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FIGHTER DEFENSES IN THIRD AIR FLEET

COMMAND ZONE IN 1942

The responsibilities of the Third Air Fleet in the field of daytime fighter defenses were restricted to the air defense of the fleet's command area during daylight.

On 10 January 1942 the Command organization and order of battle of the fighter defense system in the command zone of the Third Air Fleet was as follows:

Command HQ / Units	Command Post / Aircraft Type	Commander / Aircraft Strength Actual	Effective
HQ, Fighter Command 2	St. Pol Brias	Colonel Huth	
HQ, 2d Fighter Wing	Me-109	5	3
2d Group	"	39	28
HQ, 26th Fighter Wing	"	4	3
1st Group	"	26	23
2d "	FW-190	36	31
3d "	"	33	28
HQ, Fighter Command 3	Deauville	Colonel Ibel	
1st Group, 2d Fighter Wing	Me-109	31	24
3d " 2d " "	"	37	31
Total aircraft strength		213	171

On 14 February the 26th Fighter Wing received a squadron of Me-109 fighter-bombers, and on 18 April a similar fighter-bomber squadron was assigned to the 2d Fighter Wing.

The two fighter-bomber squadrons thus in the zone of **Third Air Fleet**, were designated as Fighter-Bomber Squadron 2, and Fighter-Bomber Squadron 26.

By that time the 1st Group, 26th Fighter Wing had been reequipped with FW-190 aircraft, and the wing's 2d Squadron was in process of reequipping, also with FW-190 aircraft.

The disposition of the units committed in fighter defense missions in the zone of the Third Air Fleet, status 20 May 1942, was as follows:

Command HQ Units	Command Post Airfield	Aircraft Type & Strength Actual	Effective
2d. Fighter Command	St Pol-Brias		
HQ, 26th Fighter Wing	Audembert	FW-190 6	4
1st Group	St Omer-Argues	FW-190 38	27
2d "	Abbeville-Drucat	FW-190 44	31
3d "	Wevelghem	FW-190 37	29
Fighter-Bomber Squadron 26	St Omer-Argues	Me-109 10	6
3d Fighter Command	Deauville		
HQ, 2d Fighter Wing	Beaumont Le Roger	Me-109 2	1
1st Group	Triqueville	Me-109 42	37
2d "	Beaumont Le Roger	FW-190 45	42
3d "	Cherbourg-Théville	Me-109 25	13
Fighter-Bomber Squadron 2	Caen-Carpiquet	Me-109 15	12
Total aircraft strength[391]		264	202

391. Sources 208, 252, 262, 263.

On 20 February 1943 the Third Air Fleet controlled the following fighter forces:

Command HQ Units	Command Post Airfield	Aircraft Type	Commander and Aircraft Strength Actual	Effective
HQ, Fighter Command West	Chantilly		Colonel Ibel	
HQ, 2d Fighter Command	St Pol Brias	FW-190	Colonel Viek	
HQ, 26th Fighter Wing		FW-190	6	5
3d Squadron		"	12	5
2d Group		"	40	24
3d " (minus 1 Squadron)		"	26	18
3d " 54th Fighter Wing		Me-109	30	22
10th Squadron 54th " "	(Fighter-Bomber)	FW-190	15	12
11th " 54th " "		Me-109	13	11
HQ, 3d Fighter Command	Caen/Verson		Colonel von Merhart	
HQ, 2d Fighter Wing		FW-190	8	7
1st Group		"	34	30
3d "		"	45	34
10th (Fighter-Bomber) Squadron		"	14	13
11th & 12th Squadrons		Me-109	15	8

Command HQ	Command Post	Aircraft Type	Commander and Aircraft Strength Actual	Effective
HQ, Fighter Command, Southern France	Aix		Colonel Vollbracht	
Tactical elements from Replacement Group South		Me-109	38	15
Tactical elements from Replacement Group West		"	23	10
Tactical Elements from Replacement Group East		"	25	14
Tactical Fighter-Bomber Squadron South		"	29	11
Tactical Fighter-Bomber Squadron West		FW-190 & Me-109		
Tactical Fighter-Bomber Squadron East		ME-109	25	20
Total fighter aircraft strength available to Third Air Fleet[392]			418	274

The above tabulation shows that certain organizational changes had been introduced during the year of 1942 in the command set up of the fighter forces under the Third Air Fleet:

On 1 December 1942 Headquarters Senior Fighter Command West was established in a command post at Paris-Chantilly. Its commander was given the status of a division commander.[393]

Somewhat earlier, on 16 November 1942, Fighter Command Southern France was established in headquarters at Aix to control the fighter units committed in the areas of southern France.[394]

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392. Source 247. 393. Source 91.
394. Source 253.

The purpose in establishing Senior Fighter Command West was to provide a central control for the three fighter commands. This was to insure greater flexibility in shifting main points of effort in operations and in the exchange and transfer of fighter units, the latter a necessity which had arisen from the general development in the air situation in the west.

In examining the actual strength of the fighter groups one significant point is noticeable: On 20 May 1942 and on 20 February 1943 a number of the groups each had available more than 40 of their authorized strength in aircraft.

This is due to a change in the authorized strengths. In order to reinforce the fighter defenses in the west the Chief of Fighter Forces had chosen the simpler method of increasing their authorized strengths from 12 to 16 per squadron.

In a conference with Reich Marshal Goering on 20 July 1942 he gave the reason that it was easier to have the existing ground service personnel service a larger number of aircraft than hitherto than to activate new units.

At the same conference the Chief of Fighter Forces stated that he also intended, with the mounting output in fighter aircraft, to increase each group initially by an additional 4th squadron, and then to increase the size of the wing staff by the assignment of a wing headquarters squadron. The final size

of the standard fighter wing would thus be increased to comprise 220 aircraft (16 plus 3 x 68) instead of the former strength of 124 aircraft (4 plus 3x40).[395]

This shows that the Luftwaffe High Command had come to realize the necessity to reinforce the fighter defenses in the West. Since the available resources in personnel and in materiel in neither case would have been adequate to allow of the activation of new units, this improvized course necessarily had to be adopted.

Another measure taken at the turn of the year 1942-43 can also only be described as an improvization. Under this measure the replacement groups were withdrawn from their parent wings and consolidated to form a wing under a "Commander of Fighter Replacement Groups." This new wing was transferred to southern France and placed under Fighter Command Southern France for tactical purposes.

The decision to take the measure just described was a direct result of the German military occupation of the "Vichy Enclave" under the Petain Government of France. This occupation was carried out in a sudden swift action on 11 November 1942 after the landing of the Western Allies in northern Africa in order to provide against the eventuality of an intended defection of the French Vichy Government and against the eventuality of a landing by the Western Allies in southern France,

395. Sources 113, 247.

By this transfer of a replacement fighter wing, which at the time had an aircraft strength of 160, according to the status of 20 February 1943, it was possible to stage an ostentative show of strength. The real value of the wing for tactical purposes, however, can in no way be compared to the tactical value of a standard unit comprising 160 aircraft, since most of the personnel in the various sub-units were fighter trainees.[396]

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396. Sources 113, 247.

DEVELOPMENT OF THE WESTERN AIR SITUATION IN THE ZONE OF THE THIRD AIR FLEET IN 1942

In the first half of 1942 the air situation was marked by the features of what might be called an air war of attrition, so far as daytime operations were concerned. Obviously, the Royal Air Force was employing these attrition tactics with the objective of gradually weakening the German fighter defenses at the Channel coast;

To this end the Royal Air Force dispatched small forces of bombers, at times 4-engine bombers, under strong fighter escorts to attack targets in the area between the Channel Coast and Paris.

The attacks in themselves were of no strategic significance, which is characterized by the fact that only ten of them found any mention in the German Military Bulletins published during the 1 January-1 August 1942 period.

For the defending German fighter forces, however, this period was one of rigoros fighter combat action. The steady improvement of the quality of the Royal Air Force fighter units due to the introduction of modern aircraft of the Spitfire VIII and IX and the Hawker Typhoon models, and the constant British numerical superiority imposed an increasingly heavy burden on

the German fighter units stationed along the Channel coast.[397]

The German military command nevertheless considered these fighter forces strong enough in February 1942 to carry out the hazardous operation in which the German naval units Scharnhorst, Gneisenau, and Prinz Eugen battered their way through the English Channel from Brest to the Bight of Helligoland under fighter protection.

The operations commenced on the evening of 11 February 1942 with the departure of the German fleet from Brest. German night fighters from the XII Air Corps met the fleet on the morning of 12 February at a point level with Cherbourg and escorted it as far as possible before daybreak, when they were relieved by daytime fighters of the Third Air Fleet, which provided an uninterrupted escort, flying at low levels and observing radio silence, to the end of the journey.

It was only at 1330, when the fleet was level with Boulogne, that the British, taken completely by surprise, started to attack with air and naval forces.

On the evening of 12 February the entire fleet reached the mouth of the Elbe River after furious air and naval battles, losing only one outpost patrol boat on the way and sustaining a few minor damages to the heavy naval units through mines.

All in all the escorting German fighters and the antiaircraft

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397. Sources 227, 255.

guns of the naval ships shot down 49 enemy aircraft against a total German loss of 17.[398]

The successful outcome of this operation was not due to the strength of the German fighter forces committed in the west, but to the following factors among others:

1. Owing to the strict secrecy with which all plans and preparations were made, and owing to the excellent radio discipline with which radio silence was maintained rigidly right up to the moment of the first attacks by Royal Air Force units, the advantage of surprise could be exploited to a high degree and permitted the fleet to move as far a level with Boulogne without interference;

2. Bad weather, with cloud ceilings at 600 feet and even lower, prevented the commitment of larger Royal Air Force units in closed formation;

3. Cooperation between the German naval and air forces involved was exemplary both during the preparations and during the execution;

4. Being fully conscious of their serious responsibility, fighter personnel put forth their utmost effort in the battle to perform their mission successfully, although they fought under exceedingly difficult conditions.[399]

The second half of 1942 brought the opening of operations

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398. Source 256. 399. Source 257.

by US 4-engine bombers in the west, in itself one of the most significant turning points in the conduct of air warfare.

On 17 August 1942 twelve Fortress B-17 bombers from the US Eighth Air Force bombed the railway marshalling yards at Rouen-Sotteville and were able to return to their bases without losing a single plane.

During the same month the US Eighth Air Force launched seven further attacks, involving a total of 75 4-engine bombers, against targets in the coastal areas of France, Belgium, and Holland. Not one of the bombers participating was shot down by the defending German fighters.

In the months which followed the US 4-engine bombers continued their attacks , in steadily increasing size, against targets near the coastal areas in the occupied western territories, gradually extending their operations to as far as the mouth of the Gironde River.

On an average, the German defenses failed to bring down more than 1-4 percent of the attacking planes.

The reasons were as follows:

1. The US 4-engine bombers operated at altitudes between 25 000 and 30 000 feet, between 10 000 and 13 000 feet higher than the altitudes at which air units of the Royal Air Force had usually penetrated in the past.

This meant that the German interceptor fighters required considerably more time to attain the appropriate combat altitudes. Owing to the small depth of the forward warning zone the time between the moment of detection and that of identification of an approaching enemy was usually too short. As a result, the 4-engine bomber unit currently attacking was frequently on its return route, after having carried out its bombing mission, while the interceptor fighters were still climbing up to combat altitudes.

2. Within range of British fighters, the bombing attacks against targets near the Channel coast were always carried out with strong fighter escorts.

The high altitudes at which the 4-engine bombers operated naturally meant that the escorting fighters flew at altitudes between 30 000 and 35 000 feet. This represented a serious handicap for the German defenses, since the German fighter aircraft, particularly the FW-190 models, were markedly inferior to the British Spitfire model at such altitudes.

This was due primarily to the decreased thrust of the German aircraft engines at high altitudes, which were constructed to operate with a maximum fuel feed pressure at 23 000 feet. At altitudes above 30 000 feet the thrust of the engine dropped considerable because of the reduced fuel feed pressure.

3. The US 4-engine bombers proved to be exceptionally resistant to weapons fire, and presented a new problem in the field of armament for German fighter aircraft.

In addition, the bombers were protected against the conventional form of fighter attack from the rear by extraordinarily heavy weapons fire against which it was practically impossible for a fighter to approach to within close range, approximately 50-100 yards, without being shot down.

Events proved that the fire power of the Me-109-F-4, with it single 20-mm cannon and its two 7.9-mm machine guns, or of the FW-190, with its two Model 151/20 15-mm and two Model 131 13-mm machine guns. was inadequate to shoot down a 4-engine bomber at a range above 200 yards.

In a conference with the Chief of Luftwaffe Special Supplies and Procurement on 6 October 1942 the Chief of Fighter Forces described the FW-190 as no longer adequate for operations in the west, since its technical performances were too greatly inferior to those of the enemy fighters at altitudes above 30 000 feet. He announced his intention to transfer all FW-190 units to the eastern front and called for a speedy solution of the problem of high-altitude fighter operations. The solution was to be such that the German fighters would have superior flight performances and superior fire power in the form of cannon and super-heavy

machine guns.[401]

The transfer of FW-190 fighter units from the Third Air Fleet to the eastern front in exchange for Me-109 units (elements of the 26th Fighter Wing against elements of the 54th Fighter Wing), as shown in the table of organization of the fighter forces of the Third Air Fleet, status 20 February 1943, must be viewed in the light of the above conference.

Also related to what was discussed at the conference was the activation of specialized "high-altitude" squadrons, such as the 11th Squadron of each of the 54th, 26th, and 11th Fighter Wings, since the only German model which had proved equal in performances to the enemy fighters at altitudes above 33 000 feet was the Me-109-G-1 with its Db-605 engine, a model which had just gone into serial production.

It had also been found that the high-altitude performances of the older Me-109-F-4 model with its DB-601-N engine could be improved somewhat by the admixture of Monagas with the fuel, which was not possible in the case of the FW-190 model with its BMW-801 engine.

From the above it can be seen that for the time being there was no other way to cope with the new situation in the west than through an increased commitment of units equipped with aircraft of the Me-109 type, specially adapted to improve

its performances at particularly high altitudes.

In the field of tactics for fighter attacks, it was found after some time that the best method was to strike at the point of the enemy bomber formation, in a drive from the front.

This form of attack was exceedingly difficult, particularly if the escorting enemy fighters prevented unhampered maneuvering. The time for the delivery of weapons fire was exceptionally short, since the combined speed at which the attacker and

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400. Source 258. 401. Source 259.

the target approached each other was roughly 600 miles.

On the whole the problem of developing successful defenses against attack by US 4-engine bomber formations by means of fighter action remained unsolved in 1942.[402]

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402. Sources 3, 247, 260.

THE ATTEMPTED BRITISH LANDING AT DIEPPE

ON 19 AUGUST 1942

One special event deserves mention at this juncture, namely, the attempt made by British forces to effect a landing at Dieppe, an operation which commenced at 0653 on 19 August 1942.

This attempt did not come as a surprise for the German command in the west. As previously set forth, orders had been issued already after failure of the offensive against Russia late in 1941 to fortify the Channel and Atlantic coastline, and to make all preparations to repel any enemy attempts to land. Periodic alert exercises were carried out in all units under the Third Air Fleet, and all airfields were developed for local defense.

Increasing British air activities in the last week of July and the first week of August 1942 gave cause to expect some form of special enemy action.

The assigned mission of the fighter forces in the eventualit of action to repel enemy landing attempts were as follows:

1. To provide escorts for friendly bomber and fighter-bombs units;
2. To reequip additional fighter squadrons and hold them available for fighter-bomber missions;
2. To carry out low-altitude air attacks against ground targets.

Due to the alertness of one guard, the whole defense

system received timely warning of the British action. Although the enemy units succeeded in gaining a lodgment, with tanks, on the coast, the attempted landing was frustrated in operations involving the use of fighter, fighter-bomber, and bomber forces of the Third Air Fleet. The battle was over within eight hours, with the landed forces captured, and the bulk of the British amphibious force in retreat.

Timed to support the landing attempt, the US Eighth Air Force dispatched 24 aircraft to bomb the Abbeville-Drucat airfield.

The British air forces committed in support of the operation suffered very heavily, units of the German 26th Fighter Wing alone accounting for 38 British planes downed. German airplane losses in the encounter totalled only six.[403]

From the above it is evident that The German fighter defenses still held absolute air supremacy at the Channel coast at this juncture.

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403. Sources 264, 265.

FIGHTER DEFENSES IN OTHER THEATERS

IN 1942

I. SOUTHERN THEATER

1. Night Fighter Defense. As previously reported, the 1st Group and the 4th Squadron of the 2d Night Fighter Wing were relieved in November 1941 of their mission of long-range night fighter action against Britain and transferred to the zone of the Second Air Fleet.

Stationed on airfields on Sicily, these units were employed in escort missions to protect seaborne convoys on their way across the Mediterranean to northern Africa against night attacks by British torpedo and other bomber aircraft.

On 4 April 1942 the 4th Squadron, 2d Night Fighter Wing was transferred back to the command of the 2d Fighter Division.

The 1st Group, 2d Night Fighter Wing, operating from airfields at Catania, retained its escort mission, but on 10 May one of its squadrons was transferred to Derna, to provide escort services from there.

On 31 August the 1st Group, 2d Night Fighter Wing returned to the zone of the XII Air Corps, again for commitment in long-range night fighter missions.

On 10 January 1943 2d Night Fighter Wing and the wing's

2d Group displaced from the command area of the 2d Fighter Division for commitment in escort missions in the zone of the Second Air Fleet.[404]

These irregular movements in the disposition of units obviously was connected with the military events in the theater of war in Africa.

In July 1942 the offensive launched by the German Africa Corps had come to a halt at El Alamein.

In November 1942 the British launched their counteroffensive, compelling the German Africa Corps to withdraw through Tobruk and Benghasi to Agedabia.

At the same time a new threat to the rear of the German Africa Corps developed through the landing of Allied forces on the western coast of Africa on 8 November 1942.

On 16 November 1942 German-Italian forces landed in Tunesia.

The growing supply requirements of the Italo-German forces in Africa on the one hand, and the increasing activity of the Royal Air Force on the other hand in attacks against Italo-German convoy traffic across the Mediterranean from Italy to Northern Africa made protection by day and night for the convoys a vitally important problem.

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404 Source 245.

There can be no doubt that the mission of protecting German territories against night attack by forces of the Royal Air Force was of no less importance.

That the Luftwaffe High Command nevertheless decided to transfer 2d Night Fighter Wing Headquarters and the wing's 2d Group from its mission of protecting Germany against night attack to its escort mission in the southern theater proves that the German military potential was overstrained through developments in the military situation.[405]

2. Daytime Fighter Defense. Developments in the military situation in the southern theater could not fail to influence t the distribution of daytime fighter forces.

Whereas on 17 January 1942 the 53d Fighter Wing with two groups was able to handle all daytime fighter missions in the zone of the Second Air Fleet while the 3d Group, 26th Twin-Engine Fighter Wing provided the necessary escort services, the status as of 4 April 1942 shows that the fighter forces in the zone had meanwhile received reinforcements in the form of two fighter wing headquarters (the 3d and 27th), and 5 1/3 fighter groups, including one fighter-bomber squadron.

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405. Source 113.

These units had been moved in from the eastern theater, and their new dual mission was to provide air support for the offensive launched by the German Africa Corps and to neutralize the Royal Air Force units stationed on Malta.

According to records for 10 May 1942 3d Fighter Wing Headquarters with its 2d Group had by then again been moved out and transferred back to the eastern theater, and the 27th Fighter Wing had a new fighter-bomber squadron. The twin-engine fighter forces had been increased by a newly activated squadron, the 10th Squadron, 26th Twin-Engine Fighter Wing. A fact worthy of note here is that this squadron was equipped with outdated aircraft of the Do-17 model.

Records for 31 August 1942 show that when the offensive by the German Africa Corps bogged down 53d Fighter Wing Headquarters and the wing's 2 groups were returned to the eastern theater. The 3d Group, 1st Twin-Engine Fighter Wing was en route at the time, displacing from the eastern theater to the zone of the Second Air Fleet to replace the 3d Group, 26th Twin-Engine Fighter Wing , which had moved to Crete for employment in Greece.

On 10 January 1943 the situation was again such that the Second Air Fleet required considerable reinforcements for the fighter forces committed in its zone. The 53d Wing with

2 groups, the 77th Wing with 3 groups and one group from the 51st Wing were moved in from the eastern theater, and the 2d Group, 2d Fighter Wing, from the western theater. The twin-engine fighter forces under Second Air Fleet received reinforcements in the form of a new squadron, the 11th Squadron, 1st Twin-Engine Fighter Squadron.

Here again signs are evident of the constant shuffling and reshuffling of units back and forth which show the acute shortage of fighter forces at the time. These constant displacements could not remain without adverse effects on the effective strengths of the units concerned.

On 10 January 1943 the fighter forces under the Second Air fleet had the following strengths:

	Authorized Aircraft	Actual Aircraft	% of authorized	Effective Aircraft	% of actual
Single-engine fighter	368	249	68	173	70
Twin-engine fighter	104	47	75	53	68

By comparison with the authorized strengths, the units with their current effective strengths represented only 48 percent, in the case of single-engine, and 50 percent, in the case of the twin-engine units, of their nominal combat value.[406]

406. Source 245.

II. THE EASTERN THEATER IN 1942

1. Night Fighter Operations. In a conference with the Chief of Special Supplies and Procurement on 6 October 1942 the Chief of Fighter Forces stated that, in pursuance to orders from the Commander in Chief of the Wehrmacht, improvized night fighter units were to be established for the eastern theater.

In courses lasting between ten and twenty days, personnel were to be trained at Wiener-Neustadt for close defense night operations and at Poltava for long-range missions. The units were to be equipped with Me-110, Ju-88, and He-111 aircraft.[407]

2. Daytime Fighter Operations. The military situation as it existed in the autumn of 1942 is marked by the following salient events:

October 1942: German victory in the battle south of Lake Ladoga, resulting in the destruction of seven Soviet divisions.

November 1942: Opening of the Battle for Stalingrad. German Caucasus offensive comes to a halt.

22 November 1942: German Sixth Army is enveloped at Stalingrad area.

12 December 1942: Beginning of offensive by Provisional Army Group Hoth (Armeegruppe Hoth) in a drive from the Caucasus to relieve the Sixth Army at Stalingrad.

21 December 1942: Offensive by Provisional Army Group

407. Source 259.

Hoth comes to a halt 33 miles outside of Stalingrad.

From the above it can be seen that in November 1942 a crisis was shaping up in the eastern theater coinciding in time exactly with the crisis in Africa and with the growing severity of the daytime air situation in the west brought about by the commitment of US 4-engine bombers.

Because of the lack of adequate fighter forces the German Command found itself compelled to move the fighter units abot swiftly to reinforce the units from case to case in areas in which the current situation was most critical.

It is of interest to examine what conclusions were drawn from this overall situation concerning measures to strengthen the fighter arm as a whole.[408]

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408. Sources 113, 261.

THE 1942 INDUSTRIAL OUTPUT IN FIGHTER AIRCRAFT AND PLANS FOR 1943-44

In a conference at his office on 5 January 1943, Field Marshal Milch, as Chief of the Luftwaffe Special Supplies and Pro-Curement Services , gave a review of the aircraft production in 1942, as compared with the output in 1941 and the program for 1943 and 1944, as follows:

1. The monthly average output of the German aircraft industry in 1942, and the equivalent figures for 1941 were:

	Single-Engine Fighters	Twin-Engine and Night Fighters	Bombers and Dive bombers
1941	251.7	64.2	334.5
1942	366.5	109	424
Increase	115	45	90

Including transport planes, but excluding all other special types, such as liaison planes, seaplanes, and training aircraft, the overall average monthly output in aircraft totalled 693 in 1941 and 947 in 1942.

The overall average monthly output in single-engine, twin-engine, and night fighter, bomber, dive-bomber, and transport planes in 1942 thus showed a total increase of 254 over the fighure for 1941.

2. Field Marshal Milch informed the meeting that the original program for 1943 (Project 222) had provided for an allocation of 1802 planes of these types as against an allocation of 1947 in 1942, showing that the allocation of these categories of planes was to be just about doubled. A new program study (Project 1013) had been worked out in the meanwhile but could not as yet be considered certain of achievement, since the problems of engines, other items of equipment, raw materials, and labor involved had not yet been clarified.

Study or Project 1013 provided for an allocation of 1850 aircraft of the types under discussion here in 1943 instead of the projected 1802.

This increase of 48 aircraft per month provided for in Project 1013 is intended for the fighter arm, plus another increase of 32 aircraftas provided for in Project 1013 compared with the provisions of Program 222 , through a reduced authorized monthly allocation of bomber aircraft.

For 1944 Project 1013 provides for an increase of the monthly allocation from 1850 to 3146.

3. Compared with German output, intelligence reports indicate the following monthly output of our opponents, Britain, Canada, USA, and Soviet Russia, in 1942:

Enemy	Single- and Twin-Engine Fighters	Bombers and Dive-Bombers	Transport Planes	Total Aircraft Output
Enemy Output	1950	1453	224	3627
German Output	475	424	48	947

In 1943 it is assumed that our western enemies will have a monthly production of 1 800 single- and twin-engine fighter aircraft, including night fighter types, compared with the projected German output of 874 single-engine and 156 twin-engine fighters, making a total of 1030 including allocations for the night fighter arm.

For 1944 the numerical ratio of production in single- and twin-engine fighter aircraft between the Western Allies and Germany, according to the projected program for that year, would be:

German output 2230 aircraft

Output of our western opponents 2245 aircraft.

Field Marshal Milch stated it as his opinion that in the field of single- and twin-engine fighter production, the monthly ratio of 1030:1800 already in 1943 could be considered

as a status of parity in view of the following factors:

a. The superior quality of the German aircraft models;

b. The heavy strain which the war against Japan imposed on Germany's western opponents.

He came to the conclusion that, so far as the single- and twin-engine fighter forces were concerned, there was every prospect that the year of 1943 would be one of large scale successes in operations against the enemy.

4. For 1944 Field Marshal Milch even anticipated a considerable German superiority of Germany over the Anglo-Americans in the field of fighter aircraft production. The following is a literal quotation of what he had to say on the subject:

> In view of the factual performances which our industry has achieved I view the coming year with exceptional optimism.....
>
> The war can only be won with air power and I would like to go even farther and say--and this is a fact which has been acknowledge by the highest authority--that any war necessarily must be lost if one lacks air superiority at the points where it is required.....
>
> In the past year (1942) we received clear proof of this through what happened with Rommel in Africa. He had to withdraw for the sole reason that, owing to reasons

of supply and replacements it was not possible to build up German air superiority over the British.[409]

As early as in a Chief of Special Supplies and Procurement conference on 17 and 18 August 1942it had been Field Marshal Milch who, on his personal initiative, had increased the figures in the fighter program worked out by his own office. For the period up to 1 October 1943 he required an increased overall monthly production of 600 fighter type aircraft, an increase of 100 aircraft over the projected figures.

The whole problem here was a matter of engines: Crank shafts for the DB-605 engines used to power Type Me-109 aircraft were in short supply. Increased production in this item and an increased output in Types FW-190 aircraft and BMW-801 engines were to bring about the desired increase in overall output.[410]

In his views on the need for fighter forces Field Marshal Milch was not in agreement with the views of General Jeschonnek, Chief of the Luftwaffe General Staff.

In a conference with Reich Marshal Goering and General Jeschonnek at the end of 1941 Field Marshal Milch had offered a monthly output of 1000 fighter type aircraft. In reply, General Jeschonnek had stated that there was no need for such a large production and, as previously stated, had established a figure of 360 as the planned monthly output in fighter aircraft in 1942.

409 Source 266. 410. Source 267.

As the survey given by Field Marshal Milch on 5 January 1943, shows, this overall authorized monthly figure was exceeded even in 1942 by the average monthly output of 366 single-fighter aircraft alone, without taking the output of twin-engine fighters into consideration.

General Jeschonnek's rejection of suggestions to increase the production of fighter type aircraft was rooted in his basic views on the subject of the conduct of air warfare. As had always been the case, Jeschonnek was a firm proponent of the principles of offensive air warfare with a corresponding emphasis, in the field of air armament, on the build up of a strong bomber arm.

He could not or would not recognize the air threat developing in the west. He was too strongly influenced by younger officers, members of the General Staff Corps, whom he had gathered around him already prior to the war from the Greifswald Training Wing which he had commanded. All of these men had established reputations as bomber airmen: Baumbach, Peltz, Christian, Diesing, and Storp.[411]

Field Marshal Milch's strongposition as Deputy of the Commander in Chief of the Luftwaffe and his forceful will are characterized by the fact that, contrary to the decision made by General Jeschonnek, he changed the authorized overall figure for

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412. Source 139.

360 fighter aircraft of all types in 1942 to an actual production of 366 single- and 109 twin-engine fighters, or a total average of 475 fighter type aircraft.per month.[412]

As previously stated, plans for 1943 provided for more than double this number,namely for a monthly production of 1030 fighter type aircraft.

412. Source 139.

THE Me-163 ROCKET-DRIVEN FIGHTER PLANE OF 1942

Plans for improvement of the fighter defenses in 1943 included the production of an entirely new type of fighter plane. This was the Me-163 model, manufactured by the firm of Messerschmitt, and propelled by a rocket attachment.

Travelling at full speed this plane could stay in the air only five to seven minutes, but could attain an altitude of 33 000 feet within three minutes from take Off. It was so constructed that, when its fuel was exhausted, it could land on runners like a glider. Its maximum speed was roughly 600 miles (1 000 kilometers). It was intended primarily for use against the fast British reconnaissance airplanes which operated at great altitudes.

Acting upon recommendations from the Chief of the Fighter Arm (General der Jagdflieger) the Chief of the Luftwaffe General Staff in September 1942 had agreed to the following program for operations by the new type of fighter aircraft:

1. The units were to be committed in

Area A: the Ruhr region and

Area B: the Bight of Helligoland.

2. Within each of these two areas four to six of the new planes were to be stationed at each of three to four airfields.

3. Tests were to be carried out at moving the tactical units equipped with the new type of aircraft by rail to wherever they were needed.[413]

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413. Source 259.

FIGHTER LOSSES AND REPLACEMENTS IN 1942

According to reports by the Chief of Luftwaffe Supply and administration the losses incurred by the daytime fighter forces in 1942 totalled the following numbers of aircraft damaged to an extent greater than 10 percent and the following numbers of crews:

Period	Fighter Aircraft	Crews
27 Dec 41-28 Mar 42	592	157
28 Mar 42-30 Jun 42	1124	348
30 June 42-30 Sep 42	1274	382
30 Sep 42-31 Dec 42	745	206
Totals[414]	3735 aircraft	1093 crews

Against the above losses, the number of aircraft available for allocation as replacements through the Chief of Luftwaffe Supply and Administration in 1942 was as follows:

414. Source 101

Period	Me-109	FW-190	Total
1 Jan-1 Apr 42	761	148	909
1 Apr-1 Jul 42	1188	378	1566
1 Jul-1 Oct 42	1267	601	1868
1 Oct-31 Dec 42	1279	518	1797
Aggregate	4495	1645	6140

In examining these figures consideration must be given to the fact that the allocations through the Chief of Luftwaffe Supply and Administration included aircraft coming from current output, repair, and reconstruction. The figures given do not include allocations of fighter type aircraft to tactical reconnaissance and ground support forces. These allocations in 1942 totalled 50 aircraft.

The average monthly figure of 366 fighter type aircraft for 1942 quoted by Field Marshal Milch in his survey given on 5 January 1943 refers exclusively to the number of aircraft becoming available from current output.[415]

A comparison of the number of aircraft lost by the daytime fighter forces with those for the replacements available in 1942 creates the impression that at any given time there were enough aircraft available not only to replace current losses but also to bring the existing units

415. Source 138.

up to authorized strength, to equip newly activated units, and to take care of the previously mentioned increase in the authorized strength of twelve to sixteen aircraft per squadron.

The following figures are compiled to examine whether, in the case of the fighter forces, there was any real improvement in 1942 so far as the ratio of actual to authorized, and effective to actual strengths are concerned.

The figures are taken from reports by the Chief of Luftwaffe Supply and Administration on fighter forces.

Date	Authorized Strength in Aircraft	Actual Strength Aircraft	Actual Strength % of authorized	Effective Strength Aircraft	Effective Strength % of Actueal
1941 Dec 27	1472	1298	87	670	51
1942 Mar 28	1456	1128	78	747	67
Jun 30	1568	1277	81	901	70
Sep 30	1580	1491	93	1024	69
Dec 31	1592	1360	86	908	66

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The increased authorized strength between 28 March and 31 December 1942, by 136 aircraft and crews, reflects a reinforcement of the daylight fighter forces by several units.

The units in question were the following:

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416. Sources 247, 268.

4th Group, 1st Fighter Wing	40 aircraft
1st " 5th " "	40 "
11th (High Altitude) Squadron,	12 "
12th " " "	12 "
both from 2d Fighter Wing	
2d Fighter-Bomber Squadron	16 "
26th " " "	16 "
Total	136 aircraft.[416]

If the figures for actual strengths are compared with those for authorized strengths it is evident that the number of planes left available after replacement of losses was large enough only on 30 September 1942 to almost bring all units up to full authorized strength.

In the field of spare parts the situation, although it showed improvement over the situation at the end of 1942, remained unfavorable, and the supply of spare parts must also be considered as a part of current output in an examination of the ratio of operable, or effective, to actual strengths. Another factor to be considered is that the temporary loss of an aircraft may be due to damage done

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416. Sources 247, 268.

by enemy fire action or resulting from other causes, and that the repair is not necessarily dependent upon the availability of spare parts.

To put the intention expressed by the Chief of the Fighter Arm in the conference on 21 July 1942 into effect by reinforcing the fighter arm through an increase in the authorized strength from 12 to 16 aircraft per squadron and the activation of an additional, 4th Squadron, per fighter group, would have called for a considerable surplus in aircraft over requirements for replacement of losses.

At the end of 1942 the fighter arm had a total strength of daytime fighter units as follows:

10 wing headquarters

34 group headquarters with 102 squadrons

11 tactical squadrons

4 fighter-bomber squadrons

2 high-altitude squadrons

1 Croatian fighter squadron

making a total of 120 squadrons.[417]

To increase the authorized strength from 12 to 16 aircraft per squadron thus would have necessitated a surplus of 480 aircraft over replacement requirements. In view

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417. Sources 202, 235, 243, 244, 247, 252.

of the requirements to bring existing units up to their current authorized strength and to equip newly activated units, it is obvious that the surplus actually available was too small for this purpose, so that the increased authorized strength could be applied only in the case of a few units.

FIGHTER STRENGTHS AND PLANNING IN 1942

SUMMARY

In summarizing, the following can be said of fighter strengths and planning in 1942:

1. Figures on fighter strengths in 1942 show an appreciable increase over the figures for 1941.

2. In contrast with the Chief of the Luftwaffe General Staff, General Jeschonnek, the Chief of Special supplies and Procurement, Field Marshal Milch, who was responsible for air armaments, recognized the necessity for a strong fighter force. In his planning for 1943 and 1944 he made provisions for measures to maintain the lead over the Western Allies in point of quality and to achieve the same numerical output as the Anglo-American fighter forces in 1944.

3. The surplus left over from current output, repair, and reconstruction in 1942 after allocations to replace losses in aircraft was inadequate to

a. bring the existing units up to full authorized strength,

b. activate a sizable number of new units, or

c. put into effect on a large scale the plans to increase authorized strengths from 12 to 16 aircraft per squadron.

PERFORMANCES AND PLANNING FOR FIGHTER PILOT TRAINING IN 1942

The problem of expanding the fighter forces in general (daytime, twin-engine, and night fighter forces), which was of such dire importance in 1942, can only be stated in an examination of training performances and plans together with the targets achieved in production.

1. Fighter Personnel Training.

a. Fighter Pilots. By October 1942 five fighter pilot training schools were available for the training of fighter pilots, namely,

1st Fighter Pilot School, Werneuchen
2d " " " Zerbst
3d " " " Bad Aibling
4th " " " Fuerth, Bavaria
5th " " " Villacoublay.

Following October 1942 the following training centers were established:

6th Fighter Pilot School, Lachen-Speyerdorf

7th " " " Nancy

8th " " " Bad Vosslau

9th " " " Stolp-Reitz

10th " " " Altenburg (for blind navigation).

These schools in 1942 released a total of 1 666 fighter pilots for assignment to front line or replacement units.[418]

Reports by the Chief of Luftwaffe Supply and Administration for 1942 show that 1 093 fighter pilots were lost. After replacing these, the influx from the schools left a surplus of 573 fighter pilots in 1942 for allocations to bring the existing units up to full authorized strength, to activate new units, or to increase the authorized strength of existing units from 12 to 16 pilots per squadron.

The following figures show the ratio of actual to authorized and effective to actual strengths, and are compiled from reports by the Chief of Luftwaffe Supply and Administration:

419. Sources 251, 269.

FIGHTER PERSONNEL STRENGTHS

Date 1942	Authorized Personnel	Actual Personnel	Strength % of Authorized	Fully Effective Personnel	Strength % of actual
Mar 28	1456	1348	91	922	69
Jun 30	1568	1490	89	1048	67
Sep 30	1580	1635	104	1136	69
Dec 31	1592	1671	105	916	56

The above figures reveal that at the end of 1942 units had an actual personnel strength exceeding their authorized strengths, but that the units concerned regarded a large percentage of their assigned pilots as not fully qualified for combat action.

On 31 December 1942 another 631 pilots were reported as "conditionally qualified for combat action."[419] The explanation here is that front line units only considered pilots transferred to them from the replacement units as fully qualified for combat action after these personnel had given actual proof of their capabilities in a number of combat engagements.

b. Twin-Engine Fighter Personnel. Personnel for the twin-engine fighter forces received training at the 2d Twin-Engine Fighter School which had its headquarters and its 1st Group at Memmingen

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419. Source 101.

its 2d Group at Wunstorf (transferred to Neubiberg late in 1942), and its 3d Group in Toul, where it was activated early in 1942. In the spring of 1942 the 3d Group transferred to Orly, Paris.

Each twin-engine fighter crew comprised two personnel a pilot and a radio operator. The latter also acted as a rear gunner, servicing the rear machine gun.

In 1942 424 twin-engine fighter crews were transferred from training to front line or replacement units.

According to reports by the Chief of Luftwaffe Supply and Administration losses in the twin-engine fighter forces in the 28 March-31 December 1942 period totalled 228 crews. Adding one-third of this number for the 1 January-28 March 1942 period, for which no records were available at writing, total losses for 1942 would amount to 304 twin-engine fighter crews.[420]

Of the personnel coming from training 72 crews were thus in excess and could be allocated to bring unit strengths up to the authorized figure and to establish new units.

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420. Source 102.

The ratio of actual to authorized and of effective to actual strengths, in personnel, in the twin-engine fighter forces in the 28 March-31 December 1942 period was, according to figures from reports by the Chief of Luftwaffe Supply and Administration, as follows:

Date 1942	Authorized Personnel	Actual Personnel	Strength % of authorized	Fully Effective Personnel	Strength % of actual
Mar 28	466	323	69	88	27
Jun 30	426	458	104	345	76
Sep 30	424	380	90	176	46
Dec 31	402	411	102	173	42

On 31 December 1942 an additional 188 crews were reported as "partly qualified for combat action."

From the above tabulation it is evident that training in 1942 was able to provide enough personnel to replace losses and to assign twin-engine fighter units more personnel than they were actually authorized.[421]

c. Night Fighter Personnel. Personnel for the night fighter forces received training at the 1st Night Fighter School with its

Headquarters and 1st Group at Schleissheim,
2d " " Ingolstadt,
3d " " Kitzingen, and
4th " " Echterdingen.

421. Source 102.

The last two groups listed above were activated in 1942.

In 1942 trainees transferred from the schools to the front units totalled 239 night fighter aircraft crews.

According to reports by the Chief of Luftwaffe Supply and Administration losses in the 28 March-31 December 1942 period totalled 118 fighter aircraft crews.

Assuming losses to have been one-third of the above figure of 118 in the 1 January-28 March 1942 period, for which no records were available at writing, the total number of night fighter aircraft crews lost in 1942 was 157.

After replacement of losses a surplus of 82 crews thus remained for allocations to bring existing unitsup to full authorized strengths and to activate new units.

According to figures from reports by the Chiefof Luftwaffe Administration and Supply, the ratio of actual to authorized and of effective to actual personnel strengths in the night fighter forces was as follows:

Date 1942	Authorized Personnel	Actual Personnel	Strength % of authorized	Fully Effective Personnel	Strength % of actual
Mar 28	367	306	83	203	66
Jun 30	406	292	72	189	65
Sep 30	506	388	77	223	58
Dec 31	653	414	63	258	62

On 31 December 1942 another 87 crews were reported as "partly qualified for combat action."

From the above tabulation it is evident that the surplus from training after replacement of losses incurred was inadequate in 1942 to satisfy requirements for newly activated units and to bring the existing units up to full authorized strength.[422]

2. The 1943 Training Program. The targets established for 1943 for the daytime, twin-engine, and night fighter schools were as follows:[423]

Daytime Fighter Pilots:	3288,	or a monthly average of	274
Night Fighter Crews :	1236	" " " "	103
Twin-Engine Fighter Crews	435	" " " "	37-38

Since losses for the whole year averaged 91 pilots monthly in the daytime fighter forces, 25 crews in the twin-engine fighter forces, and 13 crews in the night fighter forces, it can be seen that planning provided an adequate margine for a considerable increase in the fighter defenses in 1943.

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422. Sources 153, 269.

423. Source 269.

On the basis of planning, which provided for the doubling of the output of fighter aircraft in 1943, it could therefore be assumed that it would be possible to increase the fighter forces of all types quite considerably.

GERMAN FIGHTER DEFENSES IN 1942

SUMMARY

The following can be said of the fighter component of German air defenses in 1942 and the developments which took place in that year in this field:

1. Consonant with the existing air situation, main emphasis in the field of fighter defenses in 1942 was

a. On night fighters within Germany.

b. On daytime fighters in all other theaters of operations.

2. In neither of these two fields of defense endeavor were the available forces adequate to meet the requirements, which had increased as a result of the mounting severity of the military situation in all theaters.

3. The large share of the overall output in aircraft allocated to the bomber arm is evidence that the ruling concept was still one of an offensive solution of the air defense problem.

4. Plans to expand the fighter defense capabilities failed because of the following reasons:

a. In the case of the night fighter arm, shortages in personnel and materiel. This applied primarily in the case of night fighter aircraft and radar instruments required for development of night fighter control positions.

b. In the case of the daytime fighter arm, the failure to realize clearly that the production of fighter type aircraft must be given priority over the production of bombers. For this reason there was no reserve output in aircraft types which in an emergency could have been used in daytime air defense.

5. Plans for 1943 provided for a considerable increase in fighter strengths. This applies both to the manufacturing and the fighter personnel training programs.

ANTIAIRCRAFT ARTILLERY DEVELOPMENTS IN 1942

AIR COMMAND CENTER

In the antiaircraft artillery field two problems predominated in 1942:

1. That of detecting enemy aircraft at night and establishing their position so as to secure firing data.

2. Reinforcement of the antiaircraft artillery arm with a view to increasing the density of antiaircraft fire in target areas to be protected and improving the effectiveness of such fire.

Problem (1) was matter of the availability of electrical target locating and antiaircraft artillery fire control instruments suitable for weather conditions in which searchlights could not provide the necessary support, and of the availability of an increased number of searchlights for night conditions of good visibility.

The solution of Problem (2) hinged upon the possibility to procure the necessary personnel, servicing equipment, and modern guns.

It remains necessary, therefore, to examine here what measures were adopted for a solution of these problems in 1942.

1. Measures to Improve Firing Performances.

a. Fire Data Procurement. The inadequate output of the German industry in electrical target locating instruments operating on the radar principle and of up-to-date fire control instruments of Type 40 made it impossible to provide the required instruments to each battery.

In order to make more rational use of the instruments that were available and in order to secure a denser concentration of defensive fire over the target to be protected, measures were taken in April 1942 to form what might be called over-size antiaircraft artillery batteries.

Under this system two or three heavy 88-mm gun batteries were grouped, each with six guns, around one electrical target locating instrument. The target data from the electric instrument was recomputed for the individual battery positions.

b. Reinforcement of the Heavy Antiaircraft Artillery Batteries. At the same time the guns received from current industrial production were used to increase the existing heavy batteries from four to six guns each. This served to increase the fire density per battery, save the personnel which would

have been required otherwise to activate new batteries, and insure a more rational use of the electrical target locating equipment available.

c. Reinforcement of the Light Antiaircraft Artillery Batteries. Starting in April 1942 light antiaircraft artillery batteries were assigned fifteen guns of 20-mm caliber instead of only twelve. The effectiveness of the light batteries was increased by increasing the authorized strength per battery by two platoons, the 4th and 5th platoons, each with three guns.

d. Measures to Improve the Effectiveness of Antiaircraft Fire. More of the batteries still equipped with Type-36/37 88-mm guns were reequipped with 105-mm guns or with the new Type 41 88-mm gun. Newly activated batteries received 105-mm and 128-mm guns, which improved their effectiveness considerably.

From mid-April 1942 on the first 128-mm double-barreled antiaircraft artillery guns reached the field units. In mid-August the first AAA tower (Flakturm), armed with 128-mm guns, was ready for action in Berlin. On 9 September the Wehrmacht High Command ordered the construction of more of these AAA towers at Hamburg and Vienna.

The capabilities of the light batteries were also improved steadily through a continuing program of resequipment with Type 38 20-mm guns and Type 38 four-barreled 20-mm guns. The latter in particularly proved highly effective in action against aircraft.

e. Measures to Improve Searchlight Support. The authorized number in each battery increased from nine to twelve searchlights. Larger numbers of the newly developed 200-centimeter searchlight were delivered to the searchlight batteries to serve as a "lead or control" searchlight.

f. Special fire directing staffs were assigned to improve the effectiveness of fire barrage batteries.

2. Measures to Increase the Number of Antiaircraft Units.

a. Newly Activated Units. Whereas all materiel with the exception of target locating and fire control instruments, which were in short supply, was available for the activation of new units, serious difficulties existed in the personnel field. Not only properly trained personnel but personnel fit for military service in general were lacking.

Under the stress of these circumstances the following measures were taken:

aa. From May on the Establishment of Home Defense Antiaircraft Artillery Batteries. These batteries had a cadre of appropriately trained antiaircraft artillery personnel to perform the most improtant functions in servicing the fire control instruments and the guns. The rest of the personnel were taken from the local industrial installations to be protected. Able-bodied men from these installations were given brief training and kept in practice.

bb. The Establishment of "Alert" Antiaircraft Artillery Batteries from Mid-August 1942 on. Apart from a very small skeleton of trained antiaircraft artillery personnel, the crews for these batteries came from military installations, civil servants, and other government civilian employees working near the battery position. These personnel also received brief training and were required to practise during off-duty hours.

On 16 August 1942 59 and on 1 September 77 batteries of this type were in process of activation.

Both of the above two types of antiaircraft artillery units were only required to maintain a status of readiness for action when enemy penetrations were

reported. However, they personnel were required to practise during their off-duty time.

cc. The Activation of Antiaircraft Fire Barrage Batteries. To reinforce the defenses at targets particularly exposed to the threat of low-level attacks, such as valley dams, locks and floodgates, and bridges, the number of fire barrage batteries was increased considerably in 1942.

A total of 70 such batteries was activated in that year in the command zones of Air Command Center.

dd. The Activation of Smoke-Screening Companies. The good results obtained in operations by the existing Motorized Smoke-Screening Company, a unit formed prior to the war by the Reich Institute for Passive Air Defense, led in 1942 to the activation of six smoke screening companies within the zones of Air Command Center.

This weapon of passive air defense was to be used to protect particularly important targets against air attack by concealing them from observation, particularly during daylight.

The overall scope of the new activations within the zones of Air Command Center in 1942 is revealed by the following comparative tabulation.

AIR COMMAND CENTER

ANTIAIRCRAFT ARTILLERY UNITS

Date	Heavy Gun Bttrs	Medium & Light Gun Bttrs	Searchlight Bttrs	Smoke-Screening Cos	Barrage Balloon Bttrs
1942 Jan 10	742	438	174	0	0
1943 Jan 13	838	538	277 1/2	6	70
Hence, new units	96	100	103 1/2	6	70

In the case of the 838 heavy gun batteries shown for 13 January 1943 the fact must be taken into consideration that this figure included a total of 207 barrage fire batteries of only limited combat capabilities.

b. Measures to Increase the Number of Railway Antiaircraft Artillery Units. In operations the first railway antiaircraft artillery units, activated in 1941, had shown how useful these units were for quick shifts of main effort.

Plans submitted in March 1942 for the organization of such units provided as follows:

Light Railway AAA Battalions, each comprising

1 battery of Type 41 50-mm AAA guns

1 " " " 36 37-mm " "

2 " " " 38 four-barreled 20-mm AAA guns.

Heavy Railway AAA Battalions, each comprising

3 batteries of Type 41 88-mm AAA guns with

1 radar instrument to each battery

2 batteries of each two Type 38 20-mm platoons plus

1 platoon of four-barreled Type 38 20-mm AAA gun

Plans also existed for the activation of railway AAA batteries equipped with 128-mm guns.

c. Measure to Improve Searchlight Support in Antiaircraft Artillery Operations. As related in the chapter on the night fighter forces, above, the two searchlight divisions of the XII Air Corps were disbanded in the summer of 1942, with the exception of one experimental regiment, and the individual searchlight batteries were assigned to the antiaircraft artillery to reinforce the searchlight forces committed to support visual antiaircraft fire at night during conditions of good visibility.

This considerably improved the chances of success in antiaircraft artillery defense action against night attacks, and at the same time improved cooperation between night fighter and antiaircraft artillery forces in the form of combined night fighter-antiaircraft artillery operations over the target area.

All measure to reinforce and improve the antiaircraft

artillery defenses were taken under the influence of the emphasis with which the Commander in Chief of the Wehrmacht (Hitler) insisted on fulfillment of the requirements stated by him.

In a conference concerning the 1942 antiaircraft artillery program on 6 March 1942 the Chief of the Luftwaffe General Staff, General Jeschonnek, stated:

> On the occasion of the last conference at the Fuehrer's Headquarters, the Fuehrer seemed under the impression that the required antiaircraft artillery program is not being enforced with the necessary emphasis.
>
> The Fuehrer attaches special importance to the fulfillment of this program.
>
> At the same time the searchlight program will be fulfilled.

The above quotation proved that, in 1942 also, the Commander in Chief of the Wehrmacht still considered that the antiaircraft artillery arm still played the decisive role in air defense.[424]

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424. Sources 65, 216, 270, 286; Study 158-160 Vol. VIII.

AIR COMMAND CENTER

DISPOSITION OF ANTIAIRCRAFT ARTILLERY FORCES

Status 13 January 1942

The disposition of antiaircraft artillery forces within the zones of Air Command Center on 13 January 1943 was as follows:

Air District Command	Gun Bttrs Heavy	Gun Bttrs Med & Light	Search-light Bttrs	Smoke-Screen Cos	Barrage Balloon Bttrs	Barrage Balloon Bttrs	Rail Hvy Bttrs	Rail Light Bttrs
I	26	15	4	0	1	3	0	0
II	1	6	0	0	0	6	0	0
III	88	58.8	36	1	7	0	18	16
IV	42	48.25	9	1	9	22	0	0
VI	175	125.6	83	1	20	61	1	0
VII	48	41	25	0	0	22	3	0
VIII	5	5.5	0	0	9	45	0	0
XI	134	131.6	72.5	2	24	13	3	0
XII/XIII	95	75.25	39	1	0	3	2	0
XVII	15	31	9	0	0	34	0	0
Denmark	3	15.6	0	0	0	7	0	4
Totals	632	553.6	277.5	6	70	216	27	20

It should be noted here that the figures for heavy and medium and light guns batteries include the strength in railway heavy and light batteries.

Air Defense Area Denmark was assigned tactically to Air District Command XI.

The antiaircraft artillery forces organic to the Navy and committed for air defense in the naval fortification areas along the coastline of the North and Baltic Seas, status 29 January 1943, comprised

116 heavy, plus 66 medium and light gun batteries, and

51 1/3 searchlight batteries.

In a comparison of the above figures with those given for Air Command Center, status 10 January 1942, (compare p. 413, above), the following salient features become evident:

1. Defenses in the eastern air districts of Germany, namely, Air District Commands II (Poznan), VIII (Breslau), and XVII (Vienna) had been weakened considerably in favor of Air District Commands VI (Muenster), XI (Hamburg), and XII/XIII (Wiesbaden/ Nuremburg). The development of main areas of defense in the western zones of Air Command Center is obvious.

2. The overall number of searchlight batteries shows a considerable increase.

The transfer to the antiaircraft artillery of the searchlight units previously assigned to the XII Air Corps until the summer of 1942 had made it possible to also commit searchlight units in Air Districts I, VII, and XVII (hitherto completely without such units), and thereby insure that the antiaircraft defenses in these districts could also function at night independent of the use of electrical target locating instruments.

3. The large increase in medium and light antiaircraft artillery units in 1942 made the allocation of such forces to all areas possible which had been stripped or wrecked in this field in 1941 through transfers to the eastern theater and transfers to reinforce the western air districts.

4. The large number of barrage fire batteries is an obvious sign of the acute shortage in electrical target locating and up-to-date fire control equipment.[425]

425. Source: Study 1958-160, Vol. VIII.

AIR COMMAND CENTER

ANTIAIRCRAFT ARTILLERY COMMAND ORGANIZATION

Status: Early 1943

AIR COMMAND CENTER

Headquarters Berlin

CG: General Weise

Command	Command Post	Commander
Air District Command I	Koenigsberg/ Eastern Prussia	General Putzier
Air District Comd II	Poznan	General Bieneck
Air District Comd III	Berlin	General Haubold (Air Dist. Comds III/IV)
1st AAA Division	"	General Hoffmann
Air District Comd IV	Dresden	General Haubold (Air Dist. Comds III/IV
14th AAA Division	Leipzig	General Schulze
Air District Comd VI	Muenster	General August Schmidt
4th AAA Division	Duisburg	General Hintz
7th " "	Cologne	General Eibenstein
22d " " (from 1 Mar 43 on)	Dortmund	General Roemer

Command	Command Post	Commander
Air District Comd VII	Munich	General Zenetti
4th AAA Brigade (from 1 Mar 43 on)	"	Colonel Thym
20th AAA Brigade (from 1 Mar 43 on)	Stuttgart	Colonel Bayer
Air District Comd VIII	Breslau	General Somme
Air District Comd XI	Hamburg	General Wolff
3d AAA Division	"	General von Hippel
8th AAA Division	Bremen	General Schaller
Air District Comd XII/XIII	Wiesbaden	General Heilingbrunner
21st AAA Division (from 1 Mar 43 on)	Darmstadt	General Steudemann
21st AAA Brigade (from 1 Mar 43 on)	Nuremburg	Colonel Juergens
Air District Comd XVII	Vienna	General Bogatsch
16th AAA Brigade (from 1 Mar 43 on)	Vienna	Colonel Grieshammer 426

Compared with the status at the end of 1941 the above command organization shows the following modifications:

1. In the performance of providing air defense for German territories Air District Commands I, II, and XVII were placed under control by Air Command Center.

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426. Sources 154, 271; Study 158-160, Vol. V.

2. A number of new antiaircraft artillery command headquarters had been established:

In Air District Command VI the 22d AAA Division

In " " " VII " 4th " " and the 20th AAA Brigade

In " " "XII/XIII " 21st " " and " 21st AAA Division

In " " " XVII " 16th AAA Brigade.

It can thus be seen that, together with the reinforcement of the antiaircraft artillery, the command had been more firmly organized and expanded, and that the inclusion of the air districts in the eastern regions of Germany as part of the air defense zone of Air Command Center now, in 1942, had established a clear cut high level command throughout Germany and thereby placed all responsibility with one top level command headquarters.

ANTIAIRCRAFT ARTILLERY DEFENSES IN THE WEST IN 1942

As previously set forth in the discussion of the air situation as it developed in the west, in the zone of the Third Air Fleet, in 1942 (compare p. 511), the opening of strategic operations by the US Eighth Air Force on 17 August 1942 resulted in considerably increased severity in the air situation.

Therefore the question which merits first consideration is that of to what extent provisions were made against this contingency, or as an immediate reaction to this development through reinforcement of the antiaircraft artillery defenses.

The only records available at writing on antiaircraft artillery strengths in the command zone of the Third Air Fleet in 1942 are those showing the status on 10 January 1942 and 13 and 29 January 1943. The figures for 13 January 1943 are from a compilation in Project von Rohden, those for 29 January 1943 from an original disposition map of the Commander in Chief of the Luftwaffe.

A comparison of the strength on the dates involved shows the following picture:

Air Dist	Date	Gun Batteries Hvy	Med & Light	Searchlight Batteries	Balloon Barrage Bttrs	Smoke Screen Companies
Holland	1942 Jan 10	13	28	78	0	0
	1943 Jan 13	23	36	6	0	0
	Jan 29	23	37.2	9	0	0
Belgium/ Northern France	1942 Jan 10	34	56	9	0	0
	1943 Jan 13	43	59	11	0	0
	Jan 29	43	69	11	0	0
Western France	1942 Jan 10	75	99	12	0	0
	1943 Jan 13	120	161	16	4	0
	Jan 29	119	166	15	4	3

The following features are clearly noticeable from the above tabulation:

1. Between early 1942 and early 1943 all air districts received considerable reinforcements in

a. heavy antiaircraft gun batteries, and this applies particularly to Air District Western France,

b. medium and light gun batteries, again particularly Air District Western France,

c. balloon barrage and smoke screening units, the first to be assigned in the occupied western territories, again in Air District Western France.

The clearly defined defense concentration of defense effort in Air District Western France is obvious

2. The number of searchlight batteries in Air District Holland was reduced opnsiderably. This had to do with the disbandment of the 1st Searchlight Division, Arnheim, on 31 July 1942, a subject treated previously in this study.

In the situation map for 29 January 1943 "rail transport defense batteries"are mentioned for the first time. These were batteries of light antiaircraft guns mounted on rail cars as defense against low altitude attacks. All in all seven such batteries were committed in the zone of the Third Air Fleet on 29 January 1943. In the above tabulation they have been included in the figure for medium and light batteries.

An examination of the interrelation between the current air situation and the commitment of antiaircraft artillery forces is interesting. This examination must be restricted to the daytime attacks carried out by units of the US 8th Air Force, because no records are available on attacks by Royal Air Force units.

ATTACKS BY UNITS OF THE US 8th AIR FORCE
IN THE ZONE OF GERMAN THIRD AIR FLEET IN 1942

Date	Number of 4-eng. Bombers	Target Attacked	US Losses
1942			
Aug 17	12	Rouen Rail Depot	0
" 19	22	Abbeville Airfield	0

US 8th AIR FORCE--continued

Date	Number of 4-engr. Bombers	Target Attacked	US Losses
1942 Aug 20	11	Amien Rail Depot	0
" 27	12	Le Trait Shipyard	0
" 28	11	Industrial Installations at Meaulte	0
" 29	12	Wevelghem Airfield	0
Sep 5	31	Rouen Rail Depot	0
" 6	30	Meaulte Industrial Targets	2
	13	St Omer Airfield	0
Oct 2	30	Meaulte Industrial Targets	0
	6	St Omer Airfield	0
" 0	69	Lille Industrial Targets	4
21	15	Lorient Port	3
Nov 7	34	Brest Port	0
" 8	30	Lille Industrial Targets	1
" 8	11	Abbeville Airfield	0
" 9	43	St Nazaire Port	3
" 14	24	" "	0
" 17	35	" "	0
" 18	19	La Pallice Port	1
	13	Lorient Port	0
	19	St Nazaire Port	0
" 22	11	Lorient Port	0
" 23	36	St Nazaire Port	4

US 8th AIR FORCE--continued

Date	Number of 4-eng. Bombers	Target Attacked	US Losses
1942 Dec 6	36	Lille Industrial Targets	1
" 12	17	Rouen Rail Depot	1
" 20	72	Romilly Airfield	6
" 30	40	Lorient Port	3

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The above tabulation reveals that from October 1942 on the area of main effort in operations by the US 8th Air Force was in the zone of Air District Commend Western France. This, in turn, explains the German emphasis in reinforcing the antiaircraft artillery forces there.

The questionable effectiveness of antiaircraft artillery fire against the American four-engine bombers is evident from the small number of bombers downed. The reason here was the extraordinarily high altitude at which these bomber formations operated, which was between 25 000 and 30 000 feet.

An examination of the disposition of German antiaircraft artillery forces, according to the situation map for 29 January 1943 reveals the following facts:

1. Air District Commend Holland. The most strongly defended points here were the port cities of Amsterdam and Holland, and the airfields at Eindhoven, Soesterberg,

427. Source: The Army Air Forces in World War II, Vol.II.

and Gilze-Rijen, which were used principally by bomber units.

2. Air District Command Belgium-Northern France. Here, the main defense concentrations were at Lille, Antwerp, and Boulogne, with Ostende, and the St Omer, Rheims (air park), and Beauvais airfields also heavily defended. Then followed, in order of sequence, the coastal cities of St Valery, Dunkirk, Calais, Dieppe, and the Wevelghem, Creil, Gravelines, and Chievres airfields. A number of other airfields, such as Brussels, Cambrai, Amiens, Montdidier, Laon, and Juvincourthad only medium and light batteries for defense against fighter-bomber and low altitude attacks.

3. Air District Command Western France. Here the points most strongly defended, by between six and nine heavy batteries, were Bordeaux, Marseille, Cherbourg, Guernsey, Jersey, Lorient, and Paris.

Areas assigned between three and five heavy batteries were St Nazaire, La Rochelle, Le Havre, Alderney, and Toulon, and the airfields at Romilly, Istres, Toulouse, and the armament factories of Le Creusot.

Points defended by between one and two heavy batteries included primarily the airfields in Normandy

and in Southern France.

The above clearly reveals the following tendency in the allocation of antiaircraft artillery forces:

1. Strong antiaircraft artillery defenses were provided in all cases for the more important ports along the Channel, Atlantic, and Mediterranean coast, and in the Gironde River estuary area.

This insured protection of these targets against surprise action of any form without having to depend on fighter defenses.

2. Next in order of importance was protection of installations of the Luftwaffe ground service organization by antiaircraft artillery.

Here, all airfields near coastal areas were assigned heavy batteries. The same applied to particularly important and vulnerable airfields farther inland and in Southern France, where the fighter defenses consisted exclusively of tactical units from the replacement fighter groups. The fact that the target areas of the US 8th Air Force frequently coincide with the points of main antiaircraft artillery concentration allow the assumption that the assignment of strong antiaircraft artillery forces was a result of these attacks.

NAVAL ANTIAIRCRAFT ARTILLERY FORCES IN THE ZONE OF THE THIRD AIR FLEET IN 1942

For a proper appraisal of the defensive strength of the antiaircraft artillery forces deployed within the zone of the Third Air Fleet it is essential also to consider the antiaircraft artillery forces organic to the Navy deployed in various areas of the zone.

No records are available on the subject for 1942, but the Antiaircraft Artillery Disposition Map of the Commander in Chief of the Luftwaffe, status 29 January 1943, shows that the following naval antiaircraft artillery forces were committed at the Channel and Atlantic coast at that time:

69 heavy plus 54.5 medium and light gun batteries, and 19 searchlight batteries.

Batteries from these forces were committed as follows:

1. Zone of Air District Command Holland. 20 heavy plus 11 2/3 medium and light gun batteries, and 4 1/3 searchlight batteries in defense of the West Frisian islands of Texel, Vlieland, Terschelling, and of the ports of Ijmuiden, Den Helder, Hoek van Holland, and Vlissingen.

2. Zone of Air District Command Belgium/Northern France. In defense of the port of Boulogne 5 medium and light batteries. It should be noted here that the Luftwaffe also had heavy concentrations of antiaircraft artillery at Boulogne, as an area of main defense effort.

3. Zone of Air District Command Western France. Here was the area of main emphasis in naval antiaircraft artillery defense. The most strongly defended points were Brest, with 17, Lorient, with 16, and St Nazaire, with 12 heavy batteries plus the bulk of all searchlight units.

This disposition of the naval antiaircraft artillery is evidently connected with the continuous attacks by units of the US 8th Air Force during daylight against these naval bases from October 1942 on. What is surprising, however, is the small number of attacking planes shot down by these strong antiaircraft forces. In view of the high standards of performance in the naval antiaircraft artillery, which had suffered less through large-scale expansions than the Luftwaffe units, it can only be assumed that the strong forces assigned to Brest, Lorient, and St Nazaire came only at the end of 1942 in reaction to the attacks by the US 8th Air Force.

Hence, it is evident that both in the Luftwaffe and

in the Navy the tendency, in the west, was to reinforce the antiaircraft artillery forces at points which enemy air attacks had shown to be main targets of strategic operations.

In contrast, precautionary allocations of defense forces are noticeable in the case of the Luftwaffe ground service organization, of Paris as the main center of communications and the capital of France, of the most important ports along the Channel coast and in the estuary areas of the Schelde and Gironde Rivers.

This tendency to improvize is to be explained, in the case of the disposition of antiaircraft artillery forces also, by the acute shortage of antiaircraft artillery units.

THIRD AIR FLEET ZONE

ANTIAIRCRAFT ARTILLERY COMMAND ORGANIZATION

Status: 1942

The command organization of the antiaircraft artillery forces within the zones of the Third Air Fleet, status 29 January 1943, was as follows:

Command	Command Post	Commander
Air District Comd Holland	Amsterdam	General Siburg
HQ of AAA regiments		
Air District Comd Belgium-Northern France	Brussels	General Wimmer
16th AAA Division (from 1 Mar 43 on)	Lille	General Eibenstein
Air District Comd Western France	Etampes	General Dr. Weissmann
11th AAA Division	Avignon	General Richter
13th AAA Division	Caen	General Spiess
5th AAA Brigade	Rennes	General Veith
11th AAA Brigade	Guernsey	General Gerlach
12th AAA Brigade	Saintes	Colonel Koester
18th AAA Brigade	Nimes	Colonel Halberstadt.

This command organization also shows clearly that main emphasis in antiaircraft artillery defense was in the zone of Air District Command Western France, that part of the Third Air Fleet command zone which had the weakest fighter defenses.[428]

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428. Sources 154, 216, 271; Study 158-160, Vol. X,XIII.

THIRD AIR FLEET
ANTIAIRCRAFT ARTILLERY DEFENSE IN 1942
SUMMARY

In summarizing, the following features can be established in respect to antiaircraft artillery defenses in the west, within the zone of the Third Air Fleet, in 1942:

1. In Air District Command Holland, geographically a part of the Third Air Fleet zone of Command, antiaircraft artillery defense was a responsibility of the antiaircraft artillery forces of the Third Air Fleet assigned to Air District Command Holland for the purpose.

Fighter defense was primarily a responsibility of

a. The units assigned for daytime and night operations and stationed in Holland from the fighter forces of Air Command Center.

b. In the border areas between Air Command Center and the Third Air Fleet during daylight of the fighter units of Air Command Center and the Third Air Fleet in close tactical cooperation between Fighter Command Holland-Ruhr Region and the 2d Fighter Command.

Since both fighter and antiaircraft artillery forces participated in air defense, relatively weak antiaircraft artillery forces were allocated to the command.

The Navy had antiaircraft artillery forces within the command zone almost as strong as those committed by the Luftwaffe.

2. In Air District Command Belgium Northern France both fighter and antiaircraft artillery forces were available for air defense. Here also, and for the same reason as above, only relatively weak antiaircraft artillery forces were allocated, primarily for defense of the Luftwaffe ground service organization near coastal areas, and for defense of large industrial and port cities.

3. In the exceptionally large zone of Air Command Western France only a few regions, in Normandy and Southern France, could be allocated fighter and antiaircraft artillery defense forces.

In by far the greater part of this zone only antiaircraft artillery units were available for air defense. Therefore, Air District Command Western France received the largest allocations of antiaircraft artillery forces in the command zone of the Third Air Fleet. In addition to the units allocated by the Luftwaffe, the

Navy assigned such strong elements of its organic antiaircraft artillery forces, with main concentrations in defense of its naval bases on the Atlantic coast, that they made up 43 percent of the total antiaircraft artillery forces deployed in the air district.

4. On the whole it is evident that the antiaircraft artillery forces were by no means adequate to fill the requirements of the Third Air Fleet, although they had been increased over the forces available in 1941.

The reinforcements thus received failed to keep pace with the mounting air activities of the enemy, particularly after the units of the US 8th Air Force began to participate. Quick shifts of antiaircraft artillery concentration apparently could only follow the enemy attacks, but failed to anticipate the widely varying and unknown strategic objectives of the enemy.

A multiple of the antiaircraft artillery forces would have been required to prdvide antiaircraft artillery protection for all targets liable to attack.

5. The very small number of aircraft which antiaircraft guns were able to shoot down out of formations operating at altitudes above 27 000 feet revealed in a manner which gave cause for serious concern that the conventional types of antiaircraft guns and firing equipment were no longer adequate for modern requirements

THE ANTIAIRCRAFT ARTILLERY IN OTHER THEATERS IN 1942

I. ANTIAIRCRAFT ARTILLERY FORCES IN THE SOUTHERN THEATER IN 1942.

The fluctuating circumstances in the African theater are reflected in the allocations of antiaircraft artillery forces to the Second Air Fleet.

A comparison of the figures for 10 January 1942 with those for 13 January 1943 reveals the following picture:

Area	Date	Gun Bttrs Heavy	Gun Bttrs Med & Light	Searchlight Batteries	Balloon Barrage Batteries
Italy	1942 Jan 10	18	14	0	0
	1943 Jan 13	161	40	32	0
Africa	1942 Jan 10	12	12	0	0
	1943 Jan 13	50	36	0	0
Greece	1942 Jan 10	19	13	3	0
	1943 Jan 13	25	13	3	3
Rumania	1942 Jan 10	41	34	6	0
	1943 Jan 13	12	8	2	0

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429. Source 216.

The above figures show clearly that the antiaircraft artillery forces had been strongly reinforced in those areas directly connected with military operations in the African theater or in those areas, such as Italy, in which a direct air threat had developed in 1942.

A direct cause for the exceptionally strong antiaircraft artillery reinforcements allocated to Italy is to be found in the severe air attacks against the industrial centers of Milan and Genoa in October 1942, carried out by air units of the Western Allies operating from bases in England.

The Wehrmacht High Command viewed these attacks with grave concern, fearing that a repetition might have serious repercussions in Italy in the political field.

The Commander in Chief of the Wehrmacht (Hitler) personally ordered the dispatch of 100 heavy antiaircraft artillery batteries to protect the industrial regions of northern Italy. However, the condition was imposed that

the guns of these batteries were to be placed on permanent mounts as speedily as possible, so that the mobile mounts could be returned to Germany. Furthermore, Italy was to provide the necessary gun crews as early as possible, although it was agreed that a few key German personnel could remain behind for the most intricate servicing of the guns.

When these batteries arrived in Italy, the gun crews consisted partly of former Russian prisonerswho had volunteered for military service in the German military forces. This gave rise to disturbances, since Italian labor greeted the Russian personnel with ovations.[430]

From the circumstances just described it is evident how seriously the shortages in personnel and equipment were already making themselves felt in the antiaircraft artillery.

On the other hand, the heavy reinforcements assigned to the southern theater in 1942 are renewed proof of the high regard in which the defensive power of the antiaircraft artillery arm was held, both in critical situations in ground combat and the newly developed critical situation in air warfare.

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430. Source 272.

II. ANTIAIRCRAFT ARTILLERY IN THE EASTERN THEATER IN 1942

Developments in the military situation on the eastern front in 1942 are characterized by the following features:

1. German preparations for a spring offensive from the positions reached at the end of 1941 before the cold of winter set in.

2. The Russian attempt in May 1942 to anticipate the German offensive by a counteroffensive of their own.

3. The German military successes on the peninsula of Kerch, at Karkhov, and Sevastopol, and in the drives toward the Caucasus region and in the battle area of Lake Ladoga.

4. The beginning of the Russian counteroffensive on 19 November 1942 in the major Don River bend area and south of Stalingrad leading up to the envelopment of the German Sixth Army at Stalingrad on 22 November 1942.

5. The German drive to relieve Stalingrad, which commenced on 12 December 1942 and bogged down 32 miles outside of Stalingrad on 21 December 1942.

It is only natural that strong antiaircraft artillery forces were required in these operations. In addition to their air defense mission high significance attaches to the missions these forces were also required to perform in ground combat in the eastern theater.

A comparison of the figures for 10 January 1942 and for 13 January 1943 shows the following antiaircraft artillery forces committed on the eastern front:

Date	Heavy Batteries	Medium & Light Batteries	Searchlight Batteries
1942 Jan 10	148	162	0
1943 Jan 13	215	288	17
Increase	67	126	17

The reinforcements thus assigned must be described as quite considerable and are indicative of the high importance of antiaircraft artillery action in this theater.[431]

III. ANTIAIRCRAFT ARTILLERY IN THE NORTHERN THEATER IN 1942.

The northern theater had two fronts

(1) an air defense front facing west

(2) the Polar Sea and Finnland front.

Whereas the antiaircraft artillery disposition map for 10 January 1942 shows units committed in the zone of the Fifth Air Fleet only in Norway, the map for

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43. Sources 113, 216.

13 January 1943 also shows sizable antiaircraft artillery forces committed in Finland.

A comparsion of the figures given on the two dates presents the following picture:

Date	Area	Heavy Gun Batteries	Medium & Batteries	Searchlight Batteries	Smoke-screen. Cos
1942 Jan 10	Norway	44	36	0	0
1943 Jan 13	Norway	42	36	0	3
	Finland	39	22	1	0

This shows that the northern theater also had received strong reinforcements in antiaircraft artillery forces.[431a]

431a. Source 216.

INCREASE OF THE OVERALL ANTIAIRCRAFT ARTILLERY STRENGTH OF THE LUFTWAFFE IN 1942

The increasing overall strength of the Luftwaffe in antiaircraft artillery forces can be seen from the following comparative tables:

Date	Theater	Gun Batteries Heavy	Gun Batteries Med & Light	Betteries Search-light	Betteries Barrage	Companies Smoke-screening
1942 Jan 10	Home	743	438	174	0	0
	Western	122	183	99	0	0
	Norway	44	36	0	0	0
	Southern	90	73	9	0	0
	Eastern	148	162	0	0	0
	Totals	1148	892	282	0	0
1943 Jan 13	Home	838	538	277	70	6
	Western	186	256	33	4	0
	Northern	81	58	1	0	3
	Southern	248	97	35	3	0
	Eastern	215	288	17	0	0
	Totals	1568	1237	363	77	9

This means that altogether the following new antiaircraft artillery units were activated in 1942 by the Luftwaffe:

420 heavy plus 345 medium and light gun batteries, 81 searchlight batteries, 77 air barrage batteries, and 7 smoke-screening companies.

Taken in combination with the measures to increase authorized strength from four to six guns per heavy and from twelve to fifteen guns per light battery, and from nine to twelve searchlight per searchlight battery, this increase in the number of units must be considered as an exceptional performance in the field of personnel and materiel and is evidence of the high importance attributed to the antiaircraft artillery arm in air defense.

Sightmust not be lost of the fact, however, that a large percentage of the newly activated units were below standard in respect to their combat capabilities because of the use of emergency personnel and the lack of electrical target locating and modernized fire control equipment.[432]

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591. Source 216.

SURVEY OF THE STATUS AND PLANNED DEVELOPMENT
OF THE ANTIAIRCRAFT ARTILLERY IN 1942

A study prepared by the Chief Antiaircraft Artillery Officer (Air Inspectorate 4), dated 6 February 1942, approved by the Commander in Chief of the Luftwaffe on 1 September 1942, and then issued as a general guide, contains the following passages on plans for development of the antiaircraft artillery in 1942:

1. 1. Capabilities: Current Status.

a. Heavy Antiaircraft Guns. In view of the increasing speed of modern aircraft and the increasingly high altitudes at which they operate, antiaircraft fire with projectiles having a time of trajectory flight exceeding 25 seconds is hardly likely to produce satisfactory results because of the excessive lead or aiming-off allowances that have to be made.

With a 25 seconds time of trajectory flight a lead of 3750 meters has to be allowed against a target moving at 150 meters per second, and of 6250 meters for a target speed of 250 meters per second.

The only possible way to reduce the time of trajectory flight is to increase the speed of the projectile. At present the only gun with any chance of successful action against targets moving at such great speeds and altitudes is the Type 41 88-mm antiaircraft gun with its muzzle velocity of 1000 meters per second.

b. Medium and Light Antiaircraft Artillery. As a rule repeated hits by 20-mm and 37-mm antiaircraft guns are necessary to bring down an aircraft.

The mounting speeds of aircraft reduce the accuracy of gunfire. The present rate of fire is inadequate against low flying aircraft with their mounting speeds. In the case of the 20-mm shell with contact fuze even repeated hits with the present types are likely to do only limited damage.

To bring down an aircraft with a weight of 30 tons an explosive charge of at least 100 grams is necessary. The explosive charges of 20-mm and 37-mm shells are only between 6 and 45 grams.

c. Fire Control Equipment. The fire control equipment presently in use makes target data computation possible within the following limits:

FIRE CONTROL DIRECTOR Type 36 AND
TYPE 40 (WITH EXTENDED RANGE)

	Type 36	Type 40
Maximum altitude	33 000 feet (10000 meter)	40 000 feet (12000 meter)
Maximum distance	43 000 feet (13000 meter)	50 000 feet (15000 meter)
Maximum target speed	180 meter/sec	300/meter sec.** (648 kilometers).

*Equivalent to approximately 385 miles/**Equivalent to approximately 645 miles (1080 kilometers).

It is thus clear that Type 36 no longer fully meets requirements for action against modern types of aircraft.

d. Range and Altitude Finder. With optical range finders target data against aircraft at adequate distances can only be secured under favorable weather conditions.

At night the use of searchlights is essential to locate target aircraft. Sound locators are effective only up to a range of 20 000 feet.

The operating range and accuracy of electrical locator instruments are adequate for present requirements. It is to be expected, however, that their usability will be restricted by countermeasures which the enemy will adopt.

e. Searchlights. Owing to the lack of suitable

locator equipment the 60-centimeter searchlight has a small range of effectiveness.

The effective range of the 150-centimeter searchlight is already inadequate for present target conditions.

The 200-centimeter searchlight is adequate for current requirements.

f. Balloon Barrages. These are becoming less effective because of the improved equipment of enemy aircraft with cable-cutting or similar devices.

2. Deductions to be Drawn and Specifications for Equipment Development.

a. It is essential to be able to reduce the lead allowances which have to be made, or to develop and entirely new method of antiaircraft fire (abandonment of the "antiaircraft fire hypotheosis", that is, of a method based on a projected point at which the target will meet the projectile after the given time of trajectory flight of the projectile and assuming that the target will maintain its course, altitude, and speed unchanged).

b. The muzzle velocity of antiaircraft guns must be increased to 2 000 meters/second.

d. The effective range and altitude of antiaircraft fire must be increased to the stratosphere.

d. The effectiveness of defensive fire at low altitude targets must be increased and improved.

e. The blast effect of shells must be increased

f. Interference-proof radio locators must be developed.

3. Methods of Development to Fulfill these Requirements.

a. Abandonment of the Antiaircraft Fire Hypothesis. Abandonment of this method, which is based on allowing a computed lead in aiming is possible only through the introduction of antiaircraft shells or rockets steered by remote control.

Since the development of rockets is still in the experimental stages, a beginning should be made at development in the following phases:

aa. Powder-driven rockets, without remote control, suitable for use with existing fire control directors.

bb. Antiaircraft rockets, with remote con-control, guided by optical aids.

cc. Antiaircraft rockets with electrical remote control, homing device, and automatic proximity

fuze, functioning on the optical, thermal, or sound basis.

b. Independently of such developments, which would be a long-range program, all possibilities must be exploited to find an interim solution immediately which will cancel out the present lead which newly developed aircraft have over defensive fire. Possibilities envisaged are:

aa. Improved effectiveness of guns presently in use through modernization of individual parts.

bb. Increased effectiveness of fire through improved ammunition.

cc. Development of a multiple mount for 37-mm antiaircraft guns.

c. Development of Heavy Antiaircraft Guns. Another possible solution of the antiaircraft artillery problem which presents itself to the mind is the development of guns of the heaviest types (200-250-mm caliber).

Features and Advantages: Increased effective range. Increased explosive charge. Slower loss of projectile speed because of its larger weight.

Favorable calibers: 200-mm or 250-mm (Experience with the gun used to shell Paris in 1917).

Disadvantages. Large expenditure of raw materials

and labor (estimated man-hours: 120 000). Excessive weight (250-mm gun approximately 130 tons), stripped weight approximately 50 tons, with an expenditure in the manufacture of approximately 200 tons of crude steel.

In spite of these large expenditures in raw materials and man-power, the development of super-caliber guns must be pursued with all energy and in close cooperation with the Navy. This development is necessary because, if pursued in the directions indicated, it holds out promises of a usable solution which can be realized sooner than the development of a really modern rocket defense equipment in view of the stage of present rocket development.

d. New Forms of Gun Designing to Obtain Improved Capabilities. An improvement in gun performances in the matter of muzzle velocities can be expected through adoption of thr smooth or conical barrel in place of the grooved tube. Furthermore, a smooth tube would make it possible to fire super-long shells.

e. Fire Control Directors, Range Finders, Target Locator Equipment, and Searchlights. No basically new departures are to be expected in the development of these items of equipment.

f. Possible developments in the Tactical Field.

aa. The permanent emplacement of antiaircraft artillery guns dispenses with the necessity to take the weight and bulk into consideration, an important factor for mobility, and provides conditions conducive to the highest possible gun performances.

bb. Mobile antiaircraft artillery forces in the form of railway units, field type units, armored and mountain type units, and paratrooper antiaircraft guns. In addition to their air defense mission railway and field type antiaircraft artillery units represent a mobile and highly flexible reserve for use in defense of the zone of interior and the occupied territories.

g. Possibilities of Technological Development.

A light antiaircraft gun with a conical or tapered tube.

Improvements of the existing fire control directors in the matter of operating ranges and accuracy.

Equipment for wireless transmission of data (radio or photo pressure systems).

Static range finders with larger base line to improve accuracy.

Interference-proof antiaircraft artillery control apparatus based on the radar system.

Target locating equipment functioning on the infrared basis, effective in cloudy and hazy weather conditions.

A 300-centimeter searchlight.

Ammunition with increased effectiveness, with electrical detonation.

Quick-risingbarrage balloons, with power-driven starting and climbing gear.

Shells for low-level barrage fire.

Dark colored smoke for smoke screening.

The Commander in Chief of the Wehrmachtdid not approve of all points in the above list of stated requirements.

In the conference at his headquarters on 13 and 14 October 1942 he expressed doubts concerning the development of a 240-mm antiaircraft gun because of its quick attrition, since it was calculated that each gun tube would have a serviceable life span of only 120 rounds.

He decided that priority should go to the most urgently needed weapons, those which could be produced and delivered most readily, rather than to the development of super-heavy antiaircraft guns.

In other respects he considered some of the views advanced in the study dated 6 February 1942 by the Chief Antiaircraft Artillery Officer on the subject of antiair-

craft defense weapons as utopian.[433]

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433. Sources 273, 287.

PLANS FOR THE EXPANSION OF THE ANTIAIRCRAFT ARTILLERY IN 1942-43

Hitler's program for 1942, perviously mentioned in this study, provided for the following increases by the end of 1943:

New Units: 900 heavy gun batteries

750 medium and light gun batteries

200 150-centimeter searchlight batteries

25 balloon barrage batteries.[434]

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434. Source 65.

STATUS OF ANTIAIRCRAFT ROCKET DEVELOPMENT IN 1942

PLANNING

The subject of antiaircraft rockets was broached for the first time in the Technological Office of the Reich Air Ministry in 1941. During conferences with Professor Wagner the possibility of such missiles was discussed on that occasion without any specific motivation.

Within the Technological Office the whole complex problem was studied, with all branches participating, and taking as a starting point not the question "Antiaircraft rockets: Yes or No?" but the straightforward but fateful question: "Air Defense: With what?"

As the outcome of these discussions the following points were formulated in a memorandum in 1941:

1. The development of an antiaircraft rocket would

include the necessity to develop numerous new component elements, on which little or no experience is available

The problems evolving would include:

a. The development of steering methods in vertical flight at speeds approaching the sound barrier.

b. The transmission of remote control steering impulses in some interference-proof form.

c. The problems of proximity fuzes.

d. The development of homing devices functioning on a radar or sound steering basis which would guide the missile automatically to its target.

e. The problems of the effective blast range of the explosive charge for use against aircraft.

f. Precision requirements in mass production.

g. Self disintegration to avoid exposing the civilian population to danger from falling fragments of too large a size.

h. Fuel production, storage, movement, and filling.

i. Tactical mobility for the development of defense concentrations.

k. The interference-proof functioning of all individual parts within a wide range of temperatures.

The above list enumerates only a number of the characteristic problems which would be encountered, without any claim to completeness. Each of the problems listed would affect the others, and in particular would influence the final form of the rocket to be produced. Accordingly, development of the rocket as such could only begin when reliable solutions have been found for the individual component problems.

2. There is no possibility to develop an antiaircraft rocket within the foreseeable future.

3. Because of these circumstances the reply to the question "Air Defense: With what?" must be "With an all-weather fighter plane capable of blind navigation." The development of an aircraft of this type is recommended possible of consumation within the foreseeable future.

This rejection of the antiaircraft rocket by the Technicological Office of the Reich Air Ministry in November 1941, it must be noted, was given only in consideration of the possibilities for its development in comparison with the possibilities to develop an all-weather defense fighter. It did not represent a rejection of the idea as such, but was simply a considered appraisal of the possibilities of development within the foreseeable future.

As previously related above, the Chief Antiaircraft Artillery Officer in the study of February 1942 stated development of an antiaircraft rocket as an urgent requirement and proved his point convincingly.

On 1 September 1942 the idea of developing an antiaircraft rocket received new impetus from the Commander in Chief of the Luftwaffe as a result of the requirements stated with the approval of the Chief Antiaircraft Artillery Officer. However, no logical organization was set up to control the development, although a branch did exist in the Technological Office of the Reich Air Ministry in which all endeavors in the field of "Remote Control Projects" were consolidated.

As a result of historical developments, however, the antiaircraft artillery arm (Air Inspectorate 4) had a development branch of its own, and this branch was even in premises separate from the Technological Office.

Furthermore, quite outside the fields of responsibility of the Luftwaffe, the Army was concerning itself with similar problems at Peenemuende.

In their efforts to bring their plans to materialization, however, all of these separate agencies had to rely on the same sources of supply, on the same allocations of personnel, and on the existence of similar or identical

items of equipment.

These organizational defects represented a decisively important disadvantage for the entire program of antiaircraft rocket development.

In 1942 development progressed only so far that a number of projects had reached a stage that they could be considered as vehicles for tests to try out the equipment to be used later in the rocket once it had taken on definite shape.

The projects in question were:

1. Project Wasserfall. A single-stage missile weighing 4 tons and with an enormous fuel consumption.

2. Project Rheintochter. A vehicle similar to the Wasserfall missile, but with a dead weight ratio so unfavorable that it was discarded during the stage of model testing.

3. Project Schmetterling (Hs-297). A missile which, in spite of all limitations, held out best prospects of successful materialization, since it originated from the group of "Henschel Developments," types of unmanned, remote control air projectiles (Hs-293, 294, etc), and because its development was in the hands of an experienced team, with valuable experience on steering devices gained in earlier developments, and led and directed by an ingenious scientist, Professor Wagner.

By the end of 1942 it was possible on the basis of experience with various developments of air-air, air-ground, and ground to ground remote control to estimate approximately what expenditures would be required for an expectancy of finding solutions for other problems of ground to air remote control; a vast fund of knowledge had been accumulated on the aerodynamic and technical equipment prerequisites for steering and guiding, on the propulsion and flight properties of practically all-around axially inertialess projectiles, and a lot had also been learned on the psychological problems of the guidance and training requirements for the control personnel and the types of personnel to be selected for such purposes, etc.

One serious problem was still the matter of substituting for visual steering a form of ray control in which the ray would be directed at the moving target and the missile would follow the ray automatically; another was that of developing a target homing device in which rays or other features specific to the target would automatically and directly set the steering of the missile.

One separate category was a method in which the missile was combined with a tevevision steering device. In this category also all possibilities were examined and all individual phases were carefully prepared.

On the subject of the development of antiaircraft rockets in 1942 the following points can thus be noted:

1. Allied problems in the field had already been solved in other projects involving remote control missiles and vehicles.(airborne).

2. Best progress was made in the development of air to ground (Hs-293), and ground-ground (Fi-103 or V-1) weapons.

3. It appeared that the best chances of success would be offered by supporting and promoting Project Schmetterling (Hs-297) under development by the firm of Henschel, where it was handled by the team which had the most experience.

4. All part-problems connected with development of an antiaircraft rockets were still to a great extent in the stage of research into the techno-physical fundamentals involved.[435]

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435. Source 274.

THE ANTIAIRCRAFT ARTILLERY IN 1942

SUMMARY

So far as the antiaircraft artillery is concerned, the following can be said of developments in the German air defenses in 1942:

1. The high opinions held of the antiaircraft artillery as a weapon of defense is reflected in 1942 again in the scope of the reinforcements the arm received. By 13 January 1943 these reinforcements comprised

In the case of heavy batteries:	37	percent
medium and light batteries	39	percent
searchlight "	29	"
balloon barrage "	100	"
smoke companies	100	"

of the strengths available on 10 January 1942.

2. In addition to the increased number of antiaircraft units listed above, the combat strength of the unit themselves was increased by increasing the standard authorized strength of heavy batteries from 4 to 6 guns, of light batteries from 12 to 15 guns, and of searchlight batteries from 9 to 12 searchlights. These changes were introduced step by step as deliveries came from current industrial output.

3. To improve the effectiveness of local defense at specific targets a large number of balloon barrage batteries were activated.

4. First steps were taken at activating smoke screening companies to protect particularly important targets against aimed bombing from the air, and by the end of 1942 nine such companies were ready for the field.

5. Progress was made in efforts to find a solution for the problem of antiaircraft fire at night, as follows:

a. Assignment of the bulk of all searchlight batteries hitherto employed in support of night fighter operations to the antiaircraft artillery for commitment in areas hitherto inadequately protected or not protected at all by searchlights.

b. The servicing of a number of heavy batteries, so-called over-size antiaircraft artillery batteries,

by a single electrical target locating instrument.

6. Increased effectiveness of the heavy batteries through increased reequipment with 105-mm and 128-mm in place of 88-mm guns, and through introduction of the 128-mm double-barreled antiaircraft guns.

In the case of light batteries more four-barreled 20-mm guns were introduced to replace the single-barreled guns.

7. In the personnel field the shortage was general, in the field of materiel electrical target locating instruments and modern fire control directors in particular remained in short supply.

As a result of this situation, crews for the home air defense were made up of auxiliary personnel taken from the civilian employees of industrial works to form what was called the home antiaircraft artillery (Heimat-flak) and from military agencies to form what was known as the Alert antiaircraft artillery units (Alarmflak). Also it was necessary to some extent to use fire control systems of limited value.

8. Where fighter and antiaircraft artillery forces were available for air defense, relatively weak antiaircraft artillery forces were allocated. Strong antiaircraft artillery forces were assigned in areas having

only improvized fighter units or no fighter defenses at all, and to all target areas near the coast or the front which were threatened by surprise low altitude air attack.

Critical situations in ground combat at all times resulted in larger allocations of antiaircraft artillery units for participation in ground combat.

9. In spite of the considerably increased number of units available, and in spite of the increased fire power of the individual units, it was not possible to even nearly meet the steadily mounting requirements on all fronts for antiaircraft artillery support.

The acute shortage in strengths made it necessary to strip apparently less threatened areas in order to reinforce defenses at points where the enemy had already uncovered his strategic objectives through air attacks.

At certain particularly vital points, however, a certain minimum of protection was maintained by permanently assigned antiaircraft artillery forces.

10. Participation by the US Air Force in strategic air warfare in the west created new problems for the defending antiaircraft artillery forces because of the exceptionally high altitudes at which the American 4-engine bombers operated and because of their enormous resistance to the effects of weapons fire. For the

bulk of the German heavy antiaircraft batteries, aircraft operating at altitudes above 26 000 feet were beyond effective range not only of the guns but also of the instruments in use to obtain and transmit the necessary firing data. Only those batteries which had Type 41 88-mm guns, 105-mm guns, or 128-mm guns and Type 36 fire control director apparatus (with extended range) or Type 40 fire control director apparatus were able to take effective action in such situations.

11. In the antiaircraft artillery inspectorate, Air Inspectorate 4, the already apparent weakness and the weakness which would become apparent under expected conditions were recognized at an early stage.

With remarkable foresight the inspectorate as early as in February 1942 stated clearly and unmistakably the requirements for immediate solutions and new directions of development. The most important of these must be considered to have been the statement that it was essential to abandon the "antiaircraft artillery firing hypothesis" through the development of an antiaircraft rocket.

This program for antiaircraft artillery development received the approval of the Commander in Chief of the Luftwaffe on 1 September 1942.

12. The concrete plans for the continued reinforcement of the existing antiaircraft artillery forces in 1943 were established on such a basis that they provided for more than twice the capabilities available in 1942, and these plans received special emphasis through the fact that they were raised to the status of a personal program established by Hitler.

Here again is evidence of the particularly high esteem with which Hitler, as the supreme military commander, regarded the antiaircraft artillery arm.

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THE AIRCRAFT REPORTING SERVICES IN 1942

The most important factors involved in the development of the aircraft reporting services for the purposes of the conduct of fighter operations, of the antiaircraft artillery and of the passive air defense system in 1942 were as follows:

a. The progress made in the development of night fighter control positions;

b. The increased equipment of the antiaircraft artillery with electrical target locating instruments;

c. The availability of Freya radar instruments for allocation to the Reich Aircraft Reporting Service, and to be used in equipping motorized aircraft reporting companies.

I. WITHIN GERMANY. The increasing severity of the air situation at night has revealed that the existing structural set-up of the Reich Aircraft Reporting Services was inadequate to meet the requirements of the newly developed situation.

When large enemy air forces penetrated the defenses,

the whole system of aircraft reporting centers with innumerable air observers produced nothing but a chaos of unintelligible reports. The reporting centers were no longer able to process the flood of reports coming in from the various observers. Both in respect to the time requirement and the volume of work involved it was no longer possible to interpret from the countless important and unimportant message received which were important and which unimportant, or to restrict the physical presentation of the air situation to the picture gained from important reports.

The reason for this state of confusion was that the areas serving the aircraft reporting centers were too large, so that the proper evaluation and processing of the reports received took up more time than could be spent on such functions in view of the speed of the approaching enemy aircraft.

The categoric necessity therefore existed to change the existing organization. The best solution seemed to be a system in which the reports from the air observers would be screened at sub-centers, thereby reducing the numbers of reports which would reach the aircraft reporting centers.

Plans in 1942 provided for the establishment of a network of aircraft reporting sub-centers, grouped in each sub-area around a radar station or the night fighter

system, and required to cooperate with that station.[436]

In actual practice the functions of the aircraft reporting services in 1942 were performed primarily by the radar organization of the XII Air Corps.

In January 1942 the XII Air Corps had established its first "central command post", which was placed in operation as a pilot model for the "central divisional command bunkers" established later. This first central command post was established at Deelen, Arnheim.

As previously related above the 1st Fighter Division had displaced its headquarters at the time from Oldenburg to Deelen and had assumed responsibility in this central command post for the posting of the air situation and for the conduct of night fighter operations. The conduct of daytime fighter operations for the time being continued a responsibility of a special fighter command post at the Schipol airfield, for all fighter units within the command area of the 1st Fighter Division.

The following is a brief description of the working procedures at the central command post:

All radar stations within the divisional command were linked by a direct telephone wire, supplemented by shortwave wireless channels, with the central command

436. Sources 3, 7, 275.

Photo

2d Fighter Division Command Post

at Stade

615b

Photo

Interior View of
2d Fighter Division Command Post at Stade

In Foreground: Control stations of the fighter Control Officers

Middle View : Command Stations:

Right: Switch desk of the signal officer to the radar stations and to the dot-light projectors behind glass data screen

Center: Commander station

Left: Switch desk to tactical units. Switch desk to Egan-method control positions.

In Background: Egan-method gallery with dot-light projectors to register Egan-method data (locations or stations of units).

615c

Photo

Interior view of
2d Fighter Division Command Bunker at Stade

Command Control Station

From left to right: Commander station
Switch desk to units
Egan-method switch desk

Photo

Interior View of

2d Fighter Division Command Bunker at Stade

Switch desk of Signal Officer to the radar stations and their terminal instruments at the dot-light projectors behind the glass data screen.

Photo

Interior View of

2d Fighter Division Command Bunker at Stade

Desks with terminal instruments from the radar stations behind glass data screen with dot-light projectors to register enemy situation.

615

Photo

Interior View of
2d Fighter Division Command Bunker at Stade

Switch desk of Battle Station Officer
to the fighter units

In background the glass screen on which the air situation and the Egan-method data are shown for the station of controlled units by means of dot-light projectors.

post, where each station was tuned in permanently to a separate terminal instrument.

Each terminal instrument was serviced by one woman signal auxiliary operator per shift , and was in operation, in three shifts, 24 hours daily. All woman signal auxiliary operators on duty were grouped behind a large glass screen, within the central command post, each with two dot-light projectors at her desk.

The glass screen was marked with the more important geographical features within the divisional command area and with the night fighter grid, which subdivided the area into squares marked with letters of the alphabet, each in turn subdivided into sub-squares (3x3) marked by numbers. This whole marking was duplicated on the plotting tables of the radar stations.

If a radar station detected an enemy force, the operator at the station immediately after processing reported all data by voice message to the terminal instrument in the central command post, for example

50 to 100 aircraft in grid GD 8, course 3, altitude 16 500

The auxiliary operator immediately registered this information on the glass screen, using the first dot-light for the number of aircraft, the station of

the target unit detected, and its reported course; and the second dot-light for the reported altitude, and then moving the target on the glass data screen in accordance with the messages as they came in.

In this way the current air situation at all times was presented graphically in an intelligible form.

The functioning of this process of displaying the current air situation was under constant supervision by the air signal officer on duty at the command station, from where he was able to switch in directly to all lines with the radar stations in order to make inquiries or to give search instructions. This latter function was exceptionally important. For example, if a coastal radar station reported a target on an eastern course (3) this information was passed on to the next inland radar station with instructions to direct the beam of its

instrument in the appropriate direction. This insured that the target would be picked up and tracked by the next station as soon as it left the operating range of the first station which had detected it.

From his command desk the air signal officer on duty also had direct telephone lines to the aircraft reporting centers within the divisional command area, and it was his duty to keep these centers currently posted on the air situation as interpreted by the division. The reporting centers, in turn, passed the data thus acquired through radar observation on to the antiaircraft artillery command posts within their areas or sub-areas.

From the above it is obvious that the Reich Aircraft Reporting Service, originally established with the mission of developing the current air situation, was gradually being relieved of this function by the radar organization of the Fighter Command and restricted to the functions of an air defense warning service.

In areas such as southern and eastern Germany, in contrast, there was no night fighter organization, and the interpretation of the air situation still had to be based exclusively on the observations of the Reich Aircraft Reporting Service. The interpretation of the air situation thus developed was naturally subject to the

inherent weaknesses of the system on which it was based and therefore could not be considered accurate or reliable.

The antiaircraft artillery received its reports on the overall air situation from the aircraft reporting centers in the form in which the latter received their information from the fighter divisions in whose command area they were stationed, modified by the information from reports turned in by the organization of the Reich Aircraft Reporting Service.

The data thus received provided the basis for the antiaircraft artillery units in which direction to turn their own radar target locating instruments to track targets coming within range of their fire according to their reported route.

At Air District Command Headquarters, the reports from the fighter divisions, the Reich Aircraft Reporting Service, and the antiaircraft artillery were received through separate channels, were processed at the collecting center, and were then presented on a map or by optical means.

The interpretation of the air situation thus developed provided the basis for the Air District Command to direct its antiaircraft artillery operations and to implement the necessary passive air defense measures.

The previously mentioned weak points in the observation capabilities of the Reich Aircraft Reporting Service frequent-

frequently caused confusion in the interpretation of the air situation. As time passed, the fighter divisions, which in 1942 was still able to rely on the absolutely accurate and uninterrupted observation by its instruments, in an increasing measure also became the final authority for the air district commands so fas as the interpretation of the overall air situation was concerned. So far as the air situation in detail within the antiaircraft fire zone was concerned, the local antiaircraft artillery command remained the final authority.

Activation of the 2d Fighter Division, at Stade, in January 1942 and of the 3d Fighter Division, at Metz, on 1 May 1942 established an interlocking and securely functioning system extending from the borders of Denmark to the Swiss frontier for the detection of enemy aircraft penetrating in the direction of German territory from the west. The

areas of Berlin and Central Germany were protected by the forces under Fighter Command Berlin-Central Germany, supported by a barrier of radar stations.

After Eastern Prussia had received an appropriate number of railway night fighter control positions, further railway trains were equipped in the same way and allocated to southern Germany. Besides the permanent type night fighter control positions established by the end of 1942 as Positions Eppingen, Moeve, and Bachstelze, the railway trains designated Borneo I, and Sumatra I and II, equipped as independently operating mobile night fighter control positions were committed in the Heilbronn, Eppingen, Stuttgart, Leipheim, Lechfeld, and Schleissheim sectors.

At this time the Reich Aircraft Reporting Service had only one Freya radar aircraft reporting instrument, stationed at Lechfeld, in the entire area of southern Germany.[437]

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437. Sources 3, 249, 276.

LONG-RANGE TARGET LOCATING INSTRUMENTS IN 1942

Continued development of the Freya type instruments by the summer of 1942 produced what could definitely be called a long-range target locating instruments capable of detecting enemy units at a distance of 180 miles. In positions along the coast of Holland, these instruments were capable of detecting targets over England at altitudes ranging between 6 000 and 10 000 feet.

The instruments in question were as follows:

1. The Wassermann Series. These instruments had a tower 230 feet high, with twelve Freya antennae arranged one above the other.

Altitude range of the direction beam antennae: 4-15 degrees.

Traversing arc of the antennae system: 360 degrees.

The level of the direction antennae beam could be raised or lowered as required by means of a phase modifier.

The three models of this type of instrument operated on wavelengths as follows:

Model M-III: 1.2 to 1.9 meters

Model M-IV : 1.9 to 2.5 meters

Model M- V : 2.5 to 4 meters.

2. Type Elephant. This was a permanently emplaced set, without traverse, and operating on a 7.5 meter wavelength.

3. Mammut Type. A permanently emplaced set, without traverse, and operating on a 2.4 meter wavelength.

4. Type Heidelberg. A passive set tuned to the wavelength on which the target locating instruments of the British radar system were operating, which received the identification signals of British aircraft and thereby made it possible to determine their position.

With these instruments in operation the air defense system to protect Germany had the decisively important advantage of being able to detect at a very early stage any concentration movements by British air forces, and to recognize early enough the direction in which an air formation left Britain. This made it possible to surmise roughly whether the approaching air formation intended attacking areas in southern, central, or northern Germany.

Another very important factor here was the interpretation of messages intercepted by the Radio Intercept Services, since it was possible to form a rough estimate of the strength of the approaching enemy formation from an identification of the units participating in the impending attack during their assembly.[438]

438. Sources 3, 7, 277.

THE FIRST RADIO AND RADAR JAMMING OPERATIONS DURING ROYAL AIR FORCE NIGHT ATTACKS IN 1942

The first British radio jamming activities td interfere with the German radar observation system were directed at the German naval radar stations at the Pas de Calais, the mission of which was to detect British convoy traffic in the mouth of the Thames River and provide data for German counter-operations.

Then for the first time on 2 September 1942 very strong and clearly audible British jamming transmissions commenced against a German Freya aircraft reporting station at the Pas de Calais. These transmissions continued from then on in a steadily growing volume.

Following the pattern of German interference activities, the British transmissions started at the narrowest part of the Channel and then fanned out.

Shortly before the invasion of Northern Africa by forces of the Western Allies in November 1942, radio interdiction transmissions were also noticeable at the El Alamein front.

In these radio interference operations the British made use of permanently emplaced radio jamming sets as well as of such sets installed in aircraft.

This interference with the operations of the Freya aircraft reporting radar instruments were a source of grave concern. Even graver was the fear that it would be possible for the enemy, within the foreseeable future, to prevent the functioning of the Wuerzburg type instruments, and it was on the functioning of these instruments that the defense system based its determination of the precise location of enemy units and their altitude. Furthermore, the whole night fighter defense system and the direction of antiaircraft fire at night, and during bad weather also during daylight, depended on data from this source.

Two known facts made these fears particularly acute:

1. The discovery, made in strictly secret tests, that the air drop of tinfoil cut in lengths equivalent to a half-wavelength could put the Wuerzburg instruments completely out of operation.

2. The capture by the British of parts of a Wuerzburg set in a commando operation at Bruneval on 28 February 1942, and of three or four sets in November 1942 during the withdrawal of the German Africa Corps from the El Alamein line.

A the end of 1942 the situation was such that scientific research and technological experiments had failed to find a remedy which could be applied in the event of the British making use of tinfoil.

A decision was made which was to have fateful consequences: the Chief of Wehrmacht Signal Services received instructions to maintain the strictest secrecy on the subject and to keep all records on the matter in his safe.

This decision was motivated by the intention definitely to make use of this method of radar interference when the time came to resume the air offensive against Britain and to keep the matter secret for that purpose. No clear-cut and urgently worded instructions were given to develop a means of protection for friendly Wuerzburg radar instruments.[439]

MEASURES TO COUNTER RADAR INTERFERENCE IN 1942

In a conference at the Reich Air Ministry on 8 October 1942, which was called because of the interference with operations of the Freya instruments and tactical radio and wireless telegraphic communications, the following measures were adopted as countermeasures:

1. On the wave-bands used by the Freya instruments.

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439. Sources 278, 279.

a. Change of wave-bands to alternate frequencies in the case of the Freya stations of the Luftwaffe and the Navy at the Channel coast.

Twenty-five trombone bow frames from the firm of GEMA were available for this purpose, which could be placed in immediate use, and from November on the de-tuning attachments (Frequenz-Verstimmungsmoeglichkeit), also developed by the firm of GEMA and suitable for frequencies between 120 and 150 MHz, would be available. Initially ten of these attachments would be delivered monthly, but the output was to increase steadily.

b. In order to insure that the "silence zone" ordered for the Freya instruments, the 130 MHz or 2.32 wave band, remained in force for the modified instruments, a notice was to be posted on the trombone bow frames to this effect, so that for the time being these attachments in changing frequencies would vary only between the 120 to 125 MHz frequencies.

c. The order to the troops was to be renewed that they were not to use the wave bands between 126 and 130 MHz.

d. Other Alternate Frequencies.

aa. For the 2.14 to 2.30 (130-140 MHz) wave-bands on which the Freya instruments operated, the

firm of GEMA was to so far complete its developing processes that the production of equipment for these wavebands could be expected from 1 January 1943 on.

b bb. Development work on the so-called "silence Freya instruments" for frequencies between 86 and 100 MHz (3 to 3.5 meters) was to be so far completed in the first quarter of 1943 that deliveries of these instruments could be expected from 1 April 1943 on.

transmitters" with the Wuerzburg Riese and C instruments in the coastal areas from Holland to Brest was to be prohibited until further notice.

d. All Wuerzburg instruments in use by the Air Signal Corps were to have a Stendal demodulator attached.

3. General. Measures were to be taken to insure that air units on harassing raids, recognized at the coast as such, were to be reported immediately to the antiaircraft artillery command posts farther inland, together with information on the number and types of planes involved, so that immediate countermeasures could be taken in the most appropriate form in the various defense regions. 440

The above measures are unmistakable evidence that the German Air Command took the matter of radar and radio interference very seriously and with great foresight initiated the appropriate countermeasures.

In the case of the Wuerzburg projects, however, it is noticeable that the countermeasures initiated made no provisions against the possible enemy use of tinfoil in radio and radar interference activities.

Changes in the frequencies used could provide no solution to this problem, since the enemy in each case could counter these frequency changes by changing the

length of the tinfoil strips used.

The strict secrecy ordered on the subject of the tinfoil method of interference was evidently the reason for the incomplete measures taken to protect the Wuerzburg instruments and for the incomplete treatment of the subject as a whole. The future was to show, in

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440. Source 250.

1943, that a variation of frequencies could not prevent interference by the tinfoil method, and on the day the Royal Air Force commenced using this method German air defense found itself face to face with a problem for the solution of which no means had been prepared.

THE PERSONNEL AND MATERIEL SITUATION OF THE AIRCRAFT REPORTING SERVICES IN GERMANY IN 1942

The strain on the personnel and materiel resources resulting from the increasing severity of the military situation naturally also affected the organization of the aircraft reporting services within Germany.

1. The Reich Aircraft Reporting Service. With the withdrawal of all personnel fit for military service, the level of performances by the reporting and air observer personnel necessarily sank. The only replacements available were reservists from the older age classes, whose willingness and conscientiousness in most cases were beyond reproach, but whose capabilities were restricted by reason of their general physical condition.

Equipment of the air observers was improved in 1942 by the issue of larger, 25x105, tripod-mounted field glasses, the tripod being adjustable in height. However, it was 1943 before these could be delivered in appreciable numbers.

The allocation of radar instruments to the Reich Aircraft Reporting Service was restricted to areas into which the night fighter organization had not yet been extended.[441]

2. Radar Organization of the XII Air Corps. Already in 1942 the severe measures taken to call up all personnel fit for combat action from the ground service organization of the Luftwaffe and from all industries began to affect progress in the radar manufacturing program and thereby the whole organization of the aircraft reporting services.

In a conference at Headquarters of the Commander in Chief of the Luftwaffe on 14 October 1942, the situation was described as follows:

a. In 1941 the Chief of Signal Communications had requested manufacture of 200 Wuerzburg and 1 000 Freya instruments. These requirements had been nowhere near fulfilled.

441. Sources 7, 281.

b. In response to objections raised by the Chief Antiaircraft Artillery Officer, the requisition by the Chief of Signal Communications for 1 000 Freya instruments had been deferred in favor of a larger number of Wuerzburg instruments.

c. Owing to shortages in personnel and raw materials the output of Freya instruments by the firm of GEMA had not reached the required figure.[442]

At a conference at Headquarters of the Commander in Chief of the Luftwaffe on 21 January 1943 developments in the radar program were again the subject of discussion: It was established in these discussions that if the planned measures to withdraw military personnel and civilians fit for military service from the Luftwaffe ground service organization and from industry for assignment to front units were implemented, this would have seriously adverse effects for research and development, procurement, and operations.

The requirements stated by the Chief of Signal Communications on the subject were as follows:

1. 1000 scientists qualified in the field of high frequency were to be withdrawn from active military service for research and development activities.

2. For the 17 000 skilled workers employed in

442. Source 281.

the radar industry, immediate issue of orders prohibiting their employment in other activities. Some of these personnel were already earmarked for drafting to military service.

3. Personnel employed as specialists in the electronic tube industries were not to be called up for military service before other personnel had received training to replace them.

The requirements stated above were submitted in person by the Commander in Chief of the Luftwaffe to the Commander in Chief of the Wehrmacht on the same day.

Other important points which were revealed at the conference were as follows:

1. The XII Air Corps already had 14 000 woman signal auxiliaries employed in its signal communications system.

2. The Commander in Chief of the Luftwaffe approved recommendations by the Chief of Signal Communications that the servicing personnel for Wuerzburg Riesen instruments (3 direction-finder operators and three data readers per instrument) should be replaced by female personnel after appropriate training.

3. For development of the forward aircraft reporting

areas to serve the purposes of air defense for German territories and to support night fighter operations, the following sequence of priority was established:

a. Sicily

b. Denmark, to protect Berlin

c. Rumania

d. Southern Germany

e. a belt extending from Marseille to protect Northern Italy.[443]

443. Source 222.

From the above series of characteristic features the following can be stated concerning circumstances in the aircraft reporting services in 1942:

1. The difficult conditions in respect to personnel and raw materials hampered the electronics (radar) industry in efforts to expand to its full production capacities.

2. The radar program established in 1941 was still far from fulfillment.

3. To insure that the radar program would be fulfilled, including the necessary reasearch and development activities, it was necessary to return to the industry personnel with the proper qualifications who had been called up for military service and to halt immediately the withdrawal of further such personnel from industry for assignment to combat units.

4. The replacement of male by female personnel in the signal communications system of the ground service organization had already assumed large proportions.

5. Plans for a continued expansion of an aircraft reporting organization based on electronic facilities had to award priority to the needs of other theaters, resulting from the military situation, over the needs of Germany herself for complete development of the

organization within Germany. The following can be considered as the basis for the priority sequence established on 21 January 1943:

a. Sicily. The landing of Anglo-American forces in West Africa in November made the Mediterranean and African theater the most critical of all theaters of operations.

Development of the aircraft reporting organization was therefore a matter of the utmost urgency.

b. Denmark. The tactics of the Royal Air Force, which dispatched its units on a course north of the German radar system--which extended as far as the Danish border--in order then to strike across the Baltic Sea into the center of Germany, necessitated an expedited development of the radar system to cover Denmark with radar instruments.

c. Rumania. The first air attack against the oil center of Ploesti, carried out on 12 June 1942 by twelve 4-engine B-24 bombers of the US Air Force operating from the Fayid air base of the Royal Air Force at the Suez Canal brought into prominence the hitherto latent air threat to Germany's vitally important oil supplies, which were indispensable for the continued conduct of the war. This made the development of an aircraft

reporting organization in Rumania as a primary condition for systematic day and night air defense an urgent necessity.

For this purpose Fighter Command Rumania, with headquarters at Bucharest, was established in October 1942.[444]

d. Southern Germany. The frequent penetrations of Royal Air Force units into the areas of Southern Germany made the speedy development of a radar syatem in these areas, hitherto completely without such protection, an urgent necessity.

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444. Sources 282, The Army Air Forces in World War II, Vol. II.

e. The Marseille Area. In attacking industrial centers in Northern Italy in October 1942, Royal Air Force units frequently approached and returned by way of the Marseille area in order to avoid having to cross the Alps. As previously reported in this study, the German supreme command took a very serious view of these attacks because of the possibility of adverse political repercussions. This was why the Marseille area was considered so important as an advance area for the protection of Northern Italy.

THE AIRCRAFT REPORTING SERVICES IN THE WEST IN 1942

COMMAND ZONE OF THE THIRD AIR FLEET

In contrast with conditions in the zone of Air Command Center, the aircraft reporting services within the command zone of the Third Air Fleet were consolidated as an integral organ controlled by Air District Command Belgium-Northern France.

The means available for the procurement of data to develop the current air situation were as follows:

1. The radar equipment of the Luftwaffe permanently assigned to stations established along the Channel and Atlantic coastline.

2. The observation posts of the Radio Intercept Service.

3. The radar emquipment of antiaircraft artillery units assigned in areas of concentrated antiaircraft artillery defense.

4. The motorized aircraft reporting companies with their aircraft reporting detachments and their Freya type radar equipment.

5. The reporting system of the Navy.

In view of the vast expanses to be covered and the existing shortages in personnel and equipment it definitely cannot be said that this area in 1942 had an adequately [illegible] dense network of reporting posts in the form of visual and oral observers or in the form of radar supported observation.

The parts with the best protection in this field were the coastal areas along the Channel and Atlantic coast. There the Freya and Wuerzburg type instruments, the aircraft reporting detachments, and the observation posts

of the Radio Intercept Service, supplemented by the radar instruments and the seaborne units of the Navy, both of the latter with the special missions of seaward observation, provided a densely interlocking network of possibilities for effective action.

Whenever their assigned missions permitted, enemy units endeavored to escape detection as long as possible by

approaching at low altitudes across the sea.

For the German daytime fighter units stationed within the coastal zones, the dense reporting network just described was adequate to enable them to track the course of the approaching enemy force up to the point of visual contact.

If an enemy force succeeded in penetrating inland to target areas protected by antiaircraft artillery, the radar instruments available to the antiaircraft artillery provided adequate data for a continuous interpretation of the air situation.

The zone between the coastal areas on the one hand and Germany and Southern France on the other hand had only a widely meshed network of aircraft reporting detachments and radar stations. Back of a forward observation belt radar stations were available to keep the areas of approach to southern Germany under observation at the following points:

First Line : Ghent, Lille, Amiens, Rouen, Caen, Rennes

Second Line: Brussels, Rheims, Paris, Le Mans

Third Line : Liege, Metz.

Within each line the radar stations were spaced between 60 and 90 miles (by air) apart; the distance between the separate lines was between 90 and 150 miles.

To cover the entire areas of northern and central France against aircraft approaching the southern parts of Germany

the Freya instruments therefore had to operate at their maximum effective range and satisfactory results could only be obtained in favorable operating conditions and if the enemy approached at correspondingly high altitudes.

In practice, however, it was rarely possible to track the course of enemy attackers without interruption, espevially in the case of single planes, such as strategic reconnaissance units.[445]

THE AIRCRAFT REPORTING SERVICES IN OTHER THEATERS IN 1942

In consonance with developments in the air situation, development of the aircraft reporting organization was a particularly acute necessity in the southern theater.

In North Africa the system was based primarily on the motorized aircraft reporting companies, which in an increasing measure received mobile radar equipment on collapsible Type Freya and Type Wuerzburg mounts.

The establishment of stationary radar positions, to serve simultaneously in support of night fighter operations, on Sicily became a matter of the highest priority.

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445. Source: 7. [illegible], 270.

As previously related, the use of radar equipment in the mobile operations of the North African theater resulted in the capture, by the British, of a number of Wuerzburg instruments, a circumstance which was to produce conditions seriously threatening the air defenses of Germany in 1943.[446]

PLANNING IN THE FIELD OF RADAR TECHNOLOGY FOR THE AIRCRAFT REPORTING SERVICES IN 1942

In a return to the projections and experiments of prewar years, the idea was again taken up in September 1942 of an all-around sky sweeper operating on the radar principle with a rotating (Panorama instrument) antenna.

It was thought that instruments of this type would have a longer operating range than the Freya type, and particularly important advantages were expected of a continuously maintained scanning capability covering 360 degrees of the entire area within range.

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446. Sources 222, 278.

In addition to these advantages, the longer range would reduce considerably the number of instruments required.

The first experimental model, which had been tested at "Tremmen," west of Berlin, had failed to function, and further development of this project had soon been stopped.

In September 1942 the Commander in Chief of the Luftwaffe seriously reproached the Chief of Luftwaffe Signal Communications, General Martini, for neglecting to develop the Panorama instrument, and instructed an officer from his immediate staff, Major Kneemeyer, to direct activities in all problems in the field of high frequency technology.

Professor Esau, the scientific director of activities in the field of high frequency technology was also relieved of his post and replaced by Chief Engineer (Oberstingeneur) Dr. Plendl.

The measures obviously were in reaction to the disturbing results of British interference with the operations of Freya instruments and gave renewed impulses to the development of the Panorama istrument.

However, it was not before the end of 1943 that these measures produced useful results, which culminated later in development of the Jagdschloss instrument,[447] a type of PPI

447. Source 222.

and IFF ground installation with rotating antenna.

THE AIRCRAFT REPORTING SERVICES IN 1942

SUMMARY

In summarizing the following can be said of the aircraft reporting component of German air defense in 1942:

1. The increasing severity of the air situation had revealed with growing clarity the inadequacies of the organizational setup of the Reich Aircraft Reporting Service.

To remedy the situation a decentralization of the aircraft reporting centers was planned. Under these plans aircraft reporting sub-centers were to be established, which were to be linked closely with the radar stations of the night fighter organization.

It was 1943 before these plans could be implemented.

2. Radar instruments became the main source of data on the air situation. However, the inadequate industrial output in this field made it necessary to first satisfy the needs of the night fighter arm, the antiaircraft artillery, and the motorized aircraft reporting companies committed in areas of mobile operations for these instruments.

3. The sequence of priority in the development of an aircraft reporting organization based on radar became contingent upon requirements for development of the night fighter defense system in accordance with the air situation and the military situation in general.

4. Serious problems resulted from systematic operations by British ground installations and aircraft instruments, commencing in the autumn of 1942, to interfere with the functioning of Freya instruments through jamming.

Sweeping measures introducing the use of variable frequencies were taken to counter the British jamming operations directed against the Freya instruments.

From experiments carried out in Germany it was known that the use of tinfoil could interfere with the functioning of the Wuerzburg type instruments, which in every respect were the backbone of the entire antiaircraft artillery and night fighter defense system. However, the responsible authorities chose to ignore the possibility that the enemy might make the same discoveries and took the fateful decision to endeavor to avert this source of danger by maintaining strict secrecy on the results obtained in the German experiments.

5. Because of shortages in personnel and raw materials the industrial output in radar type aircraft reporting

instruments lagged far behind current requirements.

6. The resumption of experiments connected with the construction of a Panorama instrument in September 1942 opened the way for very promising developments.

PASSIVE AIR DEFENSE IN 1942

I. THE AIR RAID PROTECTION WARNING SERVICE.

With the growing severity of the air situation in 1942 the efficacy of the regulations governing measures to alert the civilian population also became questionable.

Whereas in 1940 an order by Hitler had established generally that the air alert was to be sounded even if only a single enemy aircraft crossed over city areas, experience in 1941 showed that the frequency of such general alerts produced an intolerably heavy loss in industrial output.

A rule was therefore established that large installations of the armament industry were to be excluded from the general alerting system, and that the locally responsible antiaircraft artillery commander would take timely steps to warn such installations in the event of a imminent threat of air attack.

For the general area of Berlin the regulations established by the Commander in Chief of the Luftwaffe on 6 September 1941 remained in force in 1942. These regulations provided as follows:

1. In the case of Russian aircraft the alert was only to be sounded when they reached the antiaircraft fire zone.

2. In the case of British aircraft it was permissible to depart from the requirement of a ten-minute advance warning if such action seemed justifiable in view of weather conditions (sudden bad weather) or the behavior of the enemy (recognized harassing or attack objectives).

3. If British aircraft flew over Berlin on an easterly course the all-clear signal could be given even if it was to be expected that they would return by a route over Berlin.

The risk must be accepted here that the decision to delay warning in an effort to protect the population against unnecessary disturbance might result in the warning, when it becomes necessary, might reach the population too late. This might happen occasionally in the event of an unexpected change in the behavior of the enemy.

On 30 September 1941 Field Marshal Milch, State Secretary for Aviation and Inspector General of the Luftwaffe, expressed doubts concerning an advance warning of less than ten minutes. On 5 October 1941, however, the Commander in Chief of the Luftwaffe decided that the order was to remain in force.

Following repeated false alarms in Berlin the

Commanding General, Air Command Center, in January 1942 recommended new regulations for the sounding of air alerts for Berlin during daylight on the following basis:

1. If it was not clear from the reports received that the approaching aircraft were hostile, the warning as a rule was only to be given after the bombing target area was clearly recognized.

2. In cases where antiaircraft artillery units opened fire against unidentified aircraft, or against aircraft flying in clouds or above the cloud ceiling, (in areas closed to air traffic), the alert was only to be sounded after actual bombing was reported.

In a teletype message on 13 March 1942 the Commander in Chief of the Luftwaffe disapproved these recommendations and renewed his orders that the regulations of

6 September 1941 were to remain in force.

From the above it is clear that no ideal solution was found to reconcile the requirements for proper protection of the population against bombing attacks through the sounding of a timely alert in every instance of a possible bombing attack on the one hand with the desire on the other hand to shield the population against needless alarm and to avoid unnecessary interferences with manufacturing activities.

Concisely stated, the problem was whether to sound the alert too early and too often, or less frequently and possibly on occasions too late. No clear-cut answer was found to this problem, and even the civilian population held divided opinions on the matter.[448]

II. CIVIL AIR DEFENSE IN 1942.

In the autumn of 1940 a special Air Raid Protection Staff (Arbeitsstab Luftschutz) set up in Air Inspectorate 13, worked out plans, designated as the Air Raid Protection Program, for the construction of air raid shelters to accommodate a total of 26.5 million persons in 61 localities. In July 1941 this program was modified to meet the requirements of the current military

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448. Source 283.

situation.

A decree issued by the Commander in Chief of the Luftwaffe established the localities in which the construction of air raid bunkers and the improvement of other air raid shelters was to continue, and the localities in which no new construction work on air raid structures was to be initiated. By this means work in the second phase of the Air Raid Protection Program was concentrated on a restricted number of 56 localities in the western and central areas of Germany.

Shortages in construction materials, transportation facilities, and more particularly fuel and manpower, made it necessary to restrict the number of bomb-proof bunkers to be constructed severely and to concentrate rather on the improvement of existing cellars and other shelters.

The approval of the Commander in Chief of the Wehrmacht for both decisions was obtained by the State Secretary for Aviation in an oral report on 28 January 1942.

When it became clear in the autumn of 1942 that progress in the implementation of the program was not keeping pace with the steadily increasing severity of air warfare and the constantly increasing frequency of attacks against German territory, the Air Raid Protection Staffin November 1942 prepared and submitted to the State Secretary for

Aviation a memorandum aiming at expediting the completion of the air raid precaution measures and vitalizing air raid protection activities on the whole.

In an "Annual Plan for 1943" the most urgently essential requirements for an effective system of air raid protection were stated in a compilation adapted to the current

conditions of the wartime economy in general.

The memorandum provided for continuation of the current program and its extension to include other localities under frequent attack.

However, it was only in the spring of 1943 that the Commander in Chief of the Luftwaffe approved this modified program.[449]

III. SMOKESCREENING IN 1942.

As stated previously in the chapter on the antiaircraft artillery the protection of specific targets by means of smokescreening commenced in 1942 through the activation of a total of 9 smokescreening companies, 6 of which were allocated to German territories and 3 to occupied France.

The results obtained by these companies in operations in 1942 aroused a keen interest on the part of the Commander in Chief of the Wehrmacht in the expansion of this new arm.

In agreement with the Reich Minister for Armaments, the Chief of the Luftwaffe General Staff determined which targets were to be given smoke screening protection. The primary targets given protection of this nature were hydrogenation plants, installations manufacturing fighter aircraft and submarines, bridges, valley dams, and viaducts.

449. Source 284.

At certain industrial installations smokescreening concentrations were developed, with smoke representing the primary and antiaircraft artillery the secondary form of defense.

In general such points of smokescreening concentration were given only light antiaircraft artillery units and balloon barrage units as an additional protection.

However, the continued expansion of the smoke-screening arm soon became limited by the shortage of personnel and the inadequate industrial output in smoke-producing acids.[450]

IV. INDIVIDUAL AND FACTORY AIR RAID PROTECTION AND DUMMY INSTALLATIONS IN 1942.

Reporting on the subject of the effectiveness of passive air defense measures on 28 March 1942 the Inspector for Passive Air Defense (Air Inspectorate 13) pointed out the following:

1. In Berlin the damage averted by means of dummy installations was eleven times, in the case of the coal hydrogenation plant of Poelitz seven times as high as the cost of their construction.

2. That the damage sustained in attacks against

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450. Source 9.

the Poelitz hydrogenation plant was so small in spite of the sensitivity of the works to air attack must be ascribed to the air raid protection measures of a passive nature which had been taken.

In Berlin, also, it was due to the passive air defense measures taken that no considerable damage was done to installations of vitallymilitary importance.

Thus measures of individual and factory protection rendered a proximately 98 percent of the incendiaries dropped innocuous.

In the case of fires which resulted the Technical and Auxiliary Service in almost all cases prevented serious damage.[451]

PASSIVE AIR DEFENSE IN 1942

SUMMARY

In summarizing the following can be said of the passive air defense component of the German air defenses in 1942:

1. In the Air Raid Warning System the major problem was that of warning the population in time of expected air attacks without alarming the public with unnecessary frequency and without interfering too seriously with industrial production. Conflicting opinions made it impossible to find a solution appropriate

451. Source 285.

to the requirements of the situation.

The Commander in Chief of the Luftwaffe finally decided that the safeguarding of the industrial output must be given preference over the desire to secure complete protection for the population.

2. The failure to carry out in full the planned air raid protection construction work was due in part to the inadequacy of construction facilities.

The increasing severity of the air situation made it an imperative necessity to provide for increased air raid protection measures for 1943.

3. The activation of smoke screening companies made it possible to improve local defenses for specific targets particularly endangered by daytime low altitude or precision bombing attacks and for targets particularly sensitive to air attack. The Wehrmacht High Command supported the further expansion of the smoke-screening arm.

4. The existing dummy installations had drawn on themselves a considerable percentage of the bombs intended for other targets. The value of the damage thus averted represented a multiple of the materials expended on their construction.

5. The factory passive air defense system, individual passive air defense, and the units of the Technical and Auxiliary Service had rendered excellent services in averting the danger of fires resulting from incendiary bombing by the enemy.

On the whole the passive air defense forces available could still be considered adequate to meet the requirements of the air situation as it existed in 1942.