf-110 fighter therefore must be considered in connection with these experiences. The increased penetration range of the Bf-109-D gave these units greater flexibility in operations, both for the purpose of developing concentrations in air defense action and in missions to protect friendly bombers and reconnaissance planes in the near front areas, while the heavy fighter units were to protect bombers on strategic missions against targets far in the enemy rear.

In a sober appraisal of experience gained in the operations of the He-111 group in Spain there could be no doubt that in the execution of daylight operational missions depended entirely upon the availability of heavy fighters for escort purposes, even if the opposing air forces had only fighter types which were not exactly modern.

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88. Source 56.

Also in the battle for Brunete Antiaircraft Artillery Battalion F-88 experienced dramatic moments in its capabilities for dual missions: the missions of air defense, and participation in ground combat.

In the Red conduct of air operations low-level attacks by bombers and fighters were the dominant feature, a result of the superiority of the German Bf-109 at high altitudes and the pronounced effectiveness of the German 88-mm anti-aircraft guns. In air defense on the German side the main emphasis was on the light batteries, the effectiveness of which the enemy endeavored to eliminate by means of surprise low-level attacks. In the battle for Brunete antiaircraft guns alone brought down 16 enemy aircraft within five days, which can be considered a considerable number compared with total Red air strength of only around 200 aircraft. This broke the Red air supremacy and created the necessary conditions for the decisive operations on the ground.

In the all-out attack against Brunete on 25 July 1937 a new form of "total" air warfare made its appearance when the Condor Legion Command, together with the Spanish air units it controlled, and supported by the Italian air units, carried out an operation which can be described as a classical example of continuous attack by bombers, reconnaissance planes armed with bombs, and fighters.

All heavy antiaircraft batteries participated in the battle on the ground, together with the Spanish artillery, which was placed under control of the German antiaircraft artillery for the purpose.

This hail of bombs and shells against the small village of Brunete, which was defended tenaciously by the Reds, continued for several hours. Then came the end. First small groups, then scattered units, and finally whole battalions of the Red defenders left their positions and fled in panic to escape from the holocaust, pursued relentlessly by fighters attacking them at low levels with weapons fire.[89]

The battle for Brunete thus demonstrated clearly the decisive role of air power and its decisive share in the success achieved in ground operations. However, the air forces were only able to play this decisive role after they had gained freedom of movement and after the air over friendly terrain had been brought under control by the friendly air defense forces against the hostile air forces.

This realization governed the strategic concept throughout the rest of the Spanish campaign. All ground operations from then on were supported by air action against the hostile air forces. Prior to the planned offensive in the Madrid sector in December 1937, for example, all German, Spanish, and Italian air units participated in air operations lasting

89. Source 57.

three days against the Red air forces committed in the Zaragoza sector. Besides the intention to mislead the Reds concerning the intended offensive at Madrid, the purpose of these operations was to prevent any reinforcement of the Red air forces at Madrid by forces from Zaragoza once the offensive on the ground was under way.

In the case of the offensive which opened on 9 March 1938 in the Teruel-Zaragoza area, which aimed at a breakthrough to the Mediterranean coast, all air forces were employed initially in attacks against the hostile positions to prepare the way for the attack on the ground and against hostile reserves near the front and then, on 10 March, struck a successful blow against the Red air forces by attacking their airfields.[90]

It was during this offensive, which was to prove the decisive operation of the Spanish Civil War, that the Bf-109 began its sensationally triumphant course, which proved its superiority over all aircraft types employed against it by the Red air forces. The modern Martin bomber had no chance whatever against it, and within a few minutes one German fighter alone shot down four bombers out of a formation. The Red fighters were unable to match the Bf-109 in speed or in operating altitudes.

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90. Source 58.

91. Source 59.

And so the Bf-109 became the key to air superiority in all circumstances, whether it was escorting He-111 bombers on their missions, operating on roving missions to clear the skies over Red territory of hostile aircraft, or patrolling the air over friendly front areas.

The high importance of this weapon for attack and defense was understood and resulted in the reequipment of the 3d Squadron of the J-88 Wing with Bf-109s instead of the He-51 it still had as a ground-support squadron.[92]

After the autumn of 1938 the Red air forces never again gained the initiative. What could be called a game of cat and mouse began between the J-88 Wing and the Red air forces, with the J-88 Wing playing the part of the cat.without any room for dispute.

One great advantage here was that the wing had been reequipped with Bf-109-D planes, with their increased time-in-air capability of two-and-one-half hours. This made it possible now for the K-88 Bomber Group to be employed against strategic targets farther in the enemy rear, escorted by the fighters of the J-88 Wing, whenever necessary.

The period lasting from the breakthrough to the Mediterranean coast to the opening of the Katalonia offensive on 23 December 1938 was dominated completely by action

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92. Source 46.

against the Red air forces. The purpose of these operations was to so far decimate the Red air forces on the ground and in air action that air supremacy could be clearly established before the opening of the offensive on the ground-- a classical example of the offensive solution of the air defense problem.

The Reds reacted to thise tactics by avoiding all air battle and protecting their units against attack on their airfields by hiding them on frequently changing fields.

Occasionally they risked sending out their few Martin bombers, with a strong escort of foghters, to bomb targets at the front. How to provide fighter protection against such attacks was a problem, since there was an interval of only five to eight minutes between the time the approaching enemy units could be spotted by visual observers at the front and the time they would drop their bombs, so that even planes going into action in a scramble take off necessarily would arrive too late.

The solution found for this defense problem was to have the front areas reconnoitered frequently by units of two to four Bf-109s. It happened repeatedly on such occasions that an approaching Red formation was completely scattered by a single attack of a few Bf-109s before even reaching the front. In such cases the Red bombers simply jettisoned their bomb

loads over their own territory and turned away to return to their bases at top speed in a downward slope. The escorting Red fighters would dive down to near ground levels and fly back singly to their bases.

Even when Red fighters appeared in giant formations of 50-100 aircraft to demonstrate their might in the front areas their reaction to attack was just the same: An attack by a pair of Bf-109s was sufficient to scatter the entire formation and put it to flight.

The demoralizing effect which the superior performances

of the Bf-109 produced was so marked that the Condor Legion Command could afford to risk dispatching its K-88 units, escorted by the J-88 Wing units, repeatedly to bomb the port of Barcelona, 90 miles distant from the front. Red fighters actually took off each time these formations were reported approaching, but avoided attacking as soon as the presence of Bf-109 escort fighters was observed.

Bombing of the Red airfields produced no satisfactory results, since the Reds salvaged their planes by taking off in time. Thus, during the Katalonia offensive, well prepared special action was required to strike the Red air forces a decisive blow. This mission fell to the lot of the J-88 Wing. At morning dusk on 12 January 1939 approximately 35 Bf-109s took off from their airfield at the mouth of the Ebro River, La Cenia. Flying at a low altitude far across the sea in a northeasterly direction, they turned west at a point carefully plotted by course and time, and with a strength of three squadrons attacked the Red fighter airfields at Taragona, Reus, and Valls in surprise low-level raids.

The Rata fighter group at Reuss was just about to take off and dispersed in all directions at the moment the Bf-109s were climbing for their attack. At the other fields complete surprise was achieved. This action accounted for 12 Red fighters burned on the ground.[93]

93. Source 3.

With the mounting air superiority on the side of the Spanish Nationalists, the antiaircraft artillery units of the Condor Legion became increasingly indispensable for direct fire against ground targets. More than 50 percent of the units were constantly attached to the Spanish divisions and achieved decisive successes against pockets of resistance and Red tanks which they took under direct fire. The batteries left behind to protect the tactical bases of the K-88 and J-88 units rarely had an opportunity to prove their defense capabilities.

During the period from September 1938 to the end of the civil war the Red air forces made only one attempt, with 7 Martin bombersin October 1938, to attack La Cenia. The defending 88-mm antiaircraft battery shot down one of the attackers while a pair of planes from the J-88 Wing took-off immediately and brought down another two, This was proof that the air defenses were proof against all surprise attacks.[94]

From the account just given of the events in the Spanish Civil War from 1937 to early 1939 the decisively important role played by the fighter and antiaircraft artillery arms played in deciding the outcome of the war is evident. The problem of air operations became primarily a problem of

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94. Source 3.

achieving air superiority and mainatining air supremacy during preparations for and the execution of operations on the ground. This implied nothing less than that an offensive air force would necessarily remain ineffective if the enemy defense forces denied it freedom of movement over enemy territory.

Spain had proved that the key to air supremacy was to be found in a fighter arm equipped with aircraft superior to those of the enemy in their performances. The greater this superiority in quality, the less important was the factor of quantity. Air defense of friendly territory was just as much a mission of the fighter arm as was the protection of friendly offensive air forces during their operational missions over enemy territory.

The logical result of these realizations was that, for the Luftwaffe, 1938 witnessed a materially larger increase in the strength of the fighter arm, after the fulfillment of the bomber program, and that it was understood that steps must be taken to create a strategic air arm, consisting of so-called heavy bombers, with the specific mission of protecting bombers during the execution of their strategic missions over enemy territory.

The tendency in this latter direction was given special emphasis by an order from the Commander in Chief of

the Luftwaffe dated 20 September 1938 to the Chief of the Technical Office "to develop the heavy plane in such a way that its range will enable it to cover England."[95]

In the case of the antiaircraft artillery it is also possible that the proof given in Spain of its combat value in both air defense missions and ground operations contributed towards the circumstance that the large program of expansion for 1939 was not only maintained but that the deadlines for completion were even advanced.

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95. Source 60.

1938-39 PLANNING FOR EXPANSION OF THE LUFTWAFFE
DEADLINE 1942

Insofar as plans for the continued expansion of the Luftwaffe were concerned, 1938 so far was the most important year. The appearance of the Luftwaffe with its modern and superior weapons in Spain, the proved superiority in technical performances of the Bf-109, and even of the Do-17 bomber, over foreign aircraft types at the International Air Meet in Zuerich in 1937, the demonstrations given before French General Vuillemin, the world record established by General Udet on 5 June 1938 with a Heinkel He-100 fighter--a type also shown to General Vuillemin during his visit to the Heinkel factory at Oranienbur as a type in serial production--, all of these circumstances contributed towards giving the Luftwaffe a decisive weight which intimidated foreign countries in the face of Hitler's political steps, of which the invasion of Austria in 1938 was a characteristic feature.

The successful use he had been able to make of his Luftwaffe and of the armament of the Western Allies in his political play, influenced Hitler in 1938 to call for an exceptionally large expansion of the Luftwaffe. His demands brought about a complete departure from current planning, which was adapted to Germany's existing capabilities in the fields of finance, personnel, and materiel. The Luftwaffe

General Staff considered Hitler's demands impossible to fulfill and worked out a compromise plan, which also appeared hardly possible to fulfill but which was designed to satisfy Hitler for the time being.[96]

The program established in October 1938 and which was to be completed by 1 April 1942 provided for an overall strength of

45 700 aircraft.

Of this number a total of 11 800 aircraft of all types were available in 1938. The overall total number of aircraft to be manufactured by 1 April 1942 was 31 300, including

9 000 bombers

4 300 fighters

3 500 heavy fighters

200 ground-support planes

4 000 transport planes.

The rest were to be liaison, tactical reconnaissance, Type B-1 and B-2 training, and passenger planes.

In addition, the program called for the production of

30 000 antiaircraft artillery guns, caliber 20-mm, Type 30

5 000 " " " " 37-mm, Type 18/36

8 200 " " " " 88-mm, " 18/36

2 000 " " " " 105-mm, " 38

besides which 100 128-mm Type 40 antiaircraft guns, a type

already under development in 1938, were also to be made available by 1942.

In order to insure the availability of the necessary aviation fuel supplies, plans provided for German production to reach a goal of 20 000 cubic meters per month in the last quarter of 1941. By 1 April 1942 a total of 10 000 000 cubic meters were to be placed in reserve stocks from imports and domestic production.

In a compilation prepared by the Chief of Special Supplies and Procurement on 13 December 1938 for an oral report to the Commander in Chief of the Luftwaffe the following program was considered achievable by 1 April 1942:

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96. Source 61.

Production	Nubmer	Available	Number	Total
He-177 & Ju-88	7 700	He-111 & Do-17-Z	3 200	10 900
Fighters	as required			4 300
Twin-engine fighters	300 less than required			3 200
Ground-support aircraft	as required			200
Transport planes				2 000

A considerable reduction in the number of various types produced and simplification of the types to be produced was stated as a condition essential for attainment of the program.

Furthermore, all existing manufatturing facilities plus planned expansions should concentrate on fulfillments of the program.

Type-Bf-110 and Bf-109 were intended as strategic fighters and for air defense purposes.

By 1942 the Bf-110 was to be replaced by the Me-210.[97]

The last item above was stated as a requirement by the Luftwaffe General Staff in August 1938 because the range capabilities of the Bf-110 were smaller than had been expected. The first series had been powered by 670 horse-power Jumo-210 engines and, although not quite, had almost been capable of the required range of 1 600 miles. However, the

speed performances no longer met the requirements for a modern escort fighter.[97] The installation of a different engine, the DB-601 1 100 horse power engine, produced completely satisfactory results as a fighter, but the increased fuel consumption reduced the plane's range to 660 miles, so

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97. Sources 62 and 184.

planning would have had to be based on a penetration range of not more than 270 miles, or even only 210 miles if making an allowance for 30 minutes of combat in the target area.

The bombers had a penetration range of 600 miles, so that it was impossible to take full advantage of this range if the Bf-110 was used to escort them, and this would have placed restrictions on all strategic air planning.

The new specifications for twin-engine aircraft stipulated an operating range of 1 200 miles, which would give them a penetrating range of 600 miles, equal to that of the bombers they were to escort.

These considerations had given rise to the Me-210 project, and the Me-210 was to be in full serial production by 1942 to replace the Bf-110.

In a later chapter of the present study the reasons will be given why this development project also ended in failure.

THE AIRCRAFT REPORTING SERVICE IN 1937-38[98]

The aircraftreporting service continued to expand. In 1937 and up to May 1938 it was under the direction of the Aircraft Reporting Staff Officers, who were attached to the air regional commands (Luftkreiskommandos) until 4 February 1938 and from then on to the various air force squadron headquarters.

The basic view continued in force that the entire

98. Source 25.

service should be based on a militia system. The whole organization was nevertheless given something of a military aspect by the fact that the air observation detachment commanders were awarded the status of reserve officers of the Luftwaffe.

During the large joint armed forces maneuvers lasting from 20-25 September 1937 the aircraft reporting service was set in operation within a large framework for the first time. The results proved so satisfactory that there was no reason to make any organizational changes.

The system under which the Reich Post and Telegraph Services made the necessary signal communications network and the necessary signal instruments available had proved sound in every respect.

The organization to secure quick manning and operability of the reporting network was excellent. Within a space of time varying between 20 minutes and two hours the reporting personnel were alerted, the postal authorities had connected the lines, and the telephone centers were manned. Out of the three standby teams of the air observation detachments and air observation posts at least one was on the spot within this time, so that complete operability within the regions was established.

The fact that direct lines of communication were

established between the various fighter and antiaircraft artillery command posts and the nearest air observation detachments insured immediate orientation on the air situation within the region of each air observation detachment. The overall air situation was posted in the aircraft reporting centers at the air regional command headquarters and provided the necessary data for decisions taken in directing air defense action, particularly when it was necessary to concentrate defense fighters in areas of main effort.

In the field of troops aircraft reporting services, the first motorized aircraft reporting company established as part of the Air Signal Corps in 1935 had been transferred to the Condor Legion in Spain. The establishment of another company, also motorized, with the air training division expanded the basis of the service. This company also took

part in the joint armed forces maneuver in 1937 and proved, as experience in Spain had already shown, that a reporting system based exclusively on radio transmission produced useful results.

In May 1938 the entire aircraft reporting service, the personnel of which hitherto had in some cases the status of reserves officers of the antiaircraft artillery arm and in other cases of the Air Signal Corps, was incorporated uniformly with the Air Signal Corps.

The air observation detachments now were attached to signal battalions of the several air district commands as aircraft reporting reserve companies.

Training was now a responsibility of the parent air signal battalion, and officer personnel from 1 July 1938 on were trained in special courses at the Air Signal School, Halle.

The whole measure just described was due to the feeling that a reporting organization whose functioning depended completely upon a mastery of the various means of technical signal communications, such as wire and radio communications, should be controlled by the Air Signal Corps in respect to training and operations.[99]

The concrete views held concerning the importance of

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99. Source 7.

the aircraft reporting service are reflected in a bulletin dated 12 May 1937, which was compiled by the Air Force Academy, Berlin-Gatow, and used in the instruction and training of General Staff Corps officers.[100]

The bulletin summarizes the missions of the aircraft reporting service as follows:

a. through surveillance of hostile air activities to provida the data necessary for an estimate of the air situation;

b. through speedy reporting of hostile aircraft sighted to insure timely counteraction by the defending forces, in particular to give fighter forces time enough to gain operating altitudes before the arrival of the enemy;

c. through the timely reporting of approaching hostile aircraft to the air raid warning services and to the railroads aircraft warning service to make possible the implementation of preplanned air raid precaution measures before the actual air attack can commence;

d. to report all extraordinary happenings (such as the landing of hostile aircraft, the air landing of troops and/or individuals, the airdrop of messages, light signals given by aircraft and/or from the ground, etc).

100. Source 63.

The bulletin also give an outline of the organization of the reporting system, as follows:

a. Aircraft reporting detachments (or centers): report collecting centers distributed at intervals of between 50 and 60 miles.

b. Air observation posts: report collecting centers spaced approximately 6-7 miles apart. Through their air observers they provide continuous lines of air observation, which criss-cross the entire territory of Germany. The parallel lines are spaced approximately 50-60 miles apart, with smaller spacings near the frontiers.

Field armies may be assigned aircraft reporting companies which will be employed to close gaps in the network in flank areas, etc.

Concerning the control of the service, the bulletin states:

Control of the aircraft reporting service:

In zones of operations: the commanding officers of the tactical air forces attached to army headquarters. In the Home Air Defense System: the appropriate air district commanders.

DEVELOPMENT OF THE AIR DISTRICT COMMANDS

For a better understanding of the subjects dealt with

in the present study it is necessary to explain here, from the field of command organization, that within the scope of the organization structure of the Luftwaffe the concept Luftgau [translated here as Air District Command] had a varying connotation at different times.

From 1936 to 12 October they were areal command divisions of the Luftwaffe itself. In regions in which there was a headquarters of a Senior Commander of the Antiaircraft Artillery, this officer was the commander of his Luftgau. Each Luftgau was designated by the locality of such headquarters. The localities were as follows:

Air Regional Command II (Luftkreiskommando II) : Berlin, Stettin.

Air Regional Command III : Dresden, Breslau, Weimar.

" " " IV: Muenster, Giessen.

" " " V : Stuttgart, Munich, Nuremburg.

" " " VI : Hanover, Hamburg.

Pursuant to a directive from the Commander in Chief of the Luftwaffe dated 12 October 1937, the geographical boundaries of the air district commands (Luftgaue) were adjusted to coincide with the corps command areas (Wehr-Kreise) of the Army. Thereby the Air Regional Commands were to be designated with Arabic numerals, the Air District Commands (luftgaue) with Roman numerals.

With the reorganization of the command structure of the Luftwaffe on 4 February 1938, in the course of which the existing 7 air regional commands (LuftKreisKommandos) were consolidated to form 3 air forces squadron headquarters (LuftwaffengruppenKommandos) plus the Air Command Eastern Prussia and the Naval Air Command, some of the existing air district commands also were consolidated and a new headquarters, Air District Command I, Koenigsberg, was established, so that the following air district commands (LuftgauBereiche) now existed:(See Appendix 2):

AF Squadron HQ I (East) Berlin with the following air district commands:

III Berlin

IV Dresden

VIII Breslau

AF Squadron HQ 2 (West) Braunschweig with the following air district commands:

VI Muenster

X Hamburg

XI Hanover

AF Squadron HQ 3 (South) Munich with the following air district commands:

VII Munich

XII Wiesbaden

XIII Nuremburg

Air Command Eastern Prussia, Koenigsberg, with

Air District Command I, Koenigsberg/Eastern Prussia.

Naval Air Command, Kiel [101]

101. Source 1.

The fact that the aircraft reporting centers, as the central reporting and processing stations, were at the headquarters of the various air district commands which, owing to the frequent union of functions with the district senior antiaircraft artillery officer were generally adapted principally to the interests of the antiaircraft artillery arm, certain organizational changes in respect to the reporting system proved necessary. The basic change was the previously mentioned incorporation of the entire reporting system with the air signal units of the air districts. Furthermore, the consolidation of the two positions of Senior District Antiaircraft Artillery Officer and Air District Commander provided a much firmer control of air defense matters. The newly established Air District Commanders controlled all air defense branches within his command area, including fighter and antiaircraft artillery forces, the aircraft reporting service, and the air raid precaution system. The balance was maintained in this command pattern by assigning both antiaircraft artillery and fighter personnel.

THE AIR RAID PROTECTION SERVICE IN 1937-38[102]

Appreciable progress was made in the organization of the air raid precaution system in 1938.

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102. Source 8.

As mentioned previously, in the discussion of the basic regulations contained in the manual THE CONDUCT OF AIR OPERATIONS, the problem of how to protect industrial installations and large residential areas against the effects of air attacks was a cause of great concern.

Paragraph 191 of the manual provides for retaliatory attacks in reply to possible intimidation attacks an enemy might carry out against residential areas within striking range of his forces.

Special mention is made of the fact "the morale of the civilian population must be supported by means of appropriate defense measures" and that for this purpose civil defense is of particular importance.

This purpose was served by the organization of the fire fighting services under the Reich Law of 1938. The main point in this law as it affected the existing fire fighting services was that, while they were left under the various municipal authorities, they were at the same time incorporated with the police forces, as a technical police force on an equal footing with the security and rural branches of the regular police, and thus were placed under the Ministers of Interior of the various constituent states of the Reich. Their equipment was standardized and their over-

all strength in motor vehicles was increased from 4 200 in 1935 to a total of 10 000. The entire personnel strength of the fire fighting police within the Reich in 1938 totalled roughly 280 officers and 12 000 enlisted men.[103]

Hand in hand with the above went the materialization of the existing theories on the implementation and functioning of the air raid precaution services on the basis of interpretations of the air situation furnished by the aircraft reporting service. In the previously mentioned pamphlet of the air force academies dated 12 May 1937[104] the air raid warning system is described as the link between the aircraft reporting services and the civil air defense system.

Its missions were to give timely warning to certain areas and local installations concerning a threat of air attack, to initiate preplanned air raid precautionary measures of a general nature, such as blackouts, and of a special nature, such as the requirement to take cover in air raid shelters and the organization of fire guard and decontamination teams, and to give the all-clear signal when danger

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103. Source 64.

104. Source 63.

was passed.

For the performance of these missions the whole system was organized in

a general air raid warning service and

a local air raid warning service.

As part of the general air raid warning service, the various air raid warning centers were to assume responsibility for the appropriate functions in areas not more that 24 miles in diameter, and for this purpose were to be in close contact with the appropriate aircraft reporting centers.

What was called air raid warning posts were responsible for the local warning services; within the local centers of the air raid warning sectors and sub-sectors and in the offices and premises of authorities and factoeires, etc., they were to assume their functions in order to initiate the air raid precaution measures commensurate with the current situation.

Considerable progress was made in preparations for the measures of civil air protection in 1937-38.

The responsible authorities here were

1. The Technical and Auxiliary Service (Sicherheits und Hilfsdienst) as an official organization. It included police, fire fighting forces; the decontamination,

medical, veterinary, and repair emergency services; specialist teams for gas, water, and electricity; and in port areas was manned by seagoing personnel with appropriate equipment. These forces were intended for mobile employment, including missions outside of their atation areas. Some of them were motorized.

2. The Factory Air Defense System. This consisted of teams formed from the personnel of the individual industrial and other installations, who had received training and had been issued the necessary equipment to enable them to handle all problems resulting from an air attack.

3. Individual Air Raid Protection. This included the air raid wardens appointed in each large residential block. They were responsible for the necessary preparations and for the issue of the necessary instructions to all persons living within their blocks, and had received training appropriate to the purpose.

The most important duty of this organization was to see that all attics were cleared of all unnecessary materials which were flammable and to insure that fire extinguishing materials, such as sand and water, were readily available for quick measures to avert the danger of fire caused by incendiary bombs.

They were given appropriate training in quick methods of fire fighting and all inhabitants of buildings received instructions on the best methods for the quick extinguishing of incendiary bombs.

4. The Air Raid Protection Forces of the Reich rail Services and of the Post and Telegraph Sustem.

These were organized in the same manner as the official Technical and Auxiliary Service and were responsible specifically for the protection of railroad and postal installations.[105]

For a proper allocation of the air raid protection forces and also for the overall planning for the assignment of air defense forces a proper appraisal of the degree of protection a possible target/was needed required.

Information on this point was available in the Targets for Air Defense (Luftschutzobjektkartie) Register. Work at compiling this register had commenced as early as in 1935 on the basis of data furnished by the Ordnance Offices of the Army and the Navy, Branch 5 of the Luftwaffe General Staff, the Economics Ministries, and the Luftwaffe Technical Office.

The basic appraisal of the defense requirements of industrial targets was handled by the Economics and Armaments Office, a division of the Joint Armed Forces (Wehrmacht)

105. Source 63

High Command.

Following this step The Luftwaffe General Staff, after a careful analysis of the geographical position and the vulnerability of the target to air attack and of the available means of defense assigned the target its definite classification.

The register was forwarded to the air district commands as the autorities responsible within their areas for the execution of all air defense measures. Here the necessary supplementary entries were made in accordance with local circumstances.

The air district commands were responsible for all planning concerning the employment of means of defense in the ecent of war.

As a result of the measures just described all defense targets were classified in different categories in accordance with their importance, as follows:

1. Special Category. Installations of vital military importance, which were to be provided provisional protection against air attack at an early date even if no internal or foreign complications existed.

2. Category I. Particularly important targets, which might be subjected to attack within the first few hours after the outbreak of a war.

Targets in this category were to be assigned defense forces prior to general mobilization.

3. Category II. Targets the defense of which only became acutely necessary after mobilization.

4. Category III. Targets of which it could be assumed that they would only be threatened by air attack if certain strategic conditions existed on the enemy side.

In addition to this classification in target categories, which indicated the importance of a target, provisions were made to establish priorities according to current urgency, which served in determining the strength of defense forces to be assigned inaccordance with the current military situation.[106]

For measures of passive air defense the residential and industrial centers were classified in Air Protection Areas of Categories I, II, and III.

These categories governed the organization and allocation of passive air defense forces and means, which were available as follows:

Air Protection Area Category I: Individual Technical and auxiliary services, partly motorized.

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106. Source 65.

Air Protection Area Category II: Only police and municipal forces suitable exclusively for local assignment, in addition to the various factory air defense services and the individual air raid protection services.

Air Protection Area Category III: Only factory defense services and individual air raid protection services.

This whole well considered organization of the air raid protection system is a very clear indication of a concept envisaging the utmost importance of the use of air power, in the event of war, in the sense of the theories expounded by Douhet.

It is worthy of note in this connection that the manual on the conduct of air operations quite objectively includes in its calculations the possibility of intimidation air attacks against industrial regions as an unavoidable result of modern air warfare.

The extraordinarily heavy concentration of industrial areas closely linked with residential areas in certain regions of Germany logically implied, if the enemy were to wage air warfare consistent with strategic concepts, that the civilian population of these densely populated areas automatically would be exposed to the the direct threat of air attacks. That this threat would exist was to be assumed in spite of the conditions of International Law and

even without supposing that an enemy, disregarding these provisions, might launch air attacks directed primarily against civilian residential areas.

In view of German concepts of strategic air warfare, according to which each bomber would be armed with a certain percentage of incendiary bombs ~~to~~ be used together with explosive bombs,--a combination which alone could be expected to produce decisive overall results, particularly in attacks against industrial installations with highly flammable materials,--the danger from indendiary bombs was considered as particularly acute.

Views on this subject were decisively influenced by a sensational book published in 1931 by Branddirector [civilian rank in the fire-fighting services] Hans Rumpf under the title Brandbomben, ein Beitrag zum Luftschutz (Incendiary Bombs, A Study on Air Defense). Later, Rumpf was appointed Inspector General of Fire Fighting Services and organized the Fire Fighting Police.[107]

The use of smoke screening as a means of protection against air attack was still in the experimental stages in 1937-38.

Responsibility for these experiments rested with the motorized smoke-screening battalion created in 1936 in

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107. Source 64.

connection with the Reich Institute for Air Defense.

Under orders from the Reich Air Ministry a large-scale smoke screening exercise was conducted in the terrain near Stettin in September 1937. The targets designated for protection were an electric power station and a fuel depot situated in close proximity to a system of canals and thus a target which could be detected easily from the air.

A novel feauture here was that, concurrently with the smoke screening of the actual target area, dummy smoke screening operations were to be carried out in the area opposite to the direction of the wind. The purpose was to conceal all canals, which might have served as a guide to the target, against air observation.

The tests produced a closed smoke cover extending nearly 3000yards in breadth and 6000 yards in depth lasting for a period of 30 minutes over the targets.

Air observation showed that the targets themselves and all conspicuous landmarks within the smoke-screened area were completely concealed, so that smoke screening could be considered a successful means of protection.

However, the Luftwaffe failed to act directly on the results obtained insofar as the establishment of new smoke-screening units was concerned.[108]

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108. Source 37.

SUMMARY

In summarizing, the following can be said concerning the evolution of views in the Luftwaffe on the subject of air defense in 1937-38:

1. In the build up of the air forces the significance of the fighter arm, both for purposes of air defense and air attack, became the prominent feature and found expression in the expedited creation of new light and heavy fighter units.

2. The appraisal of the antiaircraft artillery arm as a means of defense was confirmed by the results achieved by this arm in operations in Spain and provided the basis for the comprehensive program established for the activation of new units, in which particular emphasis was placed on light and medium caliber guns because of the newly introduced methods of low-altitude bombing.

3. The realization that the entire air defense system hinged upon a smoothly functioning aircraft reporting system became evident in a comprehensive development of this organization, with which, in the event of war, the troops aircraft reporting services were to be integrated to insure proper consolidation with occupied enemy territories.

4. As a result of the realization of the important impact modern air warfare would have on the civilian population and on industrial installations, considerable progress was made in the thorough organization of passive air defenses.

5. Through the consolidation of light fighter, antiaircraft artillery, and aircraft reporting forces, as well as those responsible for the passive air defense system, under the control of the air district commands a firmer command organization was established in the field of air defense.

The fighter arm, as a highly mobile means of air defense was initially restricted to certain areas in this set up, and in certain cases was even restricted to specific targets. However, the responsibility assigned to the higher level commands for air defense within their areas provided the possibility to develop main concentrations in any one of the air districts under their command. Furthermore, the assigned heavy fighter units were available for this purpose insofar as they were not currently engaged in escorting bomber forces on attack missions. Up to the end of 1938 these units admittedly were still only a theoretical factor since, apart from the training group with the 1st Training Wing, none of these units were as yet equipped with the intended Bf-110 heavy type of aircraft but instead were provisionally equipped with Bf-109-B/C planes of only limited striking range.

6. Measures to increase the range of light

fighters of the Bf-109-D type indicated the tendency to make more use of light fighters in the strategic mission of escorting bomber forcesand leaving the mission of air defense primarily to the antiaircraft artillery. This development was due largely to the influence of the experience of the Condor Legion in Spain.

7. In planning for the continued build up of the Luftwaffe in 1939 considerably bigger allowances were made for air defense than for the weapons of air attack.

In this connection, however, consideration must be given to the fact that quicker progress had been made in the build up of the bomber arm, and that by 1939 the temporary target of 30 groups of medium bombers plus 9 1/3 groups of dive bombers had already been achieved. The final ratio of bombers to fighters, to be achieved by 1942 was

10 900 bombers to 4 300 fighters and 3 200 twin-engine fighters or a ratio of 1.5 to 1.

Since the twin-engine fighters were intended primarily as offensive forces, it can be established here that it was envisaged in 1938 that the offensive theory would dominate for a long while td come.

Sight must not be lost here of the fact, however,

that destruction of the hostile air forces by means of air attacks against their airfields within their own territory was the best means of preventing their execution of attacks against friendly territory.

The basic concept just outlined therefore is not evidence of any neglect of the requirements of air defense, particularly since the twin-engine fighter forces could always be used to reinforce the defensive fighter forces if the military situation made it necessary to place main emphasis on air defense. Furthermore, this concept was consonant with the old principle of army strategy that the attack is the best means of defense.

GERMAN AIR DEFENSES
January to 1 September 1939

COMMAND ORGANIZATION OF THE LUFTWAFFE

The beginning of the year 1939 was marked by the signs of renewed organizational shanges in the structure of the Luftwaffe.

With the redesignation of the air squadron commands as air fleet commands the effort was made to adapt these headquarters to the structure of the Army. (Appendix 3)

The changes involved changed nothing in respect to thatfact that, in the sense of Paragraphs 246 and 247 of the manual THE CONDUCT OF AIR OPERATIONS, each air fleet headquarters was responsible for the entire air defense system within its command area, just as it was responsible for the conduct of operational air warfare with the forces assigned to it.

The command authority of First Air Fleet Headquarters at Berlin was expanded by extending its command to include Air Command Eastern Prussia. One month later Air Command Ostmark* was reorganized as an air fleet headquarters and designated responsible for the areas of southeastern Europe.

It is worthy of note, however, that Air Defense Zone West remained under the direct command of the Commander in Chief of the Luftwaffe.

* As Austria was called after annexation by Germany.

The explanation for this is that the areas involved at Germany's western frontier were within the command areas of the Second Air Fleet (West) and the Third Air Fleet (South)and therefore had to be placed under the authority higher that the two air fleets, namely under the Commander in Chief himself.

Within the new command organization the division of responsibility for air attack and air defense was clearly defined.

The air fleet headquarters controlled

1. The air divisions, as the commands intended for the conduct of strategic air operations, with their reconnaissance, bomber, and twin-engine fighter forces;

2. The air district commands, responsible for air defense, with their fighter and antiaircraft artillery forces, and aircraft reporting and passive defense services. In critical areas the air district commands controlled air defense commands as special headquarters to control the assigned fighter and antiaircraft artillery forces and insure maximum effectiveness of both arms. One change as compared with 1938 was that Air Defense Command Stettin had been transferred to Hanover.

So far as the ground service organization was concerned, the air district commands were responsible for all functions within the command areas. In most cases these commands were headed by officers from the antiaircraft artillery arm.

DEVELOPMENT OF THE FIGHTER ARM IN 1939[109]

As a symbol of the strategic employment for which they were primarily intended, the heavy fighter units, in addition to the changed middle digit of the designation numbers, which dated back to December 1938, were redesignated as twin-engine fighter wings (Zerstoerergeschwader) on 1 January 1939 in place of their former designation as fighter units. This measure was taken in spite of the fact that they had been easily identifiable by their middle digit "4", the digit for heacy fighters as against the middle digit "3" used to identify normal fighter units.[110]

The creation of the term destroyer plane (Zerstoerer: the term designating twin-engine fighters in the Luftwaffe) was the tangible sign of a coming tendency to consider the twin-engine fighter arm as more than merely a fighter with a longer striking range and more heavily armed. Firing tests with the armament of 4 machine guns and 2 20-mm cannon, rigidly mounted in the gunner's cockpit, had produced terrifically destructive effects against all types

of target material.

In a unit commander conference at the Reich Air Ministry in August 1939 the Commander in Chief of the Luftwaffe expressed the opinion that the "destroyer" or twin-engine fighter units of the Luftwaffe should be considered

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109. Sources 1 and 66.

110. Source 18.

as elite units which, whenever critical situations developed, were to master the crisis by means of the destructive effects of their weapons. Here, it was also considered part of the mission of twin-engine fighters escorting bombers to dive down before the actual bombing run and silence the enemy antiaircraft fire through low-level attacks with weapons fire.[111]

The spring of 1939 therefore was marked particularly by the continued build up of the twin-engine fighter arm, a process naturally carried out at the expense of the normal fighter forces, since the fighter pilot school at Werneuchen up to 1 March 1939 was the only school available for the training of personnel for both the normal and the twin-engine fighter forces.

Although the former fighter school at Schleissheim was reestablished on 1 March 1939, no trained personnel could be expected from this source before the autumn of the year. For this reason the build up of the normal and twin-engine fighter arms had to depend on the only fighter pilot school available at the time.

The training capacities of this school had been seriously reduced in the autumn of 1938, furthermore, by the use of isntructors and advanced trainees together with

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111. Source 3.

training aircraft to organize a provisional fighter group, the 4th Group, 132d Fighter Wing, in October of that year to support the forces invading the Sudetenland. Naturally, it was some time before the gaps thus caused in the personnel and materiel complements of the school could be closed.[112]

Not including the Condor Legion, the Luftwaffe on 1 June 1939 had available

13 fighter groups plus 1 night-fighter experimental squadron (10th Squadron, 2d Fighter Wing) and

10 twin-engine fighter groups

On 1 November 1938 the fighter forces had consisted of

16 fighter groups plus 1 carrier-based squadron (1st squadron, 186th Fighter Wing), and

8 twin-engine fighter groups.

The overall total of 24 normal and twin-engine fighter groups in existence on 1 November 1938 thus by 1 June 1939 had been reduced by 1 normal fighter group (1st Group, 333d Fighter Wing) which it had probably been found necessary to use for the reestablishment of the Schleissheim fighter school.

Another 2 normal fighter groups were transferred to the twin-engine fighter arm (1st Group, 231st, and 3d

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112. Source 18.

Group, 133d Fighter Wing).

It must therefore be noted here that by early 1939 the fighter component of the air defenses had been weakened by 3 fighter groups.

This circumstance was particularly serious since this weakening could not be considered unconditionally as compensated for by the growth of the twin-engine fighter arm.

Consideration must be given to the fact that the twin-engine fighter forces, by reason of their assignment to the air divisions and their resultant close contact with the bomber and reconnaissance forces, necessarily would become estranged in their entire outlook from the air defense forces, which were consolidated under the air district commands. This although twin-engine fighter status was largely only theoretical since all groups, with the exception of training group of the 141st Twin-Engine Fighter Training Wing, remained equipped with Bf-109 planes, some with a short striking range others (the Bf-109-B/C and D units) with an increased range.

It was only from April 1939 on that two twin-engine fighter groups (1st Group, 1st, and 1st Grpup, 76th Twin-Engine Fighter Wings) received Bf-110 planes, some, the Bf-110-B powered with Jumo 210 engines, some, the Bf-110-C, with DB-601 engines. It was only then that a start could

with training
be made/ and tests carried out to determine the operating conditions as changed by the increase of the crew by one radio operator.

EXPERIENCE GAINED IN THE SPANISH CIVIL WAR IN 1939[113]

Again the events during the operations of the Condor Legion in Spain/had a considerable impact on the overall concepts of the Luftwaffe Command on the subject of the conduct of air operations.

in the first few months of 1939

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113. Sources 3, 18, 67, 68.

Following the breaching of the Red front as a result of the breakthrough to the Mediterranean coast on a frontage extending from the mouth of the Elbro River to north of Valencia, preparations were made for a large-scale offensive aiming at the conquest of Catalonia right up to the Pyranees.

At the time the Condor Legion had available the following forces:

Bomber Group K-88 with approximately 40 He-111 aircraf

a dive bomber flight of 3 Ju-87 planes

Fighter Group J-88 with approximately 45 Me-109 planes of Type D (Jumo-210 power unit) and E (DB-601-A Power unit)

Reconnaissance Squadron A-88 with 5 Do-17 and He-45 aircraft

Naval Air Squadron S-88 with 8 He-59 planes

Antiaircraft Artillery Battalion F-88, comprising

5 heavy and 2 light batteries

Air Signal Battalion LN-88.[114]

After repeated postponements 17 December 1938 was established as D-Day for the offensive. In line with medern German concepts of air warfare, the offensive on the ground was preceded on 15 December by a series of air

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114. Source 69.

strikes against enemy troop concentrations at the lower reaches of the Ebro River in the southern sector of the Red front, against the Reuss and Taragona rail depots, and against billeting areas in Amposta. The purpose of these attacks was to deceive the enemy and divert their attention from the area of main effort in the planned offensive, the Seros, Lerida, and Balaguer region.

Owing to a renewed postponement of the offensive to 23 December because of unfavorable weather conditions, the air attacks were continued up to 22 December and actually had the result that the Red Army Command transferred two of their five reserve divisions to the region of the lower Ebro River.

The all-out nature of this air offensive is evidenced by the fact that the K-88 Bomber Group, using double relief crews, dispatched its units ceaselessly by day and by night and that Fighter Group J-88 participated in the night bombing attacks with three old Ar-68 planes which had been used in the autumn of 1938 as night fighters against Red bombers.

On the morning of 23 December the offensive on the ground commenced, preceded by continuous bombing attacks lasting 45 minutes against the Red positions in the Segre River line, with all German, Spanish, and Italian air

units participating.

The bombing was repeated six times by evening on the 23 December and in the final stages extended into the enemy rear to strike the withdrawing Red forces.

The situation on the ground as it existed in the evening showed that Corps Navarra, in whose line of advance the Condor Legion was committed, had achieved the deepest penetration into the enemy positions.

From then on the air forces were committed in day and night operations in all areas where the ground forces needed support.of this type.

Under a ceaseless hail of bombf the Red front by mid-January became fluid in a general withdrawal.

The important factor which made the execution of intensive air operations possible was that the Nationalist side had uncontested air supremacy during daylight. Having only a small force of Martin type bombers, and since the risks involved in combat against the German fighter and antiaircraft forces was too great, the Reds confined their air activities to demonstration flights to the front in large formations, with all available fighters participating.

The respect for the German Bf-109s was so pronounced, however, that the appearance of a few Bf-109 patrols in the front areas sufficed to send the entire formation scattering home in confusion.[115]

As the Nationalist offensive on the ground proceeded the Condor Legion again had an opportunity for operational action. The main objective this time was to destroy the Red air forces at their bases and to shoot down any fighters which might take off whenever the necessary conditions for bombing operations existed for the K-88 units escorted by J-88 forces.

The capture of Taragona on 15 January 1939 finally broke Red resistance.

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115. Sources 3, 70.

What followed in the form of air operations during the advance of the Nationalist ground forces on Barcelona can be described, as far as the Condor Legion was concerned, as a classical example of the effects of continuous and almost ceaseless attacks by all available air forces, using bombs and weapons fire, against the routed enemy, destroying any semblance of order and turning the retreat into a panic.

Whenever reconnaissance planes discovered Red planes on a Red airfield the planes discovered were under attack with bombs or with the weapons fire of J-88 units within a few hours.

On 6 February 1939 Ju-88 units in low-level attacks against an airfield at Figueras destroyed the last remaining 27 Red fighter planes in the whole area.

Catalonia was under Nationalist control on 9 February.[116]

What happened in this decisive phase of the Spanish Civil War confirmed former experience that the superiority of the Bf-109, which had even increased considerably with the introduction of the Model E (Type DB-601-A engine), a plane with performances exceeding even those of the French fighter squadron fighting on the Red side and equipped with the most modern foreign fighter model of the time--the Curtiss P-36--, was the key to a successful conduct of air ope-

116. Sources 3, 71.

operations.

The concept of complete air supremacy, which was not even mentioned in the manual THE CONDUCT OF AIR OPERATIONS, had become a concrete idea.

PLANNING FOR EXPANSION OF THE LUFTWAFFE IN 1939

In its plans for the continued strengthening of the Luftwaffe by air forces, the Luftwaffe Command applied the obvious conclusions to be drawn from what has just been related above.

Already under the influence of a possible conflict with Poland the plans established by the Commander in Chief of the Luftwaffe on 24 June 1936 provided for the activation of the following new units by 1 November of the same year:

22 bomber groups plus 2 coastal patrol groups

4 dive-bomber groups, 1 of them carrier-based

6 twin-engine fighter groups

13 fighter groups plus 1 carrier-based squadron.[117]

If this plan had been carried out the overall strength of the Luftwaffe in flying forces on 1 November 1939 would have been as follows:

52 bomber groups

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117. Source 72.

13 1/2 dive-bomber groups, one of them carrier-based.

16 twin-engine fighter groups

26 fighter groups plus 2 carrier-based squadrons and 1 night-fighter squadron.

In view of the fact that in 1939 the twin-engine fighter groups were considered in every respect as part of the offensive air arm, plans thus provided for a much greater increase in offensive air forces than in fighters intended specifically for defensive missions. This is proof of the continued predominance of the ideas of an offensive solution to the air defense problem.

An incisively important factor was the fact that a beginning was made in the spring of 1939 at reequipping the light fighter forces with Bf-109E planes powered by DB-601-A engines in place of their current Bf-109-D planes powered by Jumo-210 engines.

The newly introduced engine with its increased power of 350 horse-power naturally had a higher fuel consumption, so that the increased range which had been gained by the installation of reserve fuel tanks inside the Bf-109-D was lost. With its time-in-air capacity of 75 minutes the Bf-109-E was back at the level of the first Bf-109-B/C planes.[118]

This circumstance considerably reduced the possibilities for use of light fighter units to escort bomber forces and again gave them the aspects of a weapon designed primarily for air defense purposes.

The Bf-109-D aircraft released through reequipment of the light fighter forces with Bf-109-E planes were assigned to 7 of the existing 10 twin-engine fighter groups insofar as they still had the Bf-109-B/C model with its small time-in-air capability. These twin-engine units thus could be used on strategic missions up to a range of 210-240 miles penetration, which corresponded to the

118. Source 3.

capabilities of the Bf-110-C . One disadvantage, however, was that their lack of navigational instruments made these units subject to the same weather restrictions as the light fighter units.[119]

How far the views on the missions of twin-engine fighters actually had departed from the original concept of a heavy fighter for the dual mission of offense and defense is evident from the plans of the Luftwaffe General Staff for the development of the Me-210, under development by the firm of Messerschmidt to displace the Bf-110.

As previously described, the Bf-110-C was considered a complete failure as a "destroyer" plane, the installation of BD-601-A engines with their higher fuel consumption having reduced its penetration rangedto 210 miles as compared with the specified penetration range of 600 miles, with a reserve of 30 minutes in the target area.

Plans for the new Me-210 specified a penetration range of 600 miles plus a fuel reserve for combat action at top speeds in the target area, which necessitated a total range capacity of 2 500 kilometers or 1 500 miles.

Calculations in the Luftwaffe General Staff revealed immediately that the plane would have to carry a take-off load of two-and-one-half tons of fuel. The idea now

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119. Source 25.

evolved that if the plane were armed with a 1 100-pound bomb and carried one ton less of fuel it could be adapted for use as a dive bomber. Its penetration range then would still be 360-420 miles with a take-off load of one-and-one-half tons of fuel, and this range was considered adequate.

This line of thought received added impetus from the realization that the existing Ju-87 dive-bomber units because of their inadequate striking range and their small speed already had to be considered out-dated in 1939.

Planning went so far as to conceive of an Me-210, with its superior speed and long penetration range, being adapted to replace the existing Ju-88 dive-bomber model as part of the program to be completed in 1942.

As a result of these views Messerschmitt, the designer of the new plane, was required to include a number of specifications modifying his plans for a plane intended exclusively as a twin-engine fighter. These specifications called for modifications in the cockpit permitting the inside loading of 2 550-pound bombs, the installation of braking devices for dive-bombing, and remote control for the two machine guns to be mounted on the sides of the body with a rearward line of fire.

The results of this interference in the development

of the twin-engine fighter will be discussed in greater detail later in this study.

The only point which needs mention here in this connection is that the views held in 1939 on the subject of air defense and the consequent planning for the future completely deprive the air defense forces of an arm predestined for defensive missions by virtue of its long striking range and its heavy armament.[120]

For the reasons just described planning for future air defense had to be based exclusively on the Bf-109 light fighter type. Here it appears that the changeover to the BD-601-A engine, which gave the plane considerably increased climbing and speed capacities, was in actual fact a serious disadvantage when the fact is taken into consideration that a fighter unit with Bf-109-D planes, because of its being able to stay in the air twice as long as the Bf-109-D, could also protect an area twice as large.

At best this disadvantage could be removed by the 13 new light fighter groups to be activated by 1 November 1939. The improved performances of the Bf-109-E were not of such dire importance here, since the Bf-109-D already had an adequately decisive superiority in performance, which enabled it to cope with any of the existing types

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120. Source 25.

of foreign bomber aircraft.

The overall outcome of these developments was that the defensive fighter arm once again was relegated to the role of operations restricted to specific targets, as had been the case once before, in the 1935-38 period when its units had been equipped with He-51 and Ar-68 aircraft.

This fact is evident from the operational directives issued by Commander in Chief of the Luftwaffe for air defense in the event of war.

Under the heading of General Operational Principles the directives state that

1. the missions assigned in the operational directives are binding for the first operations;

2. besides the need for protection--in accordance with the air target defense register;-, the probability of an attack must be taken into consideration in the distribution of forces and a dispersion of forces in any form will be avoided.

Paragraph 5 of the directives defines the mission of the defensive fighter arm, as follows:

The mission of the fighter groups committed in the main areas of air defense will be to protect specific targets against hostile air attack and not a mission of roving patrol against hostile bomber

forces within circumscribed areas.

Therefore, fighter groups, besides their operational areas, will be assigned clearly defined combat missions.

Fighter units committed in areas near the zones of operations may be called in for action against hostile fighters and reconnaissance planes if their mission and the current air situation permit.[121]

Contrary to German traditional command usage, the mission assigned in the first paragraph of the directives is couched in the negative form of a prohibition. This formulation of a order discloses certain divergencies betwsen the views of the Luftwaffe General Staff and those of the leading men of the fighter arm.

The rigid restriction of a fighter pilot to a local defense mission was contrary in every respect to the mentality of the average fighter pilot, which was primarily aggressive. The aim of the fighter pilot was to shoot down enemy aircraft, no matter of what type they were or where he encountered them.

The operational directives were also contrary to the general rules established in the manual THE CONDUCT OF AIR OPERATIONS, which states in Paragraph 250:

Fighter forces will be allowed the largest

121. Sources 73, 74.

possible scope of personal initiative. They will be assigned missions without any unnecessary operational restrictions and without needlessly defining the areas of their operations.

The following reasons could be adduced for the view of the Luftwaffe General Staff that it was essential to restrict fighter forces to the targets they were assigned to ptotect:

1. Reequipment of the fighter units with Bf-109 planes with the time-in-air capability of 75 minutes reduced their tactical time of combat ability to 30 or 40 minutes. Steps had to be taken to insure

that within the period of combat capability the bulk of the fighter forces would be available at the target they were assigned to protect in order to repel bomber attacks.

2. The restriction of fighters to specific targets must bring about that, if the enemy launch simultaneous attacks at a number of targets he would encounter fighter and antiaircraft defense at all points.

3. If employed in roving fighter missions, the danger existed that fighters might be lured from the target they were to protect by hostile air units, such as fighters or reconnaissance planes operating under fighter escort, which constituted no direct threat to the protected target. If they then were required to repel a later bomber attack they might not be able to arrive in time or might be compelled to first land for refuelling and remunitioning.

It can thus be established that the concept of restricting fighters in the defense system to their assigned protective targets was due largely to the reduced time-in-air capabilities of these units owing to their reequipment with Bf-109-E aircraft.

At this point it seems of interest to examine what

types of targets the Luftwaffe Command considered important enough for protection by both antiaircraft artillery and fighter forces.

On the assumption that under modern conditions any war would commence with a sudden concentrated air attack, the operational directives referred to definitely established the initial missions.

The reason here was that there would be no time in such a case for the issue of further orders and that the entire defense system must go into action just as suddenly as the probable attack would take place.

The peacetime disposition of the fighter forces in 1939 was adapted to this requirement insofar as the various units were stationed in the vicinity of the targets it was their mission to protect.

It was assumed that, in the event of a sudden hostile attack, the initial missions would have to be executed from these stations.

From then on the units would land at and operate from other airfields, prepared in advance, to withdraw them from the effects of attack which might be launched against their generally known peacetime bases.

These tactical air fields were in the close vicinity of the peacetime garrisons (within between 12 and 30 miles).

THE PROTECTION ZONES OF THE FIGHTER ARM [122]

Fighter Unit	Strength	Garrison	Zone to be protected
1st Gp, 1st Wing	1 Group	Jesau	Koenigsberg/ Eastern Prussia
2d Wing	1 Group plus 1 night fighter squadron	Doeberitz	Berlin
3d Wing	1 Group	Zerbst	Halle-Leipzig
26th Wing	2 Groups	Cologne Duesseldorf	Rhein-Ruhr Region
1st Gp, 51st Wing	1 Group	Bad Aibling	Rosenheim/Munich
1st Gp, 52d Wing	1 Group	Boeblingen	Stuttgart
53d Wing	2 Groups	Wiesbaden Mannheim	Frankfurt-Mannheim
1st Gp, 76th Wing	1 Group	Vienna/ Aspern	Vienna and Wiener Neusta
1st Gp, 77th Wing	1 Group	Pilsen	Bohemia and Moravia
1st Gp (1st Fighter Sq), 2d Air Wing	1 Group	Garz	Stettin-Greifswald
1st Sq, 186th Wing	1 Squadron	Kiel	Kiel

It can be seen from this disposition of forces that, besides Berlin with its importance as an industrial center and as the center of Government and Munich as the main center of the National Socialist Party, the fighter arm was intended to protect all important industrial regions.

A marked feature here is the way in which the area of northwestern Germany, with the ports of Hamburg, Bremen, and Emden was neglected.

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122. Source 68.

Since these areas belonged within the zones of naval fortifications, however, and in view of the fact that they had particularly strong antiaircraft artillery defenses--in which may be included the strong antiaircraft artillery of the heavier naval units afloat--it is understandable that the inadequate fighter forces available for the defense were deployed primarily to protect the industrial regions in the German interior.

To obtain a true picture of the situation as it existed on 1 June 1939 it is necessary to include the units designated as twin-engine fighter forces, since at that time they could only be considered to have the combat value of normal fighter units and, if necessary, undoubtedly would have been made available for missions of direct air defense. The forces involved were as follows:

Twin-Engine* Fighter Unit	Strength and Aircraft Type	Garrison	Zone of Operations
1st Gp, 1st Wing	1 Group Bf-110	Damm	Berlin and Central Germany
2d Gp, 1st Wing	1 " Bf-109-B/C	Fuerstenwalde	Berlin, Pomerania, Brandenburg
1st Gp, 2d Wing	1 " "	Bernburg	Central Germany
26th Wing	2 " Bf-109-D 1 " Bf-109-B/C	Dortmund & Werl, Lippstadt	Ruhr region
1st Gp, 52d Wing	1 " "	Illesheim	Franconia
1st Gp, 76th Wing	1 " Bf-110	Olmuetz	Czecho-Slovakia
2d Gp, 76th Wing	1 " Bf-109-B/C	Gablingen	Upper Bavaria
1st Gp (heavy fighter), 1st tng Wing	1 " Bf-110	Barth	NW Germany

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In this disposition of forces the following areas appear as areas of main concentration:

Berlin and the industrial regions of Central Germany

the Rhine-Ruhr region

the Munich-Nuremburg region.

The heaviest concentration of fighter defenses was thus in the Rhine-Ruhr region, where 2 normal and 3 twin-engine fighter groups were available.

The program for expansion of the fighter arm, to be completed by 1 November 1939, provided for the creation of the following new units:

1. Normal Fighter Forces.[124]

Fighter Unit	Strength	Garrison	To protect the areas of
2d Gp, 2d Wing	1 Group	Straussberg	Berlin & Central Germany
2d & 3d Gps, 3d Wing	2 "	Merseburg	Industrial regio Central Germany
3d Gp, 26th Wing	1 "	Bonn	Rhine-Ruhr region
27th Wing	2 "	Jever Neumuenster	Bight of Helligoland
51st Wing	2 "	Bad Aibling Gablingen	Munich-Bavaria
2d Gp, 52d Wing	1 "	Nellingen	Stuttgart
3d Gp, 53d Wing	1 "	Frankfurt	Frankfurt & middle reaches Rhine River
1st Gp, 54th Wing	1 "	Herzogenaurach	Nuermburg-Franconia
3d Gp, 77th Wing	1 "	Neisse	Upper Silesia

123. Source 68 (Footnote to page 166)
* It should be borne in mids that these units in most cases still had single-engine planes (Footnote to page 166)
124. Source 72.

2d Gp,76th Wing	1 Group	Zwoelfaxing	Vienna-Wiener Neustadt	
2d Sq,186th Wing	1 Squadron carrier-based	Bremerhaven	Bight of Helligoland	

This planning reflects a general reinforcement of the fighter defenses in the areas already considered as areas of main effort in air defense on 1 June 1939.

One difference is that the gap existing in north western Germany was to be closed by the assignment of 1 fighter wing with two groups.

An examination of the program for the activation of new twin-engine fighter units produces the following picture:

2. Twin-Engine Fighter Forces.[125]

Twin-Engine Fighter Unit	Strength	Garrison	To Protect the Areas of
2d Gp, 2d Wing	1 Group	Delitzsch	Central Germany, Silesia, Saxony
27th Wing	2 "	Verden Soltau	North Western Germany
51st Wing	2 "	Leipheim Laupheim	Bavaria & Wuerttemberg
2d Gp, 52d Wing	1 "	Bayreuth	Franconia, Upper Palatinate, Bavaria.

This reveals a reinforcement of the fighter forces in the industrial regions of Central Germany, Nuremburg, and Stuttgart, plus measures to also use twin-engine fighter forces to close the gap in northwestern Germany.

However, it is necessary to emphasize here again the fact that, so far as mentality was concerned, the assignment of the twin-engine units to the various divisions

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125. Source 72.

resulted in a mentality attuned to missions differing widely from thise of direct air defense. Training and instruction in these units dealt primarily with the problems involved in providing escort protection for bomber forces and in carrying out low altitude attacks over enemy territory, and not with such subjects as aircraft reporting services, scramble take offs, guided approach to reported hostile air forces, and integrated action with antiaircraft artillery forces.

Furthermore, the lack of contact with the authorities responsible for the other branches of direct air defense, which the defensive fighter forces had through mutual discussions at the various air district headquarters, definitely would have had adverse effects on the operations of the twin-engine units, at least during the initial stages of their employment in defense missions.

One advantage was, however, that the commanders of twin-engine fighter units in most cases had come from the fighter arm and therefore still had an adequate matery of the techniques required, and all twin-engine fighter pilots had received their training at the two existing fighter pilot schools.

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126. Source 3.

NIGHT FIGHTERS IN 1939

One noticeable feature in an examination of the overall situation as it existed on 1 June 1939 in the field of fighter defenses is that all thought and all planning was devoted exclusively to defensive fighter operations during daylight, and that the field of night fighting was completely neglected if the small-scale experiments with a squadron of the 2d Fighter Wing at Doeberitz are disregarded.

This is all the more surprising in view of the fact that, as previously set forth, both the manual THE CONDUCT OF AIR OPERATIONS and the bulletin of the Air Force Academy (Bulletin 127 of 11 August 1937) for use in instruction on the subject of night fighter operations contained very concrete views on the subject.

Even as late as in June 1939 a lecture held by Captain Pohle, GSC, of the Operations Division of the Luftwaffe General Staff, on the occasion of a general staff field exercise , in which he dealt with the basic concepts of the General Staff on the conduct of air warfare and with planning for future types of aircraft, makes no mention whatever of the subject of night fighting operations.[128]

127.

At that time only one fighter squadron was carrying out night fighting exercises officially at Doeberitz in line with instructions contained in the directive issued by the Commander in Chief of the Luftwaffe on 28 April 1937. This was the 10th Squadron, 2d Fighter Wing. It was under the command of a former air captain of the Lufthansa Airline, and was equipped with outdated Ar-68 aircraft.[129]

Similar tests were being carried out at Greifswald by a night fighter squadron established in the field under the 2d Training Wing.[130]

On its own initiative the 26th Twin-Engine Fighter Wing also carried out such tests with a detachment from its 2d Group at Werl.[131]

Then suddenly the Commander in Chief of the Luftwaffe, presumably under the influence of suggestions made at a field command conference held at the time, decided at the end of June that night fighter units were to be activated.

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127. Source 75.
128. Source 25.
129. Source 47.
130. Source 76.
131. Source 3.

In an order dated 24 June 1939 activation of the following night fighter units was prescribed:

1 night fighter group of two squadrons as the 1st Group, 20th Fighter Wing	In the Berlin area
1 night fighter group of three squadrons as the 1st Group, 21st Fighter Wing	In Eastern Prussia
2 night fighter squadrons as the 1st and 2d Squadrons, 70th Fighter Wing	In the Aibling area
2 night fighter squadrons as the 1st and 2d Squadrons, 71st Fighter Wing	" "
1 night fighter squadron as the 10th Squadron, 72d Fighter Wing	In the Mannhei area
1 night fighter squadron as the 11th Squadron, 72d Fighter Wing	In the Stutt- gart area

Pursuant to an order dated 10 July 1939 these units during peace were assigned under the locally responsible daylight fighter commands.[132]

With an order by the Commander in Chief of the Luftwaffe on 1 August 1939 the night fighter squadron organized in the field by the 2d Training Wing was given autorized status as the 11th (Night Fighter) Squadron, 2d Training Wing.

The units thus established were allocated Bf-109-D aircraft, capable of long time-in-air performances.

Berlin, as the Capital of Germany and the seat of Government; and Munich as the main center of the

National Socialist Party, were considered as being of particular importance. Eastern Prussia had only weak anti-aircraft artillery defenses.[133]

Mannheim and Stuttgart were not as well protected by Air Defense Zone West as the more northerly industrial centers of Frankfurt and the Rhine-Ruhr region.

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132. Source 77.

133. Sources 78, 79.

It can be stated here that the program for the activation of night fighter units was not realized to the full extent and that those activated were not employed in accordance with plans. This was due to the outbreak of war. Only 3 groups with a total of 7 squadrons were established in addition to an independent squadron, and all were placed in service as normal daylight fighter units.

MISSIONS OF THE FIGHTER ARM IN 1939[134]

The basic views held in 1939 on the subject of the role of the fighter arm in the air defense system is clearly revealed in passages quoted from the final critique by Air Fleet Headquarters 2 (West) on a map exercise conducted in the summer of 1939. The passages in question are as follows:

> In committing its fighter forces Air District Command VI (Muenster) assigned only weak elements to airfields along the frontier; in contrast, the bulk of its air forces were committed from airfields 72 miles distant from the borders with Holland and Belgium.
>
> Second Air Fleet Headquarters is not in agreement with such employment. The primary mission of fighters is to shoot down as many hostile aircraft as possible.
>
> Based 72 miles from the frontier the fighters were not even able to detect and reach enemy planes

134. Source 30.

engaged in low altitude attacks; bombers operating at high altitudes can rarely be intercepted before they have executed their bombing mission, because a high percentage of the targets to be protected are too close to the frontier. Thus, for example, attacks against ground service installations west of the Osnabrueck-Muenster line can hardly be prevented by fighters. In this area priority is with the antiaircraft artillery.

If the bulk of the friendly fighter forces are based along the frontier, the chance exists of at least intercepting the enemy forces on their return flight and pursuing them across the border.

If the enemy should violate Dutch and Belgian neutrality, as it is assumed here that they would, we are also justified in doing so.

Furthermore, fighter forces based along the frontier will be in a better position to receive and protect friendly forces returning from their missions.

The fighter forces committed farther in our hinterland will be able, at advantageous altitudes, to intercept enemy forces dispersed while crossing the antiaircraft fire zone if such forces attack targets situated farther eastward.....

Concerning the measures taken by Air District Command XI with its fighter forces the critique reads as follows:

> The three fighter wings were so committed that one group from each of them was at the coast with the other two based in the hinterland.
>
> Second Air Fleet Headquarters....holds other opinions on the employment of fighter forces. In the solution adopted by this headquarters two-thirds of the fighter forces are based on the North Sea islands or at the coast. The reasons for this groupment of the fighter forces are the same as those given above for Air District Command VI.
>
> From these bases the fighters will be in a better position, in unclear situations or if enemy attacks are expected, to carry out reconnaissance flights and protect their areas against surprise.
>
> The one-third part of the fighter forces based in the hinterland will suffice to intercept penetrating enemy forces before they can reach their targets.
>
> In the hinterland, more particularly in the case of Air District Command XI than in that of Air District Command VI, twin-engine fighters held in reserve by the air fleet could, in given circumstances, be

made available....

....Air District Command assigns an antiaircraft artillery division headquarters to control the antiaircraft artillery forces in Zone I. It would seem more advisable to assign an air defense division headquarters, to which the fighter forces would also be assigned.

If control is divided between an antiaircraft artillery division headquarters and various fighter wing headquarters, the antiaircraft artillery forces will receive their orders from the antiaircraft artillery division headquarters, the fighter forces from the air district command.

This would fail to insure smooth cooperation between the fighter and antiaircraft artillery forces.[135]

These passages reveal the following views on the missions and operations of the fighter arm, views which are highly important for air defense:

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135. Source 86.

1. It is anticipated that the enemy will launch both high and low altitude bombing attacks.

2. Friendly targets in the near border areas require particularly strong antiaircraft artillery defenses, because the defending fighter forces will rarely be able to take effective defensive action in time.

3. Fighter forces based near the borders for defensive purposes are also intended to provide protection for friendly air forces returning from their missions.

This implies to some extent a return--and this alludes to seriously reduced striking range of fighter units becaus of their reequipment with Bf-109-E aircraft--to former concepts, which considered fighters not merely as a weapon of defense tied strictly to the target it was to defend, but rather as a weapon to be used also in support of operational or strategic air warfare.

The terse formulation: "The primary mission of fighters is to shoot down as many hostile aircraft as possible" even gives expression to a requirement which proved the only proper one during the war in the same categorical form: The losses inflicted on the enemy must be so heavy, that any continuation of their operations will no longer

appear tolerable.

These views are diametrically opposed to the previously discussed Operational Directives issued by the Commander in Chief for 1939, is which the fighter arm is tied down in just as categorical terms to its assigned targets it is to defend.

It is necessary to stress here that the views of Second Air Fleet Headquarters correspond in every respect to the spirit of the manual THE CONDUCT OF AIR OPERATIONS, where Paragraph 250 as previously set forth above, imply that in operations fighters must be allowed the greatest possible freedom of action.

These divergencies of views can be explained to some extent by the fact that in the Luftwaffe High Command the repeatedly changed chiefs of staff had made it impossible to maintain a consistent line of thought.

CONCEPTS OF THE LUFTWAFFE GENERAL STAFF

After the death, in June 1936, of General Wever, whose thought was directed towards the creation of a strategic air force of the type propounded by Douhet and found expression in development of a 4-engine bomber, the position of Chief of the Luftwaffe General Staff was assumed by General Kesselring, who had to his credit enormous performances in the development of the entire ground service

organization of the Luftwaffe.

General Kesselring considered the idea of a 4-engine bomber force impracticable for fuel consumption reasons, and from the general viewpoint of economy had his doubts about the advisability of the expenditures in personnel, materiel supplies, ground service organization requirements and about the vulnerability of such large units to air attack.[136]

At the same time the assumption of control over the Luftwaffe Technical Office by Colonel Udet had introduced into the overall concept of the conduct of air warfare the idea of the dive bomber. Therefore, although main emphasis during the Kesselring-Udet era remained on the accelerated creation of bomber forces within the whole program

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136. Source 2.

to build up the flying forces, the concept was changed by the idea that for the conduct of operational warfare the two-seater bomber and the dive bomber, for precision bombing, would be more practicable.

To a great extent General Kesselring adopted the concepts of General Wever and implemented them logically in his planning. The revision of the basic manual THE CONDUCT OF AIR OPERATIONS was carried out during his term of office. The measures to modernize the fighter arm and adapt it for more versatile employment by reequipping its units with Bf-109-D planes also go back to the planning done during his tenure in office, as the responsible Chief of the Luftwaffe General Staff.

The requirements addressed by the Luftwaffe General Staff to the Technical Office[137] already called for the activation of four groups of "heavy" fighters by 1 July 1938.

This shows that the Luftwaffe General Stab was steering systematically towards a division of the fighter arm in defensive and offensive fighter units, and intended giving to the fighter arm the important position within the air defense system provided for it in the manual on air operations.

On 1 June 1937 General Kesselring assumed command over

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137. Source 44.

III,
Air District Command, Dresden, and was succeeded in his position as Chief of the Luftwaffe General Staff by by a less conspicuous personality, General Stumpff, who had long been Chief of the Luftwaffe Personnel Office.

No important decisions and no decisions deviating materially from the provisions of the planning done before his time were made during his tenure of office.

General Stumpff allowed himself to be influenced largely by the theories developed and tried out by the Luftwaffe Training Division. When reporting orally on basic matters to the Commander in Chief of the Luftwaffe he frequently took along the Chief of the Operations Branch, Lieutenant Colonel Jeschonnek, GSC, who, as Commander of the Training Wing, had himself contributed in a decisively important measure to the development of new theories.

Impressed by the views of this unusually capable officer, the Commander in Chief of the Luftwaffe on 1 February on 1 February 1939 promoted him to the rank of colonel and appointed him Chief of the Luftwaffe General Staff. Within six months he reached the rank of lieutenant general (General der Flieger).

General Jeschonnek's concepts were revolutionizing in many respects:

1. In view of the existing political situation he considered conflict with Poland and Czechoslovakia as most likely and a war against Britain as out of the question for the time being.

For the conflicts he thought possible he considered thatmedium bombers with a small striking range and small bomb-carrying capacities would be adequate. However, these bombers must be all the more capable of accurate bombing by means of dive- and and steep angle-attacks, such as could be carried out with the Ju-88 plane. The small requirements in personnel and material for forces of this type would make it possible to manufacture these planes in such large numbers that it would be possible at the same time to intimidate Britain. 138

2. He considered a "laterally" developed organization of the Luftwaffe as the best means to insure that armed conflict would be of short duration. This means that an air force should be built up with the greatest possible strength on line, without any consideration for the question of whether manufacturing capacities would make it possible to maintain this maximum strength for the duration of a long war.

It is only natural that in this concept main emphasis in the conduct of air warfare was on the offensive.

These views were not shared by the Organization Branch of the Luftwaffe General Staff, which maintained the viewpoint calling for armament in depth.[139]

However, General Jeschonnek prevailed with his ideas. Since these ideas evolved around the conduct of aggressive air warfare it is to be understood that in the pkans of

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138. Source 81.

139. Source 82.

June 1939 for the activation of new units on 1 November 1939 considerable priority was given to the operational air forces, the bomber, dive-bomber, and twin-engine fighter arms.

Here an important influence was exerted by the last commander of the Condor Legion, General von Richthofen, who had close personal contacts with General Jeschonnek. He was able to produce convincing proof that the all-out air effort, by day and by night, in the Catalonia offensive had brought the campaign in Spain to a victorious end in a time inconceivably short by traditional and in particular by Spanish standards.

In the brief final phase of the Spanish Civil War, which opened on 21 March 1939 with an air offensive in the south at Madrid and Cordoba, it was again the immense superiority of the Nationalist side in air power that forced the enemy to capitulate within five days.[140]

General Jeschonnek's theory that, in view of the possibility of armed conflict with Poland and Czechoslovakia, the greates possible on-line strength of the Luftwaffe was the decisive point was thus backed by the actual experience gained in Spain, since the areas involved would not be very large, so that the destructive effects of

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140. Sources 3, 83.

air warfare and its impact on the morale could be made felt throughout the length and breadth of the enemy territories from the very outset.[141]

Such reasoning offers an explanation for the fact that the German Air Command in 1939 did not consider air defense in itself as so serious a problem and depended to a large extent on the intimidating effects produced abroad by the almost sensational achievements of the German antiaircraft and fighter forces.

It is necessary here only to call to mind the world records established by the Heinkel fighter plane, the He-100 on 31 March 1939 with a speed of 746.606 kilometers, or roughly 450 miles, and by the Messerschmitt fighter plane Me-209 at the end of 1939 with a speed of 755. 1 kilometers,[142] or roughly 455 miles.

The passive attitude of the foreign powers during the occupation of Czechoslovakia without bloodshed and the establishment of the Protectorate of Bohemia and Moravia on 14 March 1939 increased the feeling of security which rested primarily on the knowledge of the possession of an air force which could be considered superior in both attack and defense.

GERMAN APPRAISAL OF FOREIGN AIR ARMAMENTS IN 1939

The Chief of the Intelligence Division of the

141. Source 13. 142. Source 84.

Luftwaffe General Staff in June 1939 estimated the status of air armaments in foreign countries as follows:

1. British Royal Air Force. All aircraft in service are still very much out-dated. Air defenses still very weak. It is not to be expected that industry will equal output of German air armament industry within the next few years.

Present Strength: 5 500 military type aircraft, of which

3 600 are front line units of the air forces of the homeland; approximately 20 percent considered modern.

Breakdown:

2 500 bombers (500 of them Class 1)

620 fighters (200 of them Class 1)

30 dive bombers

470 reconnaissance planes in army and naval units. (90 percent of them considered Class 2).

Equipment for the most part out-dated.

Antiaircraft Artillery. Approximately 600 heavy, 280 light guns, and 3 300 outdated searchlights.

In operable strength, particularly in the matter of air defense, the British air forces are far inferior

to the Luftwaffe. It appears that Britain will not in the near future reach the goals established in the fields of armament. For this reason purchases are being made in the United States and aircraft manufacturing industries are being established in Canada and Australia.

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Royal Air Force planning provides for the following increases by 1 April 1940:

Homeland	approximately	2 400 aircraft
Overseas	"	500 "
Navy	"	500 "

Antiaircraft artillery strengths are to be doubled.

It remains to be seen whether this large program can be established or if the demonstrative declarations in Parliament and in the Press are not intended primarily to calm the highly incensed public opinion.

2. French Air Forces. To a great extent still very much outdated. For the next few years French output will remain far behind German figures.

Present strength: 4 650 land and naval military aircraft, of which

2 500 are front line aircraft with units of the independent Air Force. Only 30 percent can be considered Class 1.

Breakdown:

1 300 bombers and strategic reconnaissance units

150 twin-engine fighters (Class 1)

1 100 fighters (400 of them Class 1).

Antiaircraft Artillery: Outdated.

France also is purchasing part of her requirements in aircraft in the United States and the Netherlands.

It is estimated that approximately 3 800 military type aircraft will be delivered by mid-1940, 700 of them purchased abroad.

Plans provide for double the present antiaircraft artillery strength.

3. Belgium and Holland. Air armaments in these countries are considered inadequate.

4. USA Air Forces. The US Air Force is considered numerically weak, but equipped with modern planes.

Since the aircraft manufacturing industry still is not very large it is thought that in the event of a war in Europe immediate effective support for France and Britain will not be possible. Such support could commence at earliest after six months.

5. Polish Air Forces.

Present Strength: 900 aircraft.

Breakdown.

270 fighters (30 of them Class 1)

170 bombers (130 " " " 1)

175 reconnaissance planes (Class 1)

190 tactical reconnaissance planes (90 of them Class 1).

Antiaircraft Artillery. Weak. Resupply system

inadequate.

The Polish aircraft factories are in the Warsaw region. They are unable to cope with large-scale serial production.

6. Soviet Air Forces. No precise information is available.

Approximate Present Strength: 6 000 military type aircraft, of which approximately

5 000 are front line units.

Breakdown.

In European Russia approximately

1 300 bombers and strategic reconnaissance planes (800 of them Class 1)

350 ground-support aircraft

250 tactical reconnaissance planes

1 400 fighters (1 200 of the Class 1).

Antiaircraft Artillery. Out-dated.

The armament industry can only meet current requirements.

7. Air Forces of Sweden, Denmark, and the Baltic States. Without significance.

8. Air Forces of the Balkan States. Insignificant.

9. Italian Air Forces.

Approximate present strength: 3 800 military types of land and naval aircraft, of which

2 800 are front line units.

It must be considered that from 1940 on the entire Italian Air Forces will become out-dated.

Antiaircraft Artillery. Only outdated equipment.

The Italian armament industry is considered inadequate.

Summary. The Western Powers have geared their armament programs to close within the next one or two years the gap by which Germany is leading.

This would produce an entirely new air situation, particularly in the field of air defense.

Their Spitfire, Hurricane, and Morane-406 fighter models and their heavy antiaircraft guns are equal to German armament standards. Their bomber aircraft are inferior to German models. American support can only start late.[143]

The appraisal of the air situation in the spring of 1939 just quoted confirms in every respect the ruling view in the Luftwaffe High Command that during the next one or two years air defense presented no problems which could not be coped with by means of the existing superior defense weapons.

The concept "Air Power" was represented in the material form primarily in the forces of the operational air arm, which included bomber, dive-bomber, and twin-engine fighter

units. It became a decisively important factor governing to a large extent the decisions taken by the Government.

For these reasons the development of these forces was the main concern of the Luftwaffe High Command in 1939.

EXPANSION OF THE FIGHTER ARM IN 1939

The overall strength of the German fighter arm dn 15 August 1939 was as follows:

5 wing headquarters

18 fighter groups

2 night fighter squadrons (10th, 2d Fighter, and 11th, 2d Training Wings).

The above figures include the three night fighter groups ordered to be activated in July-August 1939, since these groups on the outbreak of war were committed purely as daylight fighters units and remained in that category. the three groups in question were the 1st Group, 20th Fighter Wing; 1st Group, 21st Fighter Wing, and 2d Group 71st Fighter Wing.

Activation of the 1st Group, 54th Fighter Wing and of 1 carrier-based squadron, the 3d Squadron, 186th Fighter Wing, scheduled for 1 November 1939, took place ahead of schedule in the summer of 1939.

The strength of these fighter units in aircraft on 2 September 1937 was as follows:[144]

Aircraft Type	Actual Strength	Operable Stremgth
Me-109-D	112	89
Me-109-E	631	562
Ar-68 (Night Fighters)	28	25
Total strength	771	676

Personnel strength (in cre members) on 2 September 1939: Actual: 672; On duty 633.

The following twin-engine fighter units were in existence on 15 August 1939:[145]

1 wing headquarters

10 twin-engine fighter groups.[146]

The strength in aircraft available in these twin-engine fighter units on 2 September 1939 was as follows:

144. Source 18.

145. Sources 49, 101.

146. Source 18.

Aircraft Type	Actual Strength	Operable Strength
Me-110-B	27	23
Me-110-C	68	59
Me-109-D	272	259
Me-109-E	36	36
Total Strength	403	377

Crews available on 2 September 1939: Actual strength: 382; On duty: 373.[147]

The peacetime stations of the fighter and twin-engine fighter units, valid for 15 August 1939, are shown in Appendix 4.

THE ANTIAIRCRAFT ARTILLERY ARM IN 1939

The most important factor which deserves emphasis in the development of the antiaircraft artillery arm as a means of air defense was the large-scale and speedy establishment of Air Defense Zone West in 1939.

Initially the zone was designed to serve chiefly as an antiaircraft artillery barrier against hostile air forces from the West. However, the very concrete views which evolved from the experience of the Condor Legion in Spain served to expand the mission of the zone insofar as the antiaircraft guns were to take penetrating enemy

147. Sources 49, 102.

tanks under fire and provide positions in which friendly troops could organize a strongpoint system of defense.

on the ground.[148]

In a belt region extending from Wesel in the North to the borders of Switzerland in the South

197 positions for heavy antiaircraft batteries and

48 positions for light antiaircraft batteries

were completed by autumn.

Owing to materiel shortages it was not possible to carry into effect the plans to establish a completely closed belt of searchlights.[149]

If fully garrisoned, the Air Defense Zone West provided positions for approximately 788 heavy and 576 light antiaircraft guns. The purpose was to provide a threefold interlocking fire support system within the zone of effective antiaircraft artillery fire up to an altitude of 7 700 yards. This meant that at the aircraft speeds then current an enemy would be exposed at any point to fire from three batteries for a duration of five minutes, in which time 600 rounds could be fired at the target.[150]

In the previously mentioned critique on the map

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148. Source 65. 149. Source 5.

150. Source 51. 151. Source 86.

exercise conducted by the Second Air Fleet, Air District Command VI, Muenster, with support from the Second Air Fleet, had submitted recommendations that Air Defense Zone West should be extended from Wesel northward along the borders of Germany with Holland to the coast.

The forces estimated to man the zone amounted to eight antiaircraft battalions.[151]

Work on this project commenced at the outbreak of war.[152]

In the 1939 Assembly and Operational Directives (Aufmarsch-und Kampfanweisungen) issued by the Commander in Chief of the Luftwaffe the following points are established in respect to the antiaircraft artillery:

b The repelling effect must be moved more and more out of the actual bombing target area to the prtective belt zone in order to make allowances for increased aircraft speeds.

In the case of individual targets or defense regions close to the frontier (such as the Ruhr region, Frankfurt, and Mannheim) weapons furthermore will be dispersed in such a manner that an outpost area of effective fire is developed in order to repel surprise attacks at an early stage.

Low altitude night attacks need only be expected

as exceptions to the rule in the case of appropriately fine weather and of targets favorably located for such attacks. This point must be given particular consideration in the allocation of weapons for use to repel low altitude attacks....

In line with directives received from their superior headquarters[153] the air district commands will make all preparations for the operations of the air defense forces allocated to them in the event of mobilization

Other instructions given in the operational directives regulate the disposition of the defense forces:

On receipt of the code order "Local Antiaircraft Artillery Defense" (Oertlicher Flakschutz), which will be issued by the Commander in Chief of the Luftwaffe, the following measures will be taken:

1. Within three hours after receipt of the code alert all available antiaircraft artillery units will move into firing positions within or near their

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151. Source 86. 152. Source 51.

153. The commanding generals of air fleets.

peacetime stations to protect the most important targets in their areas until assigned other missions.

The air district commands are responsible for all preparatory measures (the reconnoitering and preparation of positions, stockpiling of emergency ammunition supplies, etc).

2. These instructions also apply to the antiaircraft artillery battalions intended for release to the Army if their accelerated departure does not make their use in prior missions impossible.

3. Pending transfer to their intended tactical airfields fighter units will maintain a standby alert in their peacetime garrisons for action against enemy bomber forces. The alert degree will be stated in special orders.

4. If necessary the Commander in Chief of the Luftwaffe will, already in times of political tension, designate specific air defense areas as closed to air traffic and will prohibit German and foreign aircraft from crossing them.

Aircraft which disregard such prohibition can be compelled to land, the use of weapons being permitted for this purpose.

5. All stations of the aircraft reporting services

will be fully manned.

From these directives it is evident that the Luftwaffe High Command, consonant with its own concepts, was completely attuned to the possibility that military conflict might start suddenly with an air attack.

Time-consuming assembly movements were thus out of the question, for both fighter and antiaircraft artillery forces. For this reason they were so stationed in peace from their peacetime garrison that they could go into effective action within a few hours after receiving an alert to protect the most important targets.

In the previously quoted critique of a map exercise conducted by the Second Air Fleet in the summer of 1939 the following is stated concerning the mission and operations of the antiaircraft artillery forces of this zone:

Air District Command VI requests the following forces:

a. For extension of the antiaircraft artillery belt 8 battalions

b. For protection of the air base areas 17

155

battalions.

c. Thus, for protection of the ground service organization a total of 25 battalions, plus 14

search

searchlight battalions to be incorporated with the antiaircraft artillery barrier.

In addition 2 fighter wings are requested.

Basing computations on a threefold overlap in the defenses around the protected target and a double overlap above the antiaircraft artillery barrier these requirements are justified....

Air District Command XI committed the bulk of the artillery forces intended for protection of the ground service organization in the western part of Zone I because of the large number of air bases in the region between Weser and Ems. Through integration with the naval fortifications areas an "air defense zone" is created after the pattern of Air Defense Zone West.

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155. From Wesel northward along the Dutch border to the coast.

The antiaircraft artillery forces committed in Zone II are considerably weaker because

a. Zone I represents a strongly defended outpost area of antiaircraft fire and

b. in Zone II friendly fighter forces can climb to combat altitudes in time.

In Zone III no special antiaircraft artillery forces are committed to protect the ground service organization. Their defense is to be handled primarily by fighter forces....

With this commitment of the antiaircraft artillery forces Second Air Fleet Headquarters is in agreement...

It is necessary to establish a searchlight belt at least along the coastline between Wilhelmshaven and Emden which would prevent an enemy from penetrating at night without any interference into the concentration areas of the bomber forces. It is not possible and also not necessary to provide searchlight protection for each air base.

Air District Command XI requests, for protection of the ground service organization, 68 antiaircraft artillery battalions and 3 fighter wings; elements of these forces will protect simultaneously industrial installations situated near the air bases....

Other passages of the critique subject to severe criticism the fact that, in the coastal areas of the North and Baltic Seas, air defense is controlled by two different branches of the armed forces, namely, by the Navy in the naval fortifications areas, by the Luftwaffe in the areas farther inland behind the naval areas.

Air Fleet Headquarters expresses the opinion that, to avert any dissipation of forces, command in the entire area should be with one branch and that this is a mission

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of the Luftwaffe.

On the whole this report reveals the following important features:

1. In antiaircraft artillery operations the tendency exists to establish the zone of effective fire as far as possible forward of the bomb target area.

2. The near border area is definitely an area of main effort for antiaircraft artillery. The coastal areas also are considered as such.

3. Great importance is attached to day and night antiaircraft artillery protection for the ground service organization of the friendly aggressive air forces.

4. The desire is evident to consolidate the control of all defensive forces within contiguous

defense areas under one single command. The purpose here is particularly to insure optimum integration of the action of all branches of defense, even if the units concerned are organic to a different branch of the armed forces.

156. Source 86.

The overall strength of the antiaircraft artillery forces organic to the Luftwaffe in August 1939, prior to Mobilization, was as follows:

Air District Command	AAA Regt	Composite Bns	Light Bns	Searchlight Bns	Heavy Cadre Bttrs
I Koenigsberg	11th	3	1	1	1
III Berlin	Tng	3	1	1	-
	Goering	1	2	1	-
	12th	1	-	1	-
	22d	3	-	-	-
IV	32d	2	-	-	-
IV Dresden	3d	2	-	-	1
	13th	2	-	1	-
	23d	2	1	1	-
	33d	2	-	-	1
VIII Breslau	43d	2	1	1	1
VIII Breslau	-	2	2	-	2
VI Muenster	4th	2	-	1	-
	14th	2	1	1	-
	24th	2	-	1	1
	44th	2	1	1	1
XI Hanover	6th	1	1	1	-
	26th	2	-	1	-
	36th	1	-	1	2
VII Munich	5th	2	1	1	-
	25th	2	1	-	1
XII Wiesbaden	29th	2	-	1	-
	49th	2	-	-	-
XIII Nuremburg	9th	2	-	1	1
	28th	2	1	-	-
XVII Vienna	8th	3	2	1	2
	38th	2	2	-	-
Fortress AAA Command III	-	5	-	-	-
Totals	26 Regts	59	18	18	14

The peacetime tables of organization authorized the following strengths:

	Heavy Bttrs	Med Bttrs	Light Bttrs	Searchligh Bttrs
Composite battalion	3	-	2	
Light battalion	-	1	2	-
Searchlight battalion	-	-	-	3
Fortress AAA battalion	4	1	1	1

The strength of the antiaircraft artillery arm in batteries prior to mobilization was thus as follows:

Regt HQ	Heavy Bttrs	Medium Bttrs	Light Bttrs	Searchlight Bttrs	Heavy Cadre Bttrs
6	182	23	149	59	14

The gun equipment of the batteries had not changed from the past year and was as follows:

Heavy battery 4 88-mm guns

Medium " 9 37-mm guns, 4 60-cm searchlights

Light " 12 20-mm guns, 4 60-cm searchlights

Searchlight battery 9 150-cm searchlights, 6 sound locators.[157]

Preceding figures reveal clearly that the main areas of antiaircraft artillery concentration were as follows:

1. General area of Berlin, with 5 regiments
2. The industrial region of Central Germany with 5 regiments
3. The Rhine-Ruhr region, with 4 regiments
4. The Hamburg-Bremen region, with 3 regiments.

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157. Sources 52, 55, 56.

Mobilization plans provided that in the event of war each regular unit would activate from reserve personnel and mobilization reserve equipment 3 or 4 mobilization type units.

THE NAVAL ANTIAIRCRAFT ARTILLERY ARM IN 1939

For a proper appraisal of the strength of German air defense forces it is essential to also examine the strengths available in the naval antiaircraft artillery units in the summer of 1939.

Coastal defense in the North and Baltic Seas against seaborne and air attack was an exclusive responsibility of the Navy, which was required to cooperate with the forces of the Luftwaffe.

In the summer of 1939 the Navy had the following antiaircraft artillery cadre units:

Under East Fresian Fortifications Headquarters Wilhelmshaven:

2d Naval Artillery Battalion	Wilhelmshaven
6th Naval " "	Wangeroog
Aircraft Reporting Battalion East Fresia	Wilhelmshaven

Under North Fresian Fortifications Command, Cuxhaven

4th Naval Artillery Battalion	Cuxhaven, Sylt, Helligoland
Aircraft Reporting Battalion North Fresia	Cuxhaven

Western Baltic Fortifications Command,	Kiel
1st Naval Artillery Battalion	Kiel
Aircraft Reporting Battalion Western Baltic	Kiel
Pomeranian Coastal Fortifications Command,	Swinemuende
3d Naval Artillery Battalion	Swinemuende
Aircraft Reporting Battalion Pomeranian Coast	"
Pillau Fortifications Command	Pillau
5th Naval Artillery Battalion	"
Aircraft Reporting Battalion Pillau	"
Memel Fortifications Command	Memel
7th Naval Artillery battalion	"
Aircraft Reporting Battalion Memel	"

The naval artillery battalions were organized uniformly as follows:

1st (Heavy Gun) Company	
2d (AAA)	"
3d "	" [158]

THE AIRCRAFT REPORTING SERVICE IN 1939

In the continued development of the Reich Aircraft Reporting Service a satisfactory organizational solution was found in 1939 so far as reporting techniques were

158. Source 87.

concerned.

The problem was approached from two angles:

1. First of all it was necessary to familiarize all reserve personnel to be called up as air observers in the event of mobilization with the existing German types of aircraft and their appearance, when operating, to an observer on the ground.

This could not be achieved by means of the less practical field exercises and maneuvers. For this reason the Office of the Chief of Luftwaffe Signal Services in 1938 commenced work at compiling a field manual # LDv 925/I and II under the title AIRCRAFT IDENTIFICATION SERVICE (Flugzeugerkennungsdienst), which contained photographs, silhouettes, and instructions to facilitate the recognition of aircraft.

Tests carried out with troops revealed, however, that the compilation was too large for the average person. Work was therefore commenced on a new manual, # LDv 925/III, using the system of what were called "families of similar aircraft types", which was to facilitate recognition by means of specific features in the forms of aircraft.

Publication of this manual was delayed, however, until the end of 1939.

As an additional measure a firm which specialised in this type of work was instructed to produce small models, with a scale of 1:200 of the main types of aircraft. The intention was to furnish each air observation post one set of these models.

By the end of 1939 1 set of the most important German, British, and French models were completed. After these had been approved, orders were issued to introduce them as visual aids for air observers.

2. In 1938 the Intelligence Division, Office of the Commander in Chief of the Luftwaffe, commenced compiling pamphlets on the air forces of Germany's neighbor states specifically for use by the aircraft identification services. They were registered as manuals ## LDv 901-910 and were practically completed by the end of 1938. The entire collection, which included a pamphlet on German aircraft types, contained descriptions of 647 German and foreign aircraft types.[159]

It was this large number of types which represented the problem in efforts to insure the proper functioning of the aircraft reporting system in the event of war. Another complicating factor was that, due to the militia system of the organization, the observer personnel in reserve status simply did not have the time required for

159. Source 7.

thorough training.

In practise, therefore, thorough training could only be given after mobilization. This implied a grave dangerif an enemy were to conduct active air warfar from the very first day of hostilities, which would have been quite in keeping with the concepts of the Luftwaffe High Command on the employment of its own air forces.

AIRCRAFT REPORTING RADAR INSTRUMENTS IN 1939

The salient feature of 1939 in the field of aircraft reporting is to be found in the concrete resultsobtained

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159. Source 7.

in the developments of instruments to establish the location of aircraft by radio. The events leading up to this development will now be discussed briefly.

Pursuant to a development contract assigned to it by the Navy in the early 1930s, the firm of GEMA construc ted two instruments operating on the principle of the reflection of ultra shortwaves by solid bodies. The one of these instruments operated on a wave length of 2.4 meters, the other, a smaller instrument constructed specifically for naval ships, on a wavelength of 50, and later 80 centimeters.

The first tests were carried out on 20 March 1934 with a small instrument operating on the 60 and 100 centi meter wavelengths. It was mounted on a small naval craft opposite the German target vessel Hessen.

The reflection functioned quite unmistakably at a distance of 22 yards.

New tests were carried out already two months later at Schlicksee, near Kiel. This time the instrument was equipped with a rotating paraboloid, and the target was the experimental vessel Grille. The instrument register- ed an effective and controllable reflection at a distance of 2 200 yards.

However, no special effort was expended in the next few years

few years to expedite the work of development.

In 1936 the instrument used in the tests at Schlicksee was converted to a 2.4 meter wavelength from its original 1.5 wavelength. In its new form it was used by the Navy for the first time in the Joint Armed Forces maneuver of 1937 and proved able to detect not only warships but also aircraft even at distances up to 60 miles.

These results put the Luftwaffe on the alert. The Commander in Chief of the Luftwaffe requested the instrument for use in the aircraft reporting services and received it.

The Navy considered its needs satisfied with the installation of 6 of the instruments on the North Sea islands of Borkum, Helligoland, Wangeroog, and Sylt.

In 1937 the Commander in Chief of the Luftwaffe instructed the firm of Telefunken to develop an aircraft reporting radio locator with an operating range of 15-20 miles which could register distance, lateral, and altitude data.

In February 1939 the Commander in Chief of the Luftwaffe ordered the construction of 300 positions to be equipped with 2.4 meter wavelength Freya radar instruments setting the summer of 1940 as the deadline for completion.

At Rechlin in August 1939 the leading men of the military services were shown what had been produced as a result of the development contract given in 1937. The result was an instrument operating on a 50 centimeter wavelength which solved the problem of registering the distance, lateral position, and altitude of aircraft at a range of 15 miles accurately.

From the above short description it is clearly obvious that the German Luftwaffe High Command was fully alive to the exceptional significance of this new development for the aircraft reporting service and promoted the work of further development vigorously. In practise, however, the outcome was that at the outbreak of war on 1 September 1939 not a single radio aircraft locator was in service within the aircraft reporting system with the exception of the naval instruments installed on the North Sea islands.

It was not before the end of 1939 that the Luftwaffe was able to employ its own Freya radar instruments at the west front for the purposes of aircraft reporting.[160]

GERMAN AIR DEFENSES IN 1939

So far as measures for passive or civil air defense are concerned 1939 brought the progressive implementation of the very comprehensive organizational measures introduced in 1938 in respect to the fire fighting services, the technical and auxiliary services, the individual factory defense system, and individual protection.

However, the whole system only received a decisive impetus with the outbreak of the war, when it could build up on the well considered and well prepared planning which had been done beforehand.[161]

In the field of smoke screening it was only during the war that new units for this purpose were established, when the start of daylight strategic air attacks was started by the US Airforce in operations over Germany and and made the use of all means which could support the air defenses an acute necessity.

All technical problems having been solved satisfactorily in the existing smoke screening battalion, the expansion of this service was only a metter of personnel and materiel.[162]

160. Sources 22, 45. 161. Source 64.
162. Source 37.

SUMMARY

In summarizing the following can be said:

1. The appraisal of the air forces of Germany's neighbor states and their striking power was that they represented no serious threat in air warfare to Germany because of the fact that their equipment to a large extent was out-dated.

2. The defensive strength of the existing means of active and passive defense, all concentrated under the control of the various air district commands, vouchsafed success in air defense against air attack in any form conceivable at the time.

The superior capabilities of her means of active defense gave Germany an advantage over foreign countries, and it was thought that this lead could be maintained for at least another one or two years.

3. The success achieved in the development of the first instruments capable of locating aircraft by electrical means was conducive to a special feeling of security in the matter of the timely commitment of air defense weapons and their ability to go into action even in unfavorable weather.

4. The conviction had become even stronger that the best protection for the homeland in the event of

war was to be found in a strong offensive air arm, the initial mission of which would be to destroy the hostile air forces.

5. Although emphasis in further planning for expansion of the Luftwaffe was again placed on an increase of the aggressive air forces, the fighter and antiaircraft artillery forces intended for air defense nevertheless were given a share in the program commensurate with the current appraisal of the hostile air forces.