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**THE BATTLE OF BRITAIN**

by

**GENERAL ADOLF GALLAND**

Translated by

AIR MINISTRY A.H.B.6

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EDITOR'S PREFACE

This account of the Battle of Britain, written by General Galland, has been translated from a series of articles in "Forces Aeriennes Francaises", which were themselves translated from the Spanish, as they originally appeared in an Argentinian journal. As Galland probably wrote them originally in German, it will be realised that certain changes in phraseology may have crept in during the various translations. Nevertheless the basic facts have undoubtedly been preserved, and it is felt that the account, presenting as it does the German point of view, forms a useful addition to the documentary material already available on one of the decisive battles of World War II.

Adolf Galland was one of the outstanding personalities of the Luftwaffe. He gained his first operational experience with the Condor Legion in the Spanish Civil War, flying the Heinkel 51 biplane on ground attack operations. In the Polish Campaign in 1939, he was also engaged on this type of operation, this time with the Henschel 123. He was then posted to a fighter unit equipped with Messerschmitt 109's, and flew on numerous sorties in the Western Campaign of 1940, including his first encounters with R.A.F. Spitfires and Hurricanes over the French and Belgian coast. At the end of this campaign he was promoted to Major for bravery and decorated with the Knight's Cross (Ritterkreuz).

During the Battle of Britain Galland was in command, first of a Gruppe, and, from the end of August 1940, of a Geschwader (Jagdgeschwader 26). He himself flew with great distinction and in September was awarded the Oak Leaves to the Knight's Cross for his fortieth victory since the outbreak of hostilities.

Throughout most of 1941, Galland continued his successful career as a fighter pilot, his unit operating from the Pas de Calais area against R.A.F. fighters and bombers. In June, he was awarded the Swords to the Knight's Cross, the first man in the entire Wehrmacht to be so honoured. In November, however, his operational career was cut short by his appointment, at the early age of 29, to the post of Inspector of Fighters and A.O.C. Fighters, in succession to Molders, another famous fighter ace, who had been killed in a flying accident.

In his new capacity, Galland was responsible for the development, training and operations of the fighter force, and his influence on this arm of the Luftwaffe was therefore considerable during the following three years. At first, his relations with Goering were good, due probably to his general popularity and his high reputation as a pilot. In February 1942 he was put in charge of the Luftwaffe operations in connection with the movement of the battleships Scharnhorst, Gneisenau and Prinz Eugen from France to Norway, and was mentioned in despatches for his part in the success of this difficult operation. In November 1942 he was promoted to Generalmajor (Brigadier), the youngest man of this rank in the Luftwaffe.

Soon, however, his realisation of the threat which Allied air attacks on Germany presented and his outspoken criticisms of high-level policy caused a steady deterioration in his relations with the Reichsmarschall. Goering, for his part, indulged from time to time in the most violent attacks on the Luftwaffe fighter pilots, accusing them of inefficiency and even cowardice. As the scale of Allied attacks increased and the efficiency of the Luftwaffe declined, Galland's position became more and more precarious, until at the end of 1944 he was told by Goering that he would have to be replaced, and his successor, Gollob, took over control of the fighter force early in 1945. Embittered and depressed by the course of events, Galland obtained Goering's permission to resume operational flying and in the last months of the war he led a jet-fighter (Messerschmitt 262) unit, operating in Southern Germany. He was captured by American forces shortly before Germany capitulated. After a period as a prisoner of war, he was repatriated to Germany and later took up an appointment as air adviser to the Argentinian Government.

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For readers unfamiliar with the organisation of the Luftwaffe, it should be explained that a Staffel was roughly equivalent to a squadron, having a normal establishment of 12 aircraft. A Gruppe consisted of three Staffeln and a Geschwader of three Gruppen. The operational flying units were subordinated to Luftflotten (Air Fleets), which were organised on a territorial, not a functional basis. A Luftflotte could, however, be transferred from one operational theatre to another, as in the case of Luftflotte 2 which was moved from the West to the Eastern Front in the Spring of 1941, and later transferred to the Mediterranean theatre.

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## I - FIGHTER AIRCRAFT PRIOR TO THE BATTLE OF BRITAIN

World War II began with the German attack on Poland on 1 September 1939. All the forces of the Luftwaffe took part in the Polish campaign except for a few groups of fighters and several squadrons of reconnaissance aircraft held back in western Germany as a safeguard in the event of active participation in the war by France and Great Britain. Germany had no air striking forces in this area when the two countries entered the war.

Thanks to its qualitative and quantitative superiority and to its more advanced state of preparedness, the Luftwaffe was able to destroy the small Polish Air Force, either on the ground or in the air, within the first few days of the campaign. The Polish Air Force played no further part in the operations.

The Luftwaffe was employed in the general plan of this veritable Blitzkrieg primarily on missions of tactical co-operation with the ground forces.

Transport units had been formed at the beginning of the conflict by making use of aircraft assigned to training schools for pilots, commercial aircraft and the aircraft of various service squadrons assigned to Ministers, the Nazi Party, etc. It is estimated that the Luftwaffe had about 400 transport aircraft, most of them Ju. 52s.

The theoretical strength of the fighter Staffel was 12 aircraft, while that of bomber, dive-bomber and reconnaissance Staffeln was only 9 aircraft.

Each Gruppe comprised three Staffeln. In fighter Gruppen the Stabstaffel (Headquarters flight) comprised four aircraft; all other Gruppen had only three aircraft in their HQ Staffeln. It is estimated that at the outbreak of hostilities the effective strength of the Luftwaffe was 70 % of establishment.

The effective strength of the Luftwaffe towards the end of the summer of 1939 was as follows:

30 bomber Gruppen (18 equipped with He. 111's; 11 with Do. 17's; 1 with Ju. 86's). Total: approximately 675 bombers.

9 Stuka Gruppen (Ju. 87's). Total: approximately 200 aircraft.

10 long-range fighter Gruppen (Me. 110's). Total: approximately 300 aircraft.

13 S/E fighter Gruppen (Me. 109's). Total: approximately 400 aircraft.

21 long-range reconnaissance Staffeln (20 equipped with Do. 17's; 1 with He. 111's). Total: approximately 104 aircraft.

30 close recce Staffeln (25 equipped with He. 126's; 5 with He. 45/46's). Total: approximately 200 aircraft.

During the first year of the war, by the summer of 1940, several additional Gruppen were formed, thus bringing the effective strength of the Luftwaffe nearer establishment. At this time the Luftwaffe had about 2,500 first-line aircraft, excluding transport aircraft. Several training schools for pilots were disbanded in order to provide personnel and aircraft for new units.

Luftwaffe losses up to the end of 1939 had been so small that plans for providing replacements proved later on to have been based on false assumptions: the growth of another European air force - the R.A.F. - was not taken into consideration. The R.A.F. made gigantic strides to increase its strength until it equalled that of the Luftwaffe, later inflicting on us losses far heavier than had been anticipated.

According to figures supplied by the German Quartermaster General, aircraft production in Germany during the years 1939 and 1940 was as follows:

TYPE OF AIRCRAFT	MAKE	1939	1940
S/E fighter.....	Me. 109	449	1693
T/E fighter.....	Me. 110	156	1083
Total number of fighters.....		605	2776
T/E bombers.....	Ju. 88	69	2208
	He. 111	452	756
	Do. 17	231	275
Total number of T/E bombers.....		752	3239
Dive bombers.....	Ju. 87	134	603
Transport aircraft.....	Ju. 52	145	388
Totals.....		1636	7006

According to German estimates, the British strength was as follows:-

R.A.F.

5,500 warplanes (including naval aircraft) 20 % of them of the latest types; 3,600 of them based on the British Isles. 200 of the R.A.F.'s total of 620 fighters were of the latest type.

Anti-aircraft artillery:

600 heavy guns;  
2800 light guns;  
3300 rocket projectors.

Thus the R.A.F. was numerically superior to the Luftwaffe. However, a large proportion of the British aircraft were out of date and this enabled the Luftwaffe to maintain air supremacy at this stage with about 2,500 aircraft of later types. The inferiority of the French Air Force in comparison with the Luftwaffe was even more marked.

It must be borne in mind that though the Luftwaffe was built up in an amazingly short time, another two years would have been required to bring it up to establishment. Examination of the relationship between the various branches of the Luftwaffe shows that the provision made for fighters was insignificant.

The reason for this is to be found in the basic conception on which the new Luftwaffe had been built up: it was thought of as an attacking force. This conformed to the strategic concept much in favour at that time: that mastery of the air should be obtained in the initial operations of a war through the destruction, on the ground, of the enemy's air power. I personally believe that Germany would not have lost the war if the production of fighters in 1940 or 1941 had been on the same scale as it was in 1944. In this connection it is interesting to examine the production figures for fighter aircraft during the war.

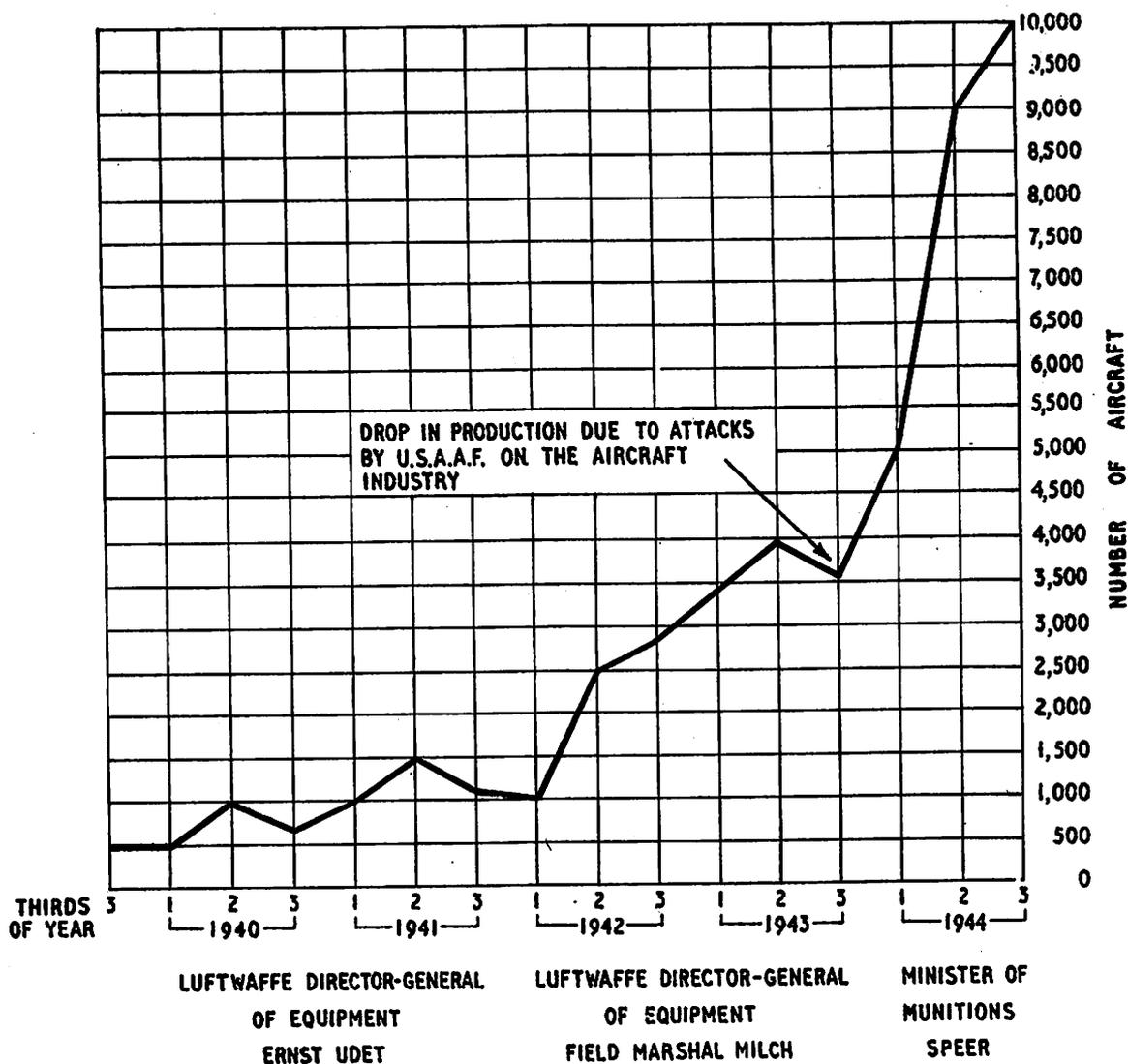


FIGURE I  
GERMAN FIGHTER PRODUCTION

This graph shows:

- 1) that the output of the German aircraft industry was stepped up very little at the beginning of the war, and that it was not until after a very long delay - in the autumn of 1944 - that peak production was reached.
- 2) that General Ernst Udet, then Luftwaffe Director-General of Equipment and responsible for the planning, development, testing and production of aircraft and all G.A.F. equipment, was unable to increase the production of fighters to any appreciable extent.
- 3) that Field Marshal Milch, Udet's successor, brought about a marked increase in fighter production, though he received no urgent order to do so: such an order would have shifted the priority in production from bombers to fighters.
- 4) that by the end of the war the German aircraft industry, under the Minister of Munitions, Albert Speer, reached peak production in spite of the heavy attacks made on it by Allied air forces.

It will be recalled that a few years previously (1935-36), the German aircraft industry produced the first Do. 17s and He. 111s, the latter being called "Schnellbomber" - high-speed bombers. A comparison between these aircraft and the German fighters of that period, the Arado 65 and the He. 51, disclosed that later models were far superior. This led to completely erroneous conceptions: it was believed then and for some time afterwards that in daylight attacks, bombers would be able to master enemy fighters and would thus not need to be escorted. In any case, fighters would not be able to accompany bombers owing to the disparity in their speeds.

However, the construction of the new Me. 109 of completely revolutionary design put the problem back again in a proper perspective. It is of interest to mention here that the Me. 109 was actually - and in the proper sense of the word - a gift from its designer, Prof. Willi Messerschmitt. It was not ordered by the German Air Ministry; on the contrary, many of the men who had been fighter pilots during World War I and who now occupied positions of authority in the Luftwaffe, rejected the new aircraft on technical grounds. They did not realise that of all the various tactics that could be employed in aerial fighting between aircraft of high performance, the close-turn combat would be exceptional, and that in a fighter with a closed cockpit a pilot could fly, see, fire and fight as well as in the old type of fighter having an open cockpit. The sceptics asserted that the new Me. 109 was not suitable for service use because of its very high take-off and landing speeds, which would give rise to insurmountable difficulties in handling it.... To-day, all that seems legendary.... Time has corrected these false conceptions and made one fact quite clear: the Me. 109 not only possessed superior features, but it caused a revolution in fighter design throughout the world.

"The air force is a strategic, offensive weapon..." These words sum up the conception that dominated the period. In order to attack it was necessary to have air supremacy. When a decision could not be obtained by surprise bombing attacks against the enemy's air power on the ground, daylight operations by bombers with fighter escorts would have to be carried out. But the High Command was not satisfied with this proposal because it meant that the operational radius of bombers would be reduced still further. The radius would become too limited and bombing attacks would lose something of their character of decisive strategic operations which the theory of Douhet ascribed to them.

The principal drawback to the Me. 109 was its short range - 105 minutes' flying time - and hence its short operational radius (about 200 km.) Later, in 1940, this drawback played a decisive part in the outcome of the Battle of Britain. Infuriated by this weakness, the C-in-C of the Luftwaffe demanded a fighter having a greater endurance. He stipulated that it should be designed to incorporate accommodation for a wireless operator - navigator, who could also act as rear gunner. This demand resulted in the production of the Me. 110, a twin-engined, two-seater aircraft, which was given the name of "Zerstörer" (destroyer). The formation of new long-range fighter units began in 1938; the best pilots were assigned to them. This was not the first instance of pilots being withdrawn from the fighter force: two years previously, when dive-bomber units equipped with Ju. 87s were being formed, and again during 1934 and 1935, when ordinary bomber units were being set-up, the young fighter force had to put a large number of its best pilots at their disposal. By 1933 it had not been possible to train more than about 300 pilots for the secret army<sup>(1)</sup>. These pilots were later to form the nucleus of flying personnel for all branches of the Luftwaffe.

The consequences of this reduction on three separate occasions of the effective strength of fighter personnel were felt in the period between 1934 and 1939, when the build-up of the Luftwaffe was being accelerated, and later, during the war itself.

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(1) In order to circumvent the Versailles Treaty, fighter pilots for this clandestine army were trained in Russia, in a district some 500 km. SE of Moscow, under the terms of a secret agreement between Germany and the Soviet Union.

For a long time fighter pilots were relegated to second place because they were not integrated into the operational air force. At manoeuvres, in conformity with regulations that had been drawn up governing their use, fighters were assigned the tasks of local air defence and combat for the purpose of achieving mastery in the air over front line zones. Thus they were not included - and this was the mistake - in the operational air forces. However, the pilots of the new long-range fighters were, according to Goering, to be the élite of the fighter personnel of the young Luftwaffe.

The plan to construct fighter aircraft having a great operational radius to enable them to escort bombers and overcome enemy air superiority over his own territory was undoubtedly carried out. However, the actual resultant aircraft could not have been more unsatisfactory. Performance figures of the Me. 110 were so low that they were inferior to those of any other modern fighter. (See Fig. 2 for comparison of performances)

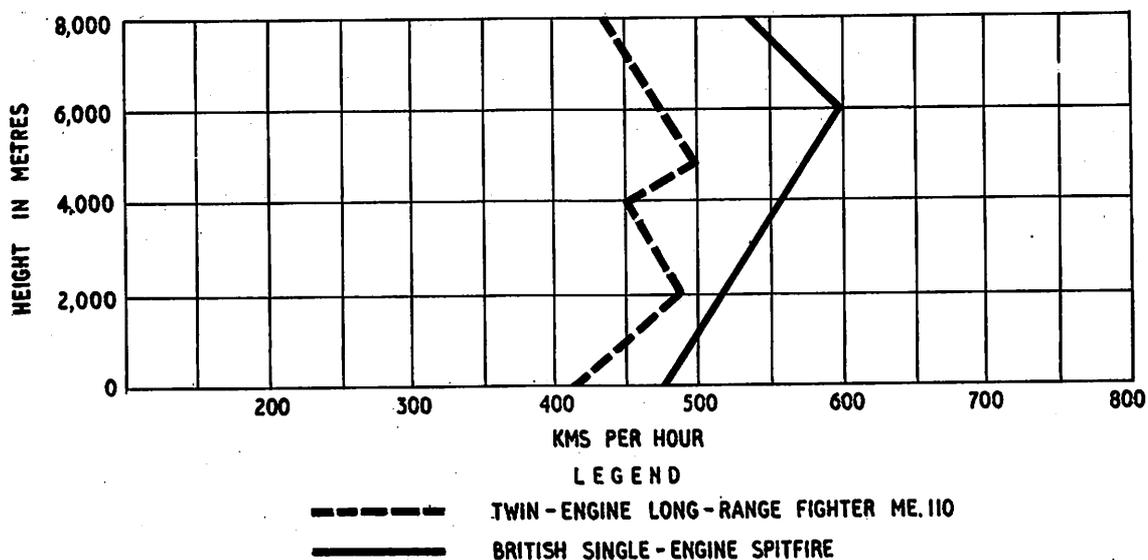


FIGURE 2  
COMPARISON OF HORIZONTAL SPEEDS

In addition to all the normal disadvantages felt by a large aircraft in combat with a smaller, single-engined fighter - weight, shape, etc. - the Me. 110 was difficult to handle at high speeds, it was very vulnerable and it could be identified immediately from a great distance by enemy fighters. The second member of the crew was of little value as a defensive gunner; during daylight sorties he could be dispensed with altogether. This was proved in 1940 during the Battle of Britain. The point will be referred to again later.

The probable effectiveness of aircraft armament and bombs was over-estimated at this period. The idea of the dive-bomber, brought back from the United States by Udet and adopted by the Luftwaffe, was believed to be practicable from all technical and tactical standpoints. This view was arrived at on the basic assumption that, as the dive-bomber would probably be more effective, it would be possible to destroy a greater number of targets using fewer bombers and bombs.

In actual practice it was proved that however great the striking power of the dive-bomber, "carpet" bombing carried out by bombers flying horizontally in formation, the bombs being released at a high altitude, was generally more effective against such targets as naval and merchant ships, railway junctions, power plants etc. It must also be remembered that when a pin-point attack is being made, only the crew of the leading dive-bomber can see the target clearly, as smoke and dust raised by the first bombs impair visibility for the following aircraft. The Stuka has other

disadvantages from the point of view of defence. In order to carry out a dive-bombing attack it was necessary to break formation, dive steeply, one aircraft after another, into an area favourable for ground defence. This gave the enemy ground defences and fighters every opportunity for successful defensive action. Moreover, from technical and aerodynamic standpoints, the suspension of the bomb-load at the front of the aircraft reduced speed and operational radius, and at the same time it affected the behaviour of the aircraft in flight.

The tactical and technical characteristics of aircraft ordered by the Luftwaffe High Command had to conform to the ruling principle expressed by the term "suitable for dive-bombing purposes". This principle had the greatest and most decisive influence on the design of bombers of both light and heavy types. Thus these characteristics were required not only of the twin-engined Ju. 88 and Do. 217, but also of the four-engined He. 177. After 1942 this requirement was dropped from orders for new types of aircraft, but up till then the development of new kinds of heavy bombers was restricted by it.

General Jeschonnek, then Chief of Air Staff of the Luftwaffe, was a staunch defender of the idea of the dive-bomber. In a lecture to the Air Staff in the spring of 1939 he declared that "above all it is necessary to economise, not so much in money as in materials".

German four-engined bombers were particularly unsatisfactory. Aircraft turned out on conventional lines between 1936 and 1938 by Junkers, Dornier and Focke Wulf were held in high esteem. Nevertheless, the High Command of the Luftwaffe decided in favour of a Heinkel project, the He. 177, which made use of a new technical development: coupling two engines together to rotate one propeller. This arrangement reduced frontal resistance while increasing speed and improving manoeuvrability. When the aircraft was tested in the air, Hitler expressed a series of opinions on it from a technical standpoint. He maintained that the innovation would not yield good results because of the slight variations in the characteristics and lives of the two engines, in spite of the fact that they were of the same type. If they were coupled together rigidly their individuality would give rise to all kinds of troubles. Hitler was right, notwithstanding the arguments of the technical experts. The difficulties and defects that came to light later (vibration, overheating, the danger of fire etc.) and the modifications that had to be made, delayed series production of these aircraft, needed so urgently by the bomber force, for a period of three years. Hitler rightly remembered this tactical error and he never lost an opportunity to formulate an opinion, generally about everything, on technical matters and to give advice that was based precisely on this intuitive "certainty".

The first squadron of He. 177's was employed during the winter of 1942-43 for the air-lift to Stalingrad. It was during this period that the series of technical troubles developed. Later the engines were uncoupled and the He. 177 continued to be built as a conventional four-engined aircraft. But because of the arms programmes of the Army and the Navy, Germany was not yet in a position, from the point of view of material resources, to undertake the formation of a large fleet of bombers with great operational radius. Jeschonnek wanted light bombers with a pay load of several thousand kilograms, an operational radius of 1,000 km. and a speed of 700 km. p. h. And he maintained that "speed takes precedence over protection". Night fighters, long-range fighters and long-range reconnaissance aircraft were to be regarded as belonging to the same class.

In the end, four-engined aircraft were neither ordered nor produced because, after the initial successes of the Luftwaffe and the lessons drawn from them, the construction of heavy aircraft was regarded as of secondary importance.

The first Chief of Staff of the Luftwaffe, General Wever, who was regarded as the Douhet and the Rougeron of Germany, and who was unfortunately killed in an air accident in 1936, maintained that Germany should have a powerful strategic bomber fleet. After his death all the

plans he had initiated were cancelled. It was believed that the possession of a large number of twin-engined bombers of medium operational range would meet the maximum requirements of a modern air war. Several years later (1942 - 1943) when Admiral Doenitz, the new C-in-C of the Navy, asked for air forces that could be employed over the Atlantic, production of the He. 177 was again contemplated, this time seriously.

It has been necessary to discuss these conflicts over the arms programme of the Luftwaffe in order to provide a better understanding of the Battle of Britain. They were the landmarks in the history of aviation during the last war.

Finally, it must be mentioned that shortly before the outbreak of hostilities, there was speculation in Germany as to whether England would risk entering the conflict for fear of the air war that would ensue. When it became evident that this was wishful thinking, it was thought that England and France could be intimidated by mass attacks such as those made against Warsaw in the last days of the Polish campaign. (To provide the massed force necessary for these attacks even Ju. 52 transport aircraft were used.) Great and renowned successes were achieved in the campaign in the West, thanks to the obvious superiority of the Luftwaffe and to the vital protection it gave to ground forces during the offensives, as well as to the important help it gave in transporting supplies.

## II - THE FIRST PHASE

In the first phase air attacks were concentrated against warships anchored in ports in the north of Britain. These attacks were carried out from bases in the north-east of Germany, and after the summer of 1940, from Norway by single Ju. 88 dive-bombers with no fighter protection.

On Hitler's express order, not one bomb was to be dropped on the soil of Britain. Thus, ships moored at quays could not be attacked. Every effort was made to avoid starting aerial warfare on a large scale.

However, it was a mistake not to have waited until an adequate force - at least 100 Ju. 88s - was available: without it it was impossible to score a major success.

Apart from this offensive activity, widespread air reconnaissance was carried out so that complete data and photographs relating to targets in Britain would be made available.

When the campaign in the West began, attacks against British merchant shipping were intensified. It was realised that Britain could not be made to surrender until her lifelines had been cut. It was to this end that the first attempt was made to impose a naval-air blockade. German U-boats operated successfully in the Atlantic, in the Western Approaches and in the Bay of Biscay. The Luftwaffe's mission in this planned blockade was to seal the ports on the east coast of Britain - North Sea and Channel ports alike. But bombing attacks against merchant shipping, especially off the east coast of England, and the sowing of mines in harbours and harbour approaches, failed to produce the crippling effects hoped for, because the forces employed in the operations were inadequate.

In the meantime, before the German magnetic mine could be used on a large scale, the British had developed a counter measure to it. On the other hand, anti-aircraft defences of enemy merchant ships and convoy escorts, enemy fighter protection and radar-assisted interception were not yet important factors. Britain's weakest and most vulnerable point was undoubtedly her dependence on supplies from overseas, not only for strategic materials, but also for primary necessities. However, the Luftwaffe was still being used in the campaign in the West, which was to furnish the bases for the forces that were to take part in the Battle of Britain.

On 18 July 1940 Hitler made a speech to the Reichstag in which he traced the course of the war up to that date. It is highly probable that it was only after another serious effort had been made to come to an understanding with Britain (Holland, Belgium and France having already been conquered) that the Battle of Britain proper was launched on 24 July 1940. Meanwhile, Germany's ambitions were, as always, exclusively in the East.

There were three correlated problems:

- 1) the strategic plan for an invasion of Great Britain;
- 2) total air war;
- 3) a naval-air blockade.

It is not within my province to judge which of these three was the most important nor when they should have been put into effect.

In any event, when the three branches of the armed forces were ordered to prepare for invasion (Operation "Sealion") the Army demanded that the Navy supply sufficient shipping space for transporting the troops and later for supplies and reinforcements. For its part, the Navy wanted the Luftwaffe to provide air cover for the invasion fleet concentrated in the occupied ports of Holland, Belgium and France. It also wanted the Luftwaffe to achieve air supremacy, in the manner of an air umbrella, during the build-up of the invasion.

Of course, provision had been made for the use of all parachute and airborne forces. Thus, in order to carry out the invasion, the primary need was to obtain air superiority, and, as far as this was possible, absolute mastery in the air. Hence the task of solving the crucial problem was assigned to the air force.

Time was required to complete invasion preparations, especially by the Navy. The Luftwaffe was to make good use of this breathing-space by carrying out independent offensive operations aimed at securing air superiority. Though there was no deviation from the original purpose - to invade Britain - the nature of the operations carried out began gradually to shift the emphasis to the strategic mission of the Luftwaffe: forcing Britain to surrender as a result of total air war. Thus the war entered a phase which was to demonstrate clearly and exactly the potentialities and the limitations of the Luftwaffe.

At this period, total air war was known only as a theoretical conception. Until then no attempts had ever been made to wage war solely by use of air power, independently of the Army or Navy, in order to break the fighting spirit of an enemy equipped with modern arms.

The following were the strategic missions imposed on the Luftwaffe:

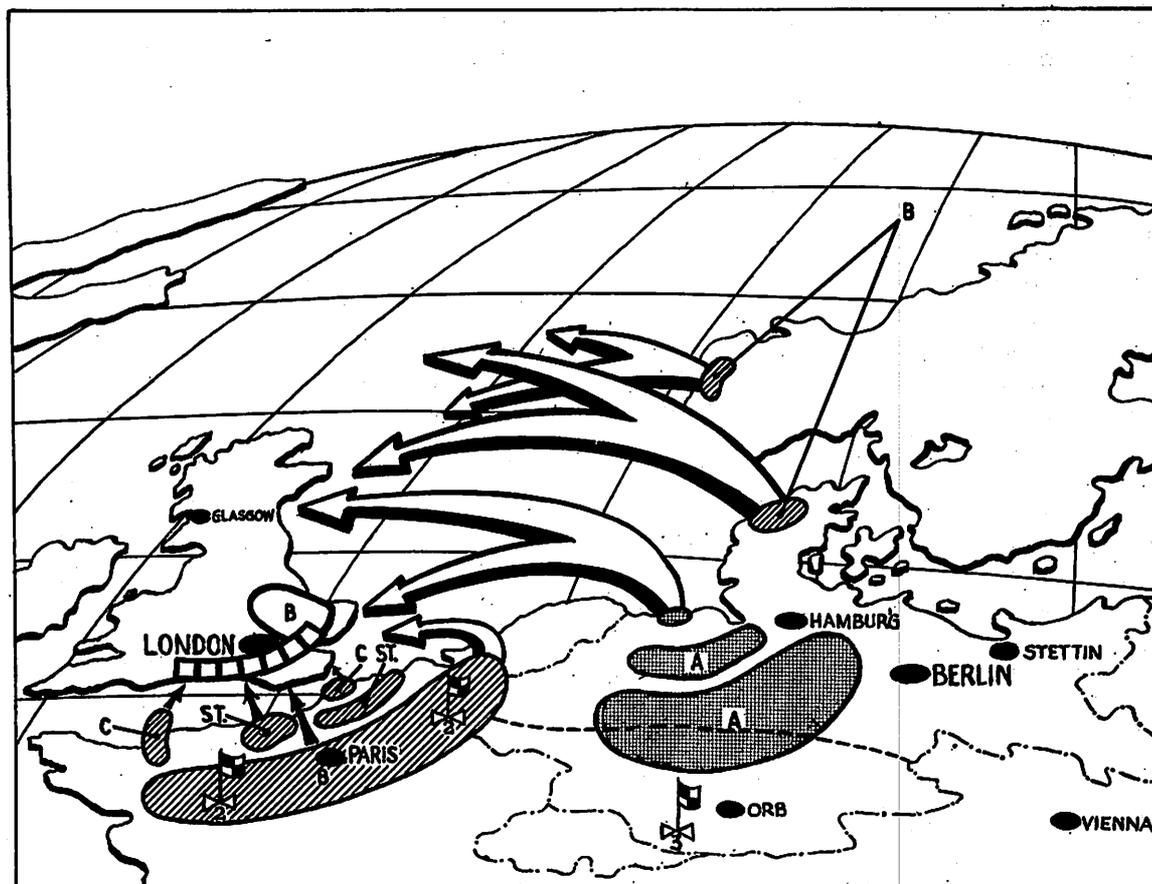
- a) the blockade of Britain (in conjunction with the Navy) by air attacks on shipping and ports;
- b) softening-up for the invasion; offensive aimed at gaining air superiority;
- c) forcing Britain to surrender by waging total air war against her.

It has now been established beyond any doubt that the Luftwaffe could not have completely accomplished these three tasks, for it lacked both the quality and the numbers necessary. The responsibility rests mainly on the C-in-C of the Luftwaffe, Hermann Goering. When doubts were expressed about the use of the other arms of the services, Goering said: "Very well, I'll get the result with my Luftwaffe...". He exaggerated the potentialities of the air force and accepted assignments which proved beyond his power to fulfil.

It was doubtless a very difficult problem to resolve, since in taking the initiative of a major operation there were, from the point of view of strategy, three alternative plans; then, during the course of the operation, emphasis of the attacks carried out by the Luftwaffe shifted from one to another of these plans. German orderliness was upset. The cause can only be indicated: at that stage the German High Command had no clear-cut strategic plan for the further conduct of the war. It is also possible that Hitler was already toying with the idea of an attack on Russia, but had not yet decided when would be the most favourable moment to launch it. As far as Hitler was concerned, the war against England had become a necessary evil to which he could not adapt himself.

Moreover, many voices in Germany were raised in criticism of the idea of attacking the British on their own soil. The critics maintained that not even the military occupation of the British Isles would be enough to bring about the end of the war. Field Marshal Kesselring, for example, headed a section of opinion that believed that an air offensive against Britain would demonstrate the limitations and weaknesses of the air force, and that it would result in our losing the most powerful instrument of political and military pressure we possessed. He asserted that it would be better to attack the periphery of the British Isles, and as a first step, close the Mediterranean at Gibraltar. Hitler decided differently. Once again it was principally Goering who goaded him into making his decision.

The responsibility for carrying out the operations was entrusted to Luftflotte 2 based at Brussels under the command of Field Marshal Kesselring, and Luftflotte 3 based at Paris, under the command of Field Marshal Sperrle. (See Fig. 3).



LEGEND

A—AIRFIELDS BEFORE 1940

B—BOMBERS

C—FIGHTERS

ST.—STUKAS

23—COMMANDS OF LUFTFLOTTE

ARROWS INDICATE ESCORTED BOMBER SORTIES

FIGURE 3

ZONE OF CONCENTRATION AFTER THE OCCUPATION OF FRANCE

The C-in-C of the Luftwaffe established a General Headquarters in France where he remained with his staff during the critical periods of the battle.

In order to make the most of their operational radius, single-engined and twin-engined fighter units were assigned to airfields as near as possible to the Channel coast. Even so, only the fighters of Luftflotte 2 based in the Pas de Calais were able to reach London, spend a maximum of ten minutes in combat, and then regain their bases. The fighters of Luftflotte 3, on the other hand, could barely reach the London area from their bases in the region of Havre. The Me. 109 was not even equipped with drop tanks.<sup>(1)</sup> Airfields situated in the country inland from the Channel coast were camouflaged with great care. The British had to be prevented at all costs from launching a surprise offensive which would compel the German forces to assume a defensive role before their own operations began. But the R.A.F. was in no condition to mount a preventive attack against the German concentrations. There is no doubt that this came as a surprise to the German Command, for it had expected to have to withstand numerous British attacks on its bases.

(1) It should be noted that in 1933 the Curtiss Hawk III was already equipped to carry auxiliary fuel tanks that could be jettisoned when empty.

### III - THE SECOND PHASE

The second phase of the German air offensive began on 24 July 1940. The aim was to rout British fighter defence in combat with German fighters, and thus to obtain the superiority necessary to ensure the effective employment of day bombers. To this end, German fighters were sent over the Channel on successive and intermittent sorties, first in group strength and then by squadrons.

At first the British accepted the challenge of these sorties and sent up Hawker Hurricane and Vickers Supermarine Spitfire aircraft to engage the German units. The Hurricanes were out of date and their performance was far inferior to that of the Messerschmitt fighter as regards both maximum speed in level flight and rate of climb. Though the Spitfire was more manoeuvrable in turning, its maximum speed was 20 to 30 km. p.h. less than that of the Messerschmitt. German ammunition and armament were manifestly better than those of the British. The R.A.F. lost the greater number of fighters.

The engines used in German fighters were not fitted with carburettors but had a fuel system incorporating injectors. This innovation prevented engines from stalling due to negative acceleration and gave German pilots a considerable advantage in critical moments of air combat.

When they were chased, British fighters tried to avoid combat by making a diving turn. The Messerschmitt had the advantage of being able to pursue them by turning at speed without loss of height.

But even more important than these technical drawbacks were the outmoded tactics used by the British fighters. Generally speaking, they flew in close formations of squadron strength in order to peel off immediately before making an attack. (See figure 4.)

German fighters, on the other hand, flew in wide, open formations a tactic evolved and perfected in the Spanish Civil War. It was easy to spot tight formations from a great distance, and at the same time they reduced the pilot's field of vision. A greater concentration of attention is required when flying in formation and virtually only the squadron leader is able to look about him. In contrast, each pilot in an open formation can and should take advantage of his unrestricted field of vision. Moreover, separate formations of two or three aircraft, flying at different altitudes, have a better chance of spotting hostile formations before they themselves are seen.

When they found that they were frequently surprised just as they were going to attack, the British protected their close fighter formations by means of two aircraft, one flying above and the other behind, whose mission it was to prevent surprise attacks. These two aircraft were called "Tail-end Charlies" or "Weavers". The "Charlies" weaved from side to side in order to increase the area of space they could keep under observation. However, this innovation did not improve the position to any great extent, and about 15 days after the beginning of this phase of the Battle of Britain the British adopted the German style of formation flying.

The High Command of the Luftwaffe and the combat units were very surprised to discover that the British already had an excellent and complete radar network which enabled them to detect the approach of German aircraft. This showed that the far-sighted and methodical British had done their utmost to make the latest technical developments available to their air defences. The geographical position of Great Britain and the location of its most vulnerable points requiring protection made air defence the most important of all the vital problems confronting the British. On the other hand, the air defences of Great Britain were in a favourable position inasmuch as they operated over interior lines to defend a relatively small territory, while the Germans had to make frontal attacks against these defences. All the preparations were made in a systematic, typically British manner with the result that the British Isles could not be easily overwhelmed by means of mass air attacks. Radar enabled the British to alert their defences in good time and to send up fighters at the right moment to intercept the German formations and to engage them when and where they chose.



In the early days of the battle, the British accepted the challenge of the German fighters. As a result, the losses they suffered were heavy, for at this stage they were no match for the Luftwaffe. The German Command constantly changed its tactics. Sometimes German fighters patrolled over Britain at any hour and at different altitudes; at other times they penetrated into enemy territory in strong successive waves. Normally each unit made three sorties per day. At this period I was in command of a fighter squadron and I received orders to carry out four consecutive flights in one day in free-lance fighter sweeps over England. The physical strain on pilots was very heavy; airframes and engines also suffered from these efforts.

The missions were carried out in the following manner: once they were airborne, the units (groups or squadrons) assembled as quickly as possible at an altitude of more than 5,000 metres over the Continent. The approach flight was begun from this height, the altitude being gradually increased to 6,500 to 8,000 metres. It took an average of 30 minutes to reach the English coast from the time of taking-off. This left about 20 minutes for the penetration into enemy territory, and then the aircraft had to return. In order to be able to attack as far as possible from a height greater than that of the British fighters, combats took place progressively from the maximum altitude. Only a small part of England was flown over. The remainder of the country, where the centres of armament production were located, was out of danger. The depth of the tactical penetration of German fighters is shown in figure 5. Twin-engined long-range fighters were not yet used operationally.

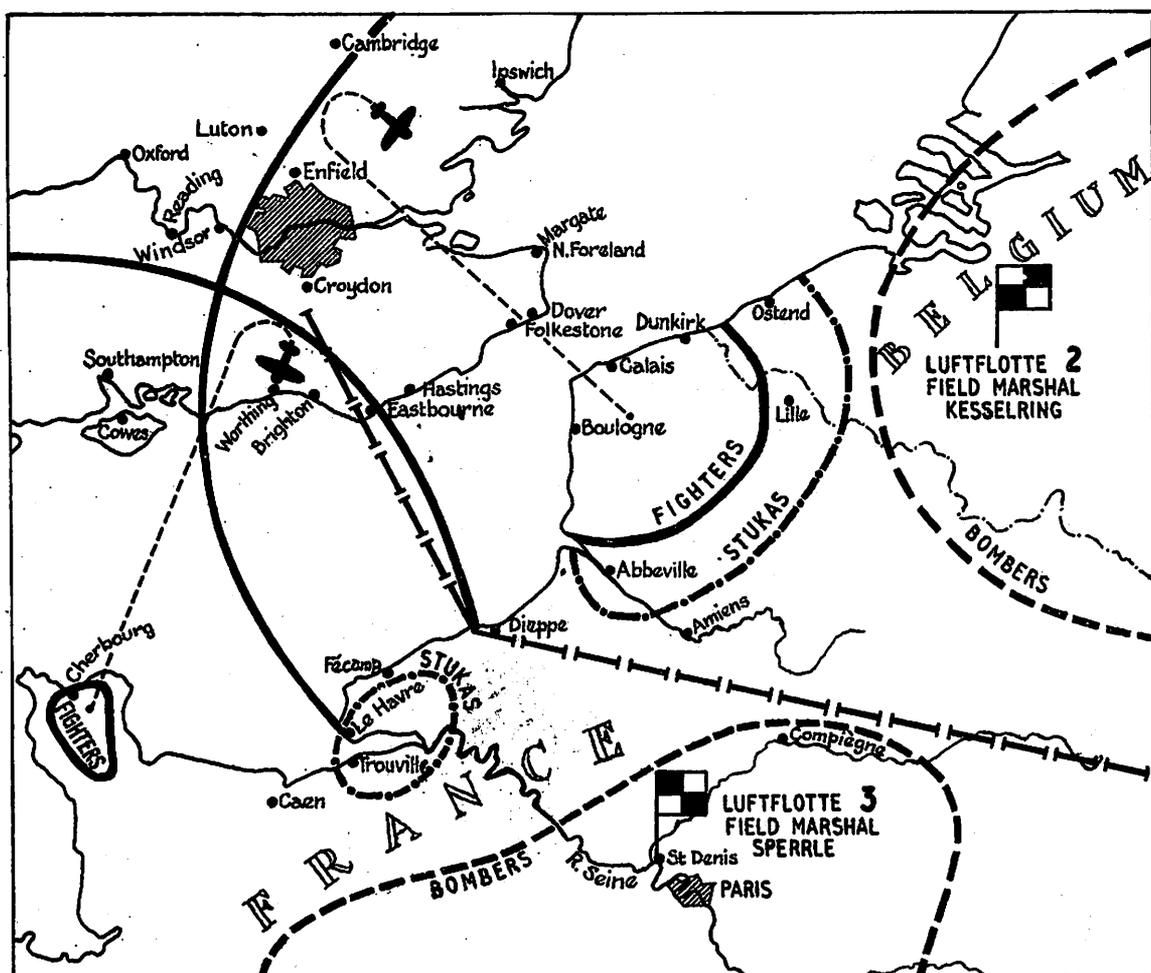


FIGURE 5  
DIAGRAM SHOWING GERMAN PREPARATIONS FOR THE BATTLE OF BRITAIN

It soon became evident that the British Fighter Command was not deceived by the German air attacks for it did not send up its fighters on hasty missions according to the exigencies of the moment. British fighter

units withdrew unhurriedly from coastal airfields to others in the interior round London, and at the same time they gradually reduced the number of sorties they made until finally they rarely went up to engage German fighters. The British Command realised that its fighter force had still to accomplish its most important mission.

The German fighters were ordered to carry out low-level attacks on airfields used by enemy fighters. These operations proved difficult and costly. The British fighters had been dispersed over a wide area and they were camouflaged to perfection, while the airfields themselves were protected by numerous light and medium anti-aircraft guns. At certain airfields the British used a barrage of cables launched by rockets. The cables descended slowly on small parachutes and proved very effective in protecting the perimeter and area of airfields against low-level attacks.

After a while the German Command had to recognise that it could not achieve its aim of an offensive air war by preparatory operations of this kind. In order to compel British fighters to fight again - the British Command had undoubtedly forbidden them to do so owing to German superiority - our fighters began to appear escorting several bombers, which attacked airfields, rail junctions and any other similar targets. The aim was to force the British fighters to give battle. For this reason these bombers were called Lockvogel (decoy birds). This time the aim was achieved. The struggle for air supremacy resumed its rhythm.

The data relative to the size and strength of the British fighter force and to its capacity for replacing losses of aircraft and personnel, on which the German Command based its strategy, proved to be completely false, as our pilots discovered in operations. And there is no doubt that the information published about German air victories, and particularly about the number of aircraft claimed to have been shot down, was exaggerated. It was only on rare occasions that the trajectory of a fighter, hit at an altitude of 6,000 or 8,000 metres, could be followed by the eye until the aircraft hit the ground. Many of the aircraft that were considered to have been definitely destroyed were able to make emergency landings or reach an airfield in spite of being hit at a high altitude. Finally, the great majority of British pilots whose aircraft had been put out of action were able to land by parachute and take up the fight again the next day in another aircraft. German estimates of British reserves were very far from correct. In the days when Goering levelled a series of accusations regarding the conduct of operations and against the commanders of units, I personally noticed several instances of gross misunderstanding. According to Goering, the British fighter force should have been practically wiped out by this time.

The facts told a different story. It is indisputable that Germany had air superiority at this time. But the British fighter pilots fought tenaciously and with indomitable courage. This was a factor that would certainly have to be taken into account in future operations.

During this period of fighter battles over England, heavy attacks were made by bombers and dive-bombers against shipping in the Thames and the English Channel. These targets were carefully protected by fighter screens staggered in altitude. When the British radar network picked up approaching German aircraft, a general alert was given and several squadrons of fighters were sent up to intercept and engage the hostile formations. Violent air battles ensued in which both sides suffered heavy losses. Nevertheless, the British could not prevent attacks on convoys.

As was to be expected, it soon became evident that the Ju. 87s (Stukas) were extraordinarily slow; when loaded their speed did not exceed 250 km. p.h. The approach altitudes varied between 3,500 and 5,000 metres and were very low. In consequence, it was extremely difficult to protect formations of Ju. 87s from attacks and to avoid the heavy losses British fighters inflicted on them. The chances of scoring hits diminished with each new sortie owing to the difficult conditions under which attacks had to be made and to the effective evasive action which the ships were able to take. While the German command did its utmost, within the framework of scheduled operations,

to secure air superiority, at the same time it did not want to miss the favourable opportunity that presented itself for attacking British merchant shipping in the zone of operations of German fighters (south-east coast of England), where attacks could be carried out by escorted Stukas (see Figure 6).

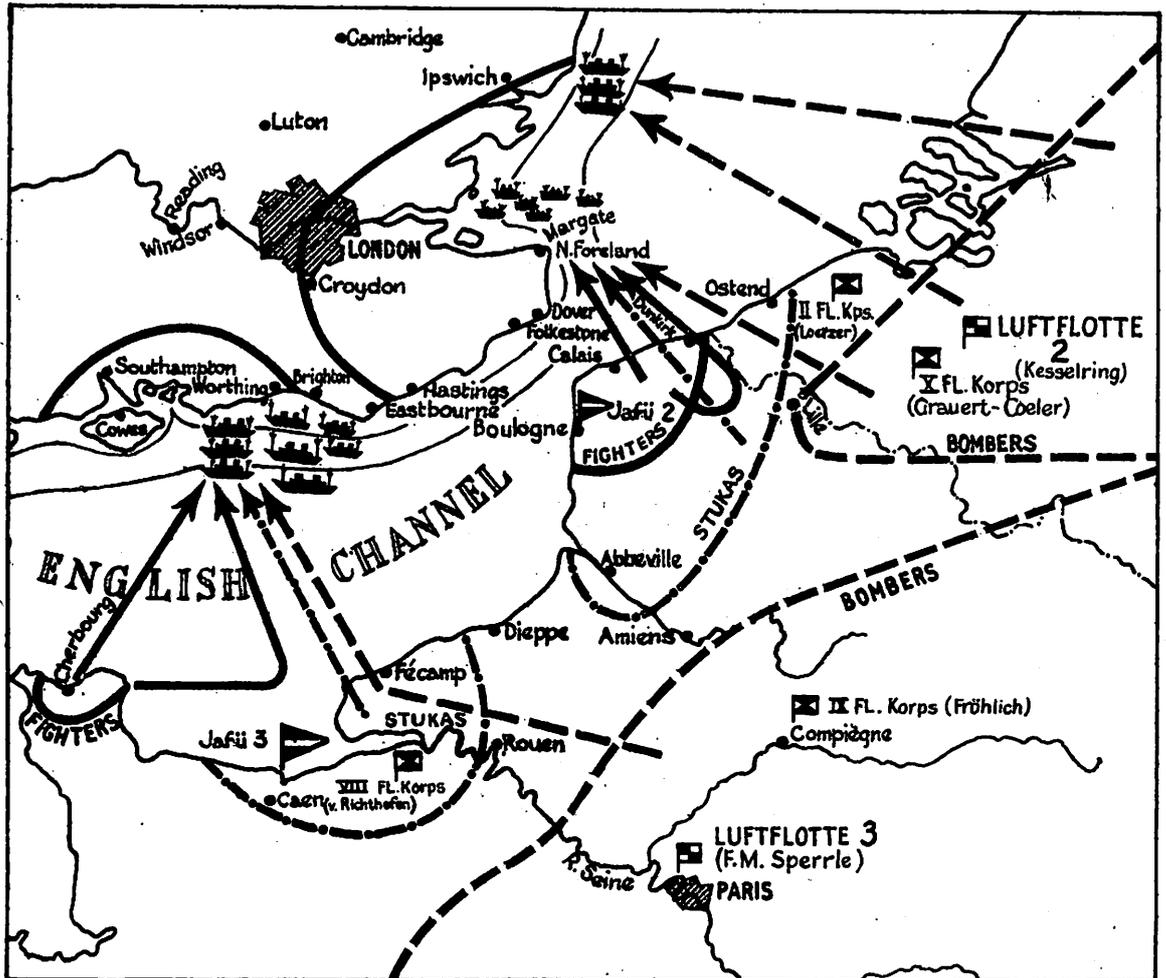


FIGURE 6

IV - THE THIRD PHASE

Fighter airfields in England were attacked by escorted bombers. Thus the task of destroying the British fighter force on the ground, or of reducing its effectiveness, was carried out as far as possible; the results obtained were very poor, for when the attacks were made, practically all available British aircraft were in the air, engaged in defensive operations. Of course, it sometimes happened that in the course of attacks carried out in successive waves over a period of several consecutive hours, the odd squadron refuelling on an airfield was damaged. But even in such cases, the damage caused was relatively insignificant, the number of bombs dropped being too small and their calibre in-appropriate. Generally speaking, damage caused to the ground organisation was superficial. Better results would have been obtained if more small calibre fragmentation bombs had been used but the bombers were not equipped with suitable release apparatus.

The British withdrew their fighter squadrons beyond London and used airfields close to the coast only for staging or emergency landings. Moreover, they had so many airfields that they had good chances of eluding attacks.

This phase of the Battle of Britain showed how limited was the distance fighters could penetrate into England due to their short operational radius. Once again the disadvantage of not having drop fuel tanks fitted to Messerschmitt fighters became apparent; had they been so equipped their endurance would have been increased to 30 to 40 minutes.

During this period of the air war over England it was already possible to detect the powerful influence that tactical considerations connected with ground warfare were exerting on the plan of operations. Few of the offensive missions undertaken within the framework of this plan appeared to conform in any way to the principles of air warfare as such. Apart from attacks against merchant shipping and ports, nothing specific was done. First this was tried, then that, then something else, but always on a small scale, with a niggardly use of the means available and against a very small part of the British Isles.

Up to this time the Battle of Britain was nothing more than a succession of small engagements. Plans for future large-scale operations were closely related to projects involving ground forces. Using tactics that were altered continually, the Germans initiated a course of action designed to undermine and eventually bring about the collapse of the British defences.

If air power was to be used exclusively against Britain, then it would have been better to concentrate on the enemy's weakest and most vulnerable points. These were, without doubt, his supply routes from overseas. Outstanding successes against them could have been scored in these initial stages, for the range of British fighters was not great enough to enable them effectively to protect merchant shipping. It is almost certain that if all the forces of the Luftwaffe had been concentrated to operate in conjunction with U-boats and warships, a decisive blow could have been delivered to British supply lines.

When units of Me. 110 twin-engined long-range fighters were first formed, it was intended to use them to escort bombers. The Me. 110 was unable to give a good account of itself in combat with British fighters, and it was for this reason that the enemy singled it out for attack. When they were attacked the Me. 110s were obliged to make a series of tight turns. (1) Though no one was willing to admit it, this was essentially a defensive measure. The twin-engined fighters had to rely on Me. 109's coming to their assistance or else escape as best they could; in consequence they suffered very heavy losses. As a result, from this time onwards, when twin-engined fighters were used to escort bombers they were accompanied by single-engined fighters. From their first operational flights in them, pilots realised

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(1) "Abwehrkreis" - tight turns in which all the aircraft turn on a common radius, one behind the other, each being protected by the guns of the following aircraft. The same manoeuvre as the American "Luftberry".

that in spite of the greater and more concentrated fire power of the Me. 110's offensive and defensive weapons, they were incapable of achieving any spectacular results. Moreover, to enable them to act as direct fighter escort to bombers, they themselves had to be provided with a fighter escort. This increased the number of aircraft taking part in missions and made them more difficult to accomplish. In spite of this they were still used operationally. This was presumably in the hope that it would be possible to entrust them with the task of escorting bomber formations on missions further afield and outside the range of single-engined fighters, when air superiority was more firmly in German hands.

An innovation was introduced into command organisation. Fighter squadrons, hitherto directly subordinated to air divisions or Fliegerkorps were now unified under a proper fighter command, known as "Jafü" (Jagdfliegerführer). Each Luftflotte had a fighter command that could be subordinated temporarily to Fliegerkorps.

Battle headquarters of fighter commanders were placed on the same basis. Conferences were held between these commanders and the commanders of fighter squadrons before and after every mission. All the experiences gained were analysed immediately and thus new ideas were evolved for methods of attack.

Insofar as it can be said to have functioned at all, the system of escorting bombers yielded poor results. There were neither special tactical rules nor uniformity of plan; each fighter squadron carried out its missions as it thought best. Hence the quality of performance attained in these missions varied considerably. Some squadrons executed their missions in an extremely satisfactory manner, others failed miserably. It was not until late in the period of air battles that tactics were standardized.

Missions were of the following kinds:

- a) direct escort;
- b) indirect or deployed escort;
- c) free-lance patrols (freie Jagd);
- d) supplementary escorts to pick up and cover returning formations ("fighter reception"); the protection of the air-sea rescue service.

In missions of type (a), patrols of two aircraft gave direct cover to the bomber formation from all sides, weaving among and around it because their speed was greater than that of the bombers. The task of these patrols was to defend the bombers against enemy fighter attacks. This type of mission was purely defensive and was not in keeping with the aggressive role of the Luftwaffe. Bomber crews attached extraordinary importance to direct escort.

Missions coming under the heading (b) were carried out by squadrons flying at a greater altitude than those engaged on direct escort missions. Indirect escort formations flew in the general direction from which enemy attacks were expected to come. Their mission was to attack formations of enemy fighters approaching the bombers being escorted before the former took the initiative. The German fighters had, therefore, to maintain visual contact with the bombers they were protecting and not become separated from them. Generally speaking, indirect fighter escorts could engage in only one combat, and then they had to re-form and reassume their original position in order to continue the specific escort mission. In the majority of cases, when a unit carrying out an indirect escort mission attacked an enemy formation from above under favourable conditions, the British fighters were beaten off and the bombers effectively protected. Of course, the enemy formation could take up a new position and renew the attack, but the object of the indirect escort mission - to neutralize imminent attacks - was accomplished in principle.

The third type of mission (c) consisted of free-lance fighter patrols in the area through which the following bomber and escort forces would fly, and over the objective itself. The purpose of these patrols was to cover the flanks of the bomber formations. They were carried out by fighters in wing or squadron strength flying out of visual contact with the bombers. Their task was to penetrate as far as the objective and to establish contact with the enemy before the bombers arrived.

Fighter pilots preferred this type of mission and from their point of view it was the most profitable one. It afforded the bombers that followed the greatest freedom of action. On their return flights these free-lance patrols usually acted as rearguards.

The description of the final type of mission (d) is self-explanatory. It was carried out in Staffel or Gruppe strength from a given point at a pre-determined time and altitude. Missions of this type were made necessary because the effectiveness of both direct and indirect escort missions diminished after a certain time and they tended to disperse, either as a result of air combats or because fighters escorted individual bombers that had been damaged and had lost formation; hence the fighters could no longer cover the remainder of the bomber formation against fresh British attacks. Generally speaking, the supplementary escort missions commenced over the English coast and thus tended to prevent British fighters pursuing the returning German formations.

Protected by these supplementary escort forces and by a specially devised form of direct escort, concurrent operations were carried out by seaplanes with the object of rescuing the crews of aircraft that had been shot down in the Channel. At first the seaplanes found these operations very tricky, but once the service was working properly it gave excellent results. On several occasions German and British pilots were picked up in the Thames estuary.

Thanks to these supplementary fighter escorts, British pursuit planes were unable to operate beyond mid-Channel.

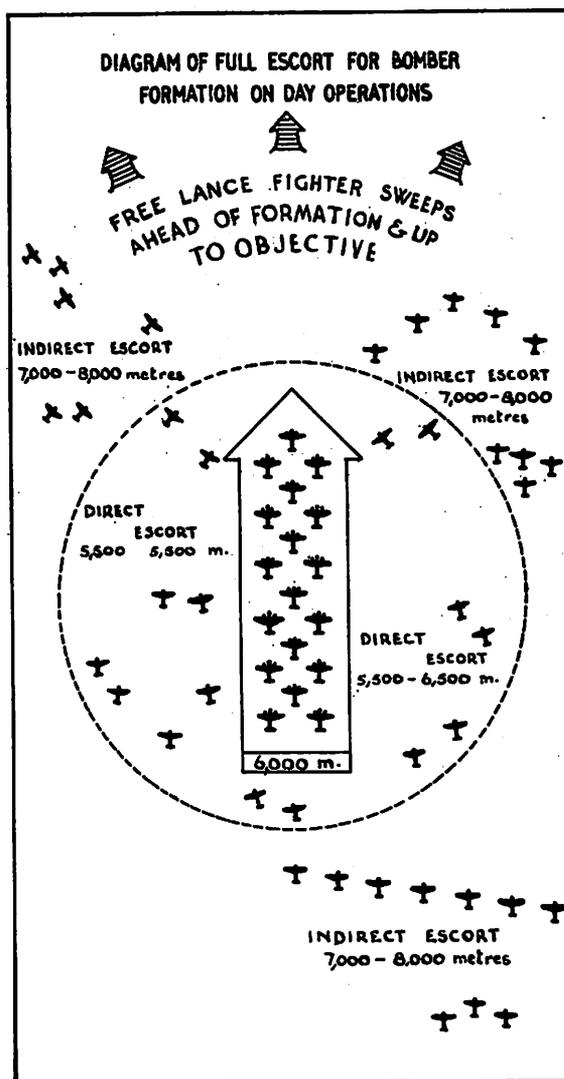
Incidentally, it was necessary to withdraw the escort formations at this stage of the missions; in almost every case this coincided with the time when they had reached the limit of their range and they had to leave the bomber formations to try to regain the French coast.

As far as possible, units were always assigned the same type of mission. The most difficult mission was direct escort. In order to avoid British anti-aircraft fire, which was generally effective, bomber units flew higher than their service ceiling and were thus slower than they should have been. The escorting fighters were unable to reduce their speed until it corresponded with that of the bombers and at the same time retain their manoeuvrability.

With great courage and skill, British fighter pilots often pierced the German fighter screens and shot down individual bombers. In order to provide the formations with some measure of protection against such attacks, the direct escort forces had to be split up into patrols of two aircraft each in order to cover the bombers from attacks from all directions. Insofar as it was technically feasible, bomber formations or their leading aircraft maintained uninterrupted R/T contact with the escorting fighters. The direct and indirect fighter escorts were supposed to be in R/T contact with one another.

In order to ensure the close co-operation necessary for the accomplishment of direct and indirect escort missions, as far as possible they were always assigned to the same fighter squadrons. Similarly, as far as it was possible, bomber formations always had the same fighter squadrons to escort them. Whenever it could be arranged, the commanders of the bomber formations and of their fighter escorts conferred before and after each attack. However, owing to the large number of missions to be accomplished, the little time that was available, and the great distances separating the various units concerned these conferences were often held by telephone.

It was only rarely that the commanders of bomber units agreed unanimously on the manner in which a mission was to be carried out. It was difficult to make them understand that it was better for the German fighters to stay out of sight and thus make the enemy attack before they saw the German fighters than to remain "glued" to the formation they were escorting and thus allow the enemy to take the initiative. The defensive fire power of the bombers was practically negligible. It did not comprise more than two or three swivel-mounted MGs of short range. To enable crews with little training to take part in the missions, bomber formations flew line astern in waves staggered in altitude. (See Fig. 7) In addition, the formations stretched over a considerable distance and this made the task of the escorting fighters more difficult.



(After the war it was interesting to talk with pilots of American fighters and bombers and to note that during the mass daylight attacks of 1943 - 1944 they had had to cope with the same problems as had faced the Luftwaffe in 1940. The same arguments and the same needs on the part of bombers conflicted with the contrary arguments and needs on the part of fighters.)

The rendezvous between bombers and fighters took place in the zone of the fighter airfields, over an easily recognised point of the coast, at a time and an altitude previously determined. On several occasions the bombers were late in arriving at the rendezvous. This meant that the fighters escorted a bomber formation other than that to which they had been assigned. Thus one bomber force had a duplicate fighter escort, while another had to carry out its mission without an escort, or else return to base. In most cases,

radio contact between fighters and bombers was not technically possible owing to the dissimilarity of the equipment carried by the two types of aircraft. When such contact was possible it did not give satisfactory results. It must be admitted that the Germans used primitive methods of navigation and communication in their operations. For this reason breakdowns frequently occurred whenever any modification, however slight, was introduced. As regards navigation, missions carried out in good weather presented no difficulty. On the other hand, no radio or radar equipment was yet available that would have enabled contact to be maintained between fighters and bombers, facilitated navigation and made it possible for bombers to home on to targets and to bomb through cloud cover.

Before the Battle of Britain reached the critical phase, Reichsmarschall Goering himself radically changed the personnel of the operational staff of the fighter force. He was not satisfied with the successes that his fighters had achieved so far, and thought that by appointing younger men to commanding positions he would increase the fighting spirit and the striking power of the German fighter force. Up to that time many of the Gruppen were commanded by officers who had been pilots in World War I. The most senior commanders of fighter Gruppen had already been relieved of their posts during or since the campaign in the West, and their places had been filled by young pilots who had been successful in operations. With one or two exceptions, the physical condition of the older unit commanders was not equal to the strain of modern aerial warfare. On the other hand, it also happened that certain young officers, accredited with several air victories, rose rapidly and were given posts of great responsibility at too early an age; it was only natural that several of them made mistakes.

It was necessary to revert to the oldest military traditions. The final developments in the war in the air showed that it was necessary for a commander to lead his unit into battle. His subordinates had no real respect for him if he demanded more from them in the course of operations than they knew he himself could accomplish. Hence it was logical and tacitly understood that Gruppe and Staffel commanders flew at the head of their units in all missions.

The fighter force was the first branch of the Luftwaffe to be rejuvenated. In most cases the commander of a Geschwader, a Gruppe or a Staffel was also the most skilful pilot of the unit and the one with the greatest number of air victories.

Less than two years after this, Goering made similar changes in the bomber force despite the protests of older pilots: the results were excellent.

## V - THE FOURTH PHASE

Thus the Battle of Britain reached the critical stage. On 7 September mass attacks against London were begun. No important changes could be made in the German plan. The attacking forces varied between 400 and 500 bombers and about 200 Stukas, necessitating an escort of 500 single-engine and 200 twin-engine fighters. The bomb load carried by each bomber varied between 1,000 kg. and 1,500 kg. The attacking force was generally made up of one bomber Geschwader (60 to 90 aircraft) and one fighter Geschwader to provide both direct and indirect escort.

Usually the approach flight was made in such a way that the various bomber units taking part in the raid arrived over the objective with the shortest possible intervals between them. To achieve this they had to fly on almost parallel courses. Luftflotte 3 picked up its escort over Havre and then flew on to its first landfall, roughly North Foreland. All the attacking units were obliged to reach London by the shortest possible route. But the limited flying time and range of the fighters allowed only ten minutes for combat over the target area. It was practically impossible for wide detours to be made on the return flights in order to avoid the British fighter barrier.

The first targets to be attacked were port installations and fuel docks and dumps on the Thames; then various sectors of the city clearly defined by squares on the map were bombed. The anti-aircraft barrage round London was very heavy. It particularly hindered the approach flight of bombers and caused considerable losses. Moreover, the balloon barrages around London and other built-up areas made it impossible to carry out low-level attacks and reduced the precision of Stuka operations. In contrast, there were no obstacles to high-level attacks made by bombers in horizontal flight - a tactic German bombers had already mastered. Most of the British fighters pounced on German formations shortly before the latter reached their objectives. For this reason the fighters were unable to prevent, except on rare occasions, the infiltration of the bomber forces. The British fighters nevertheless inflicted heavy losses.

The bomber Gruppen were given precise instructions regarding timing, lines of approach, altitudes and target sectors. In order to organise a large assault force from each Luftflotte to enable two-pronged attacks to be carried out, as the Americans frequently did several years later in their mass daylight attacks, it was necessary to spend more time in assembling the bombers and connecting them with their fighter escort. This was very difficult owing to the fighters' limited range.

Not more than ten minutes could be allowed for the process of linking up bomber formations with their fighter escort. Figure 8 shows diagrammatically how this process was effected. The example used is a mass attack carried out by Luftflotten 2 and 3 against the dock area of London during this phase of the air war.

During these first large-scale attacks, Stuka squadrons were also used. They suffered such heavy losses, particularly at the hands of British fighters, that the High Command decided to forbid their use except in attacks against shipping convoys and objectives not far inland. This renunciation of the use of an offensive weapon on which so many hopes had been placed was a severe blow to the High Command. Goering blamed it on the fighters and declared that the standard of escort and protection was deplorable. But there was not one pilot who did not know that the fault was to be found in the technical shortcomings of the Stuka.

British fighters quickly found the Stuka's weak spot. They preferred to attack them just as they dived, one after another, on to the target and also during the time it took the Stukas to resume formation. The covering German fighters were unable to protect the Stukas during their dives, the speed of the fighter in a dive being much greater than that of the dive-bomber, which was fitted with special air brakes. Hence the fighters were

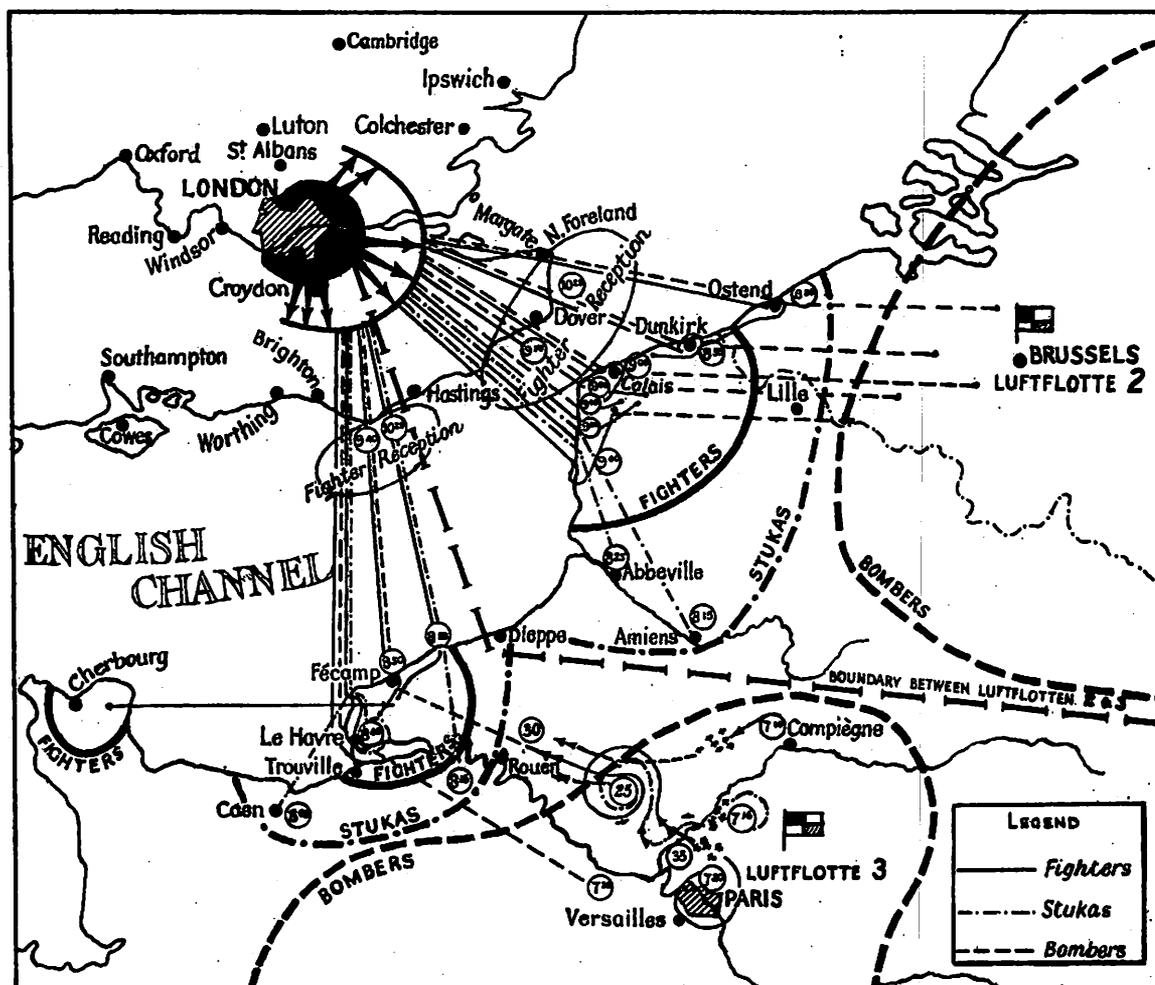


FIGURE 8

obliged to abandon their protective mission shortly before the beginning of the dive, and the great majority of them had to wait for the Stukas at the altitude at which they were to resume formation.

Several units of Ju. 88's continued to carry out dive attacks, but after a short time they, like all the others, began dropping their bombs while in level flight at a high altitude. Immediately afterwards they set course for their bases, gradually losing height in order to increase their speed. They were obliged to return by the most direct route, otherwise the situation became difficult, the escorting fighters would run out of fuel and have to abandon them; if the fighters remained, they risked being forced down in the Channel.

In the course of a mission to London starting from the Pas de Calais, a bomber formation with its fighter escort flew above the clouds and finally began its return flight somewhere in the region of the Isle of Wight. After more than two hours' flying, seven of the escorting fighters had to come down in the sea and five others ran out of petrol and made emergency landings on the French coast. Fighters were tied to the navigation of bombers with the disadvantage consequent upon the disparity between their ranges.

Experience showed that a fighter pilot who got into difficulties over the Channel had more chance of surviving if he ditched his aircraft than if he came down by parachute. The interval of 40 to 60 seconds before the aircraft sinks allows the safety belt and parachute harness to be released. The working of the air-sea rescue service has already been explained, but it is worth mentioning that thanks to the initiative of General Udet, a number of rescue buoys were anchored in the Channel in the hope that pilots who got

into difficulties would manage to swim to one of them. Inside the buoys there were, among other things, first aid kits, food, stimulants and a radio transmitter. The idea of this means of rescue was good, but not a single instance of one of the buoys being used by a pilot was reported. The British removed or destroyed all the buoys they found. In addition, many of them broke loose from their moorings owing to strong currents or tides.

The rescue equipment of German flying personnel operating over sea areas comprised:

- a pneumatic or cork life belt;
- a dinghy (single-seater for fighters, multi-place for bombers);
- a container filled with a dyeing agent, which, when emptied in the sea, created a patch of brilliant yellow on the surface of the water;
- a special pistol for firing distress signals;
- an emergency compass and other small objects.

The daylight attacks against London continued until 20 October 1940. At first only the dock areas were attacked, but later residential areas were also bombed. High explosive bombs of 50, 250, 500 and 1,000 kgs., and incendiary bombs were employed in these attacks.

The total weight of bombs dropped during one attack by all squadrons taking part may have reached the figure of 500 (metric) tons - which was very little compared with the weight of bombs dropped in raids on Germany. It must be emphasised that the tactics employed in the German attacks on Britain did not permit a concentration of the bombs on the target. Several "carpets" of bombs were dropped on the target area, but their blast effect was inadequate and the necessary saturation was not produced. In a sense, the fact that the city is so vast was a great advantage to Londoners. Parks and open spaces swallowed up a great number of bombs.

Under these circumstances twin-engined long-range fighters were not needed for direct escort missions. The High Command decided that some of them should be used by the night fighter organisation. One twin-engined fighter Geschwader was converted into a light bomber unit and employed in the next phase of the Battle of Britain. By sacrificing 50 km. p.h. of its speed, the Me. 110 could carry two bombs of 250 kg. and four of 50 kg., or alternatively, one of 500 kg. and four of 50 kg.

A factor that favoured the British must be mentioned here - one that became increasingly important as time went by: the weather.

In the autumn, what are known as "meteorological conditions of the west" are of vital importance in the Channel area. The Channel is often the limit of two different weather systems. Towards the middle of the autumn of 1940, bad weather frequently hindered the rendezvous between fighters and bombers, if it did not prevent them taking place altogether. Sometimes planned operations had to be abandoned, or targets of secondary importance attacked, either because the rendezvous between fighters and bombers could not take place, or because time had been lost in the process. The effectiveness of operations suffered in consequence and the necessarily exact timetable was upset with the result that losses increased.

But the heavy losses of the Luftwaffe were not due solely to meteorological conditions and to technical deficiencies; it was almost impossible to overcome the latter due to the tremendous speed-up in production. To these factors must be added the ferocious and indomitable resistance of the British air defences, particularly of R.A.F. fighter pilots whose fighting qualities commanded the greatest admiration.

Numerically very inferior at this stage of the struggle, they fought desperately and without respite, and saved their country. The organisation and the direction of the British air defences, represented by Fighter Command, showed great drive and initiative.

The Germans estimated that barely 200 British fighters were still available. Despite heavy losses, it was possible to maintain this figure during succeeding operations. It was a great advantage to the British to be able to concentrate their fighter forces in a ring round London; at this period they were not in a position effectively to protect a number of dispersed objectives simultaneously. But the Luftwaffe appeared to be obsessed by one idea and continued to direct its attacks exclusively against the same centre of British air defence - London.

It is possible that the exhaustion, losses and difficulties of the British defences were not less than those of the attacking German forces when, on 20 October 1940, it was decided to suspend daylight attacks against London, after the offensive had lasted five weeks. Luftwaffe losses were considerable, especially bomber losses. Its war potential was weakened; but it was not exhausted as subsequent operations and later developments in the war showed.

There were numerous reasons for the discontinuance of operations against London, some of them as follows:

The weather, the autumnal instability of which made the projected large-scale daylight operations impossible.

The false evaluation of the successes achieved hitherto, which gave rise to the belief that the air offensive would result in a decisive success. When this success failed to materialize, the German Command was led to suppose that it had been wrongly informed about the strength of the R.A.F.

The weakening of the German forces, due mainly to the tenacious resistance of the British air defences. This resistance led to the withdrawal of Stukas and long-range fighters; bombers and twin-engined fighters were lost faster than they could be replaced.

The technical limitations of German aircraft; for instance, the inadequate range of fighters; the poor performances of dive-bomber units equipped with Ju. 87's and of the Me. 110 twin-engined long-range fighters, compared with the performance of British fighters; the inadequate bomb-carrying capacity of He. 111's and Ju. 87's; the ineffectiveness of the defensive armament of bombers; the poor results obtained by bombers; the slender chances of hitting target, &c.

The modification of strategic plans for the later conduct of the war by the shift of interest to the Mediterranean, due to the advance of the Italians in the direction of Egypt, and towards the East, due to growing political tension with Russia.

However, there can be no doubt that the Luftwaffe could have continued the daylight offensive in spite of unfavourable weather conditions; similarly, the German Command could have given orders for the offensive to be continued, and felt quite safe in doing so, if it had known promptly in the course of operations, the true extent of the exhaustion of the British air defences.

The situation of the German Air Force was as follows:

Bombers: between 30 and 35% of the forces engaged had been lost in combat. Crews were overworked.

Fighters: Strength reduced by between 20 to 25%. Pilots needed to recuperate from physical and nervous strain.

Stukas: Withdrawn for rest after sustaining heavy losses.

Twin-engined  
Fighters:

Having sustained heavy losses, being converted into night fighters (with the exception of one Gruppe being converted into a light day bomber unit), or being rested.

It must be admitted that the German Air Force lost a quarter of its effective strength in personnel in the three months of its all-out offensive against Britain.

Meanwhile, the Germans were going ahead with invasion preparations. However, it is probable that by this time the Supreme Commander, i.e. Hitler, had already abandoned the original project and was developing other plans. But an imminent invasion was still the basic undertaking of the struggle against Britain.

The way for this was being prepared by daylight bomber and fighter-bomber operations and, from that time onward, also by night bomber operations.

During a short pause in the offensive, one Staffel of each Gruppe, or one Gruppe of each Geschwader (1) were reformed into a fighter-bomber unit that comprised a third of the total fighter strength. The technical modifications involved in this conversion consisted of fitting an electrical system into the aircraft in conjunction with bomb-release apparatus on the lower part of the fuselage. The aircraft industry made a special effort and produced these supplementary accessories in a few weeks. Teams of mechanics were specially formed to carry out the conversions quickly. There was no time to train pilots in the methods of dropping bombs. The majority of pilots dropped their first bomb while flying their newly converted fighter-bombers over London or some other target in Britain. There was also an assault group of Me. 109's, the aircraft of which were converted into fighter-bombers after the campaign in the west. For their part, bomber units began their night attacks after a brief period of preparation. This will be discussed later.

The fighter-bomber force comprised some 250 aircraft. The Me. 109 carried one bomb of 250 kg. and the Me. 110, as mentioned above, a bomb load of 700 kg. Thus only about 50 tons of bombs could be dropped on targets in Britain in one day.

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(1) There were seven of them.

VI - THE FIFTH PHASE

It was with these forces then, that the last phase of daylight operations against Britain was launched.

It must be realised that as fighter-bombers carried such a small bomb load, this phase was not really a continuation of the daylight air offensive - it was no more than a feeble pretence of continuing it. However, the German Command considered that the attacks were worth-while against London and other targets in Britain. But apart from their nuisance value, they achieved very little of any military value.

It was evident that German fighter pilots had no liking for missions of this type. It is disconcerting for a fighter pilot to have to fight without being able to take the initiative himself. The morale of the fighter pilots was affected; they had to carry bombs, release them at a great altitude on an enormous target without being able to observe the effect, and they had to adopt a passive attitude towards enemy fighters. This gave them a sense of inferiority. It must be added that speed, manoeuvrability and rate of climb were reduced when fighters carried bombs. It is only natural that these factors made it difficult for fighter pilots to preserve the aggressive attitude that should characterize them.

The German High Command made a scathing protest against the ineffectiveness of these operations. The Commander-in-Chief declared with profound bitterness that the fighter arm had failed in its task of escorting bombers; he objected to the manner in which fighter-bomber operations were carried out and added this to the fighters' previous shortcomings. The young commanders of German fighter units, who were convinced that they had fulfilled their tasks during the air battles of the preceding weeks, and who had accepted severe losses without complaint and without knowing whither the air war was leading, had once again to listen to grave charges being made against them.

For the first time discussions at Unit Commanders' conferences became heated, and there were signs of criticism of those in authority. The Unit Commanders were deeply offended by the tone and by the manifest exaggeration of the accusations. Moreover, the way the newspapers and radio handled news of the air war bore no relation to the severity of the struggle that was taking place nor to the grim facts that operational commanders were faced with almost every day.

Fighter-bomber attacks were carried out in such a way that one Gruppe provided the escort to its own bomb-carrying aircraft. At first, the fighter-bomber units flew in close formation, but the British very soon discovered that the aircraft in these formations it was best to attack were those carrying bombs, which could be identified easily. It was for this reason that fighter-bombers subsequently flew in smaller formations, making up a total strength of a Gruppe. The approach to the target was made at about 6,000 metres, the component formations of the Gruppe being staggered steeply in altitude. The bombs were released over the target area - London, for example - at the limit of the outward flight. The fighter-bombers had to defend themselves as best they could while the escorting fighters fought with British fighters. British fighters now fought with greater skill and the average number of victories and losses was the same for both sides.

Attacks against airfields and other small objectives were carried out in this way. The damage caused was seldom important.

The bomber fleet prepared for night operations in a surprisingly short time. The vital factor was the excellence of the ground organisation, and especially the quality of the airfields that the Germans constructed and developed in the occupied countries of France, Belgium and Holland. German bomber crews were adequately trained for night and blind flying operations (navigation under these conditions was part of their normal peace-time training) and the conversion of aircraft for night operations was rapid. Before taking part in operations, the young crews that were to form

replacements made a series of flights to accustom them to the conditions they were likely to encounter. Aircraft had to be ready for use by day or night, hence a new and more efficient cowling for concealing exhaust flames had to be perfected.

## VII - THE FINAL PHASE

Night attacks were started during the last week of October 1940. Like fighter-bomber operations, night attacks were an innovation in air warfare.

Meteorological conditions were not always favourable. It sometimes happened that a few Gruppen were unable to take off from their bases owing to bad weather. Bombers made the approach flight and carried out the attack individually.

Each unit was specially briefed about its mission. Among other things, it was told when it was to arrive over the target area and when it was to make its attack. As regards tactics, a clear distinction was made between the nuisance raid, which consisted of sending aircraft to the target throughout the night, with the object of disrupting civil life and of scattering the essential services of the country in order to undermine civilian morale, and the mass attack carried out in the shortest possible time with all available aircraft in order to increase the intensity of the blow.

The altitude of approach and attack varied between 3,000 and 6,000 metres. Navigation was effected by means of airborne range-finding instruments in conjunction with radio beacons on the French coast, and also by means of a radio navigational beam directed on to the target (Knickebein). These navigational aids supplemented the basic data worked out mathematically: course, time, air speed and drift. Light beacons on the coast and navigation by sight facilitated operations on clear nights. Several times, however, it was impossible to identify targets owing to bad weather. In such cases bomb-aiming was effected by radar-assisted navigation or by calculation. It was impossible to reach large targets - London, for example - in this way. Sometimes cleverly placed dummy installations and decoy fires were attacked. The first mass attack of almost 400 bombers of Luftflotte 3 against Liverpool was almost completely diverted by a dummy installation erected south of the city.

Location of targets by means of airborne radar equipment was unknown at this stage. The development of bomb sights for night operations had unfortunately been neglected. In general, mass attacks were made on moonlit nights when there was no cloud cover.

Under these conditions aircraft and crews carried out three sorties in one night. Thus it was possible to send 600 to 800 bombers to an objective in one night. The maximum bomb load was about 2,000 kg. per aircraft, i.e., slightly more than was carried in daylight operations (1,500 to 1,800 kg.) The difference was accounted for partly by the fact that the aircraft could fly singly, and partly because bombs could be suspended on the outer part of the aircraft - tactics that would have been dangerous in daylight operations.

After the attacks, notes were compared on the experiences gained and thus new methods and tactics could be deduced and developed. The most successful attacks were those made at the time of the full moon, when navigation and the location of targets could be carried out visually. On the other hand, the results achieved by raids carried out on dark nights under cloudy conditions could not be accurately assessed. However quickly means of lighting up targets may have been devised, the vital technical devices for navigation and radar were still lacking.

Meanwhile, British night fighters were being developed. The feverish efforts in this direction had already been noticed. However, enemy fighters were neither a problem nor a serious obstacle to German offensive night operations. The weak attacks made by the British against German bomber bases were also of no consequence. British anti-aircraft artillery, and particularly the ring round London, was very effective and was much more to be feared than night fighters. On the other hand, when the sky was overcast and an attack was made above a cloud base, the target area could be identified by the flashes of the A/A guns reflected on the clouds.

During the first few weeks of the night offensive, attacks were made against London and its port area, Liverpool, Birmingham, Manchester, Southampton, Kingston-upon-Hull and other towns. During this phase practically all towns situated south of a line Edinburgh - Glasgow were targets for German night attacks. Objectives north of this line were beyond the range of German bombers. The attacks gradually diminished in intensity until they finally ceased in April 1941.

In spite of the lack of proved offensive tactics, in spite of the inadequacy, from a technical standpoint, of the means at the Germans' disposal and in spite of weather conditions that were generally unfavourable during the autumn and winter, the German attacks, though usually on a small scale, certainly produced some successes, especially against London. There is no doubt that they caused severe damage and they must have affected civilian morale. But the damage caused to installations and industries had no lasting effects, except for one or two large-scale raids. One of these exceptions was the raid on Coventry, a relatively small city, during the night of 14/15 November 1940. It succeeded because it was made on a night when weather conditions could not have been better; there was a full moon and visibility over the approach route was excellent, while navigation was facilitated by the large fires caused by the first wave of bombers. Bomber units made three separate sorties during the night, though the number taking part became smaller each time, so that Coventry was attacked by a total of some 800 bombers. The Luftwaffe was never able to mount another attack of this classic type, though the greatest efforts were made to emulate it in raids on other targets.

Coventry became the symbol of German night attacks of this period. German propaganda invented and adopted the verb "koventrieren" - "to Coventrate" - to describe the maximum amount of destruction to be obtained by night attacks.

But these night attacks did not produce decisive successes any more than day operations did, although the losses caused by British air defences (night fighters and anti-aircraft artillery) were on a scale that could easily be supported. The losses caused by bad weather and pilots' errors equalled those caused by enemy action. The lack of success of the night raids was due primarily to the fact that the total weight of bombs that could be dropped on a target was very small, while the methods of navigation and locating targets were still primitive; for these reasons the results achieved were much poorer than had been expected. The number of bombers that could be used in night operations was still determined to a large extent by the time factor. In addition, it was a mistake to have switched so often from one target to another; there was no compelling need for this - neither strong British air defences nor other important considerations.

Nevertheless, the Luftwaffe showed that large-scale night attacks were possible and also demonstrated the way they should be carried out. The necessary auxiliary facilities were lacking, but it was already quite clear what was needed and how these attacks could be launched with good chances of success. The striking power of the Luftwaffe and the level of its technical developments had been sufficient to enable blows of unprecedented power to be struck in support of the Blitzkrieg campaigns on the ground and to help carry them through to a successful conclusion. But the young Luftwaffe did not possess a potential sufficient to mount a large-scale strategic offensive.

While British air defences grew progressively stronger, the German effort grew steadily weaker owing to the losses caused by the enemy, by the weather conditions and by pilots' errors during the day and night offensive against Great Britain. The German forces were further depleted through units being sent to the Mediterranean or withdrawn in preparation for the campaigns against Russia and the Balkans.

Neither the Battle of Britain nor preparations for the invasion of England were ever officially terminated - they were simply tapered off.

There was a serious purpose behind this. Large-scale preparations had to be concealed and at the same time the Luftwaffe had to be refitted, resupplied and brought up to strength. As far as possible, all this had to be carried out without letting the enemy or the German troops themselves know what was happening.

The Geschwader were gradually withdrawn from the front, one at a time, and sent to bases in Germany to undergo a complete technical overhaul and be brought up to strength. Air crews were given 14 to 21 days' leave in turn. After this they were sent into France or to the Channel coast. This tended to create the impression that the air offensive against Britain would be resumed during the summer of 1941. In this connection, Field Marshal Goering convened a large conference in Paris (April 1941) at which he revealed and explained the operational plan of a new offensive against Britain; it was to be more powerful than the previous one and at the right moment would lead to the invasion of the British Isles. No one doubted the truth or seriousness of these revelations.

After the conference, however, Goering gleefully informed a small circle of officers that everything he had said previously was only a manoeuvre, designed to create confusion. He declared that the Fuehrer did not intend to launch another large-scale air offensive against Britain or to carry out an invasion, but that in a very short time the Soviet Union would be attacked in a Blitz campaign the like of which had never before been seen and which would result in the annihilation of Russia. The achievements of the Luftwaffe in this new campaign would cover its flag with fresh glory.

The Russians would be liquidated in three months at the outside, Germany would be freed from all threats to its rear, and afterwards its war potential would be sufficient to mount a new attack against Britain with all the necessary vigour. While the campaign in the east lasted, only two or three Geschwader of bombers and two of fighters were to remain on the Channel coast.

In the autumn of 1941, soon after the beginning of the Russian campaign, when it seemed certain that Soviet resistance would collapse in a short time, Hitler announced the following strategic plans for the future conduct of the war:

- Russian territories to be occupied and kept under control by light armoured units of the Army;
- offensive against Britain, in which air and submarine forces were to play the major part;
- invasion of Britain to precipitate its final collapse. This would result in the dislodgement of the British from the Mediterranean;
- after a brief respite, 50 Army divisions would co-operate with the Luftwaffe and thereafter the emphasis in the air-sea-ground combination would be on the air and submarine forces. Then the real Battle of Britain would begin; compared with it, the campaign of 1940 would appear to have been only a rehearsal.

What actually happened, however, was quite different...

#### CONCLUSION

The new German Air Force was exactly four and a half years old when it was called upon to prove its mettle in the second world war. In that period the most powerful air force in the world at that time had been built up. There is no doubt that only the most prodigious efforts made this possible. Everything had to be built up from nothing: the aircraft industry, the organisation, centres of preparation and training, units, and even synthetic fuel and explosives factories. Simultaneously, and in competition with the Luftwaffe, the Army and Navy were equipped from the limited sources available.

After tremendous efforts in agriculture and industry, Germany was declared to be self-sufforting in so far as food, raw materials and fuels were concerned. Putting aside all political considerations, it must be admitted that German recovery between 1934 and 1939 - and even after this period - was in its way unique.

The reader is left to judge for himself whether the Luftwaffe did or did not attain the potential necessary to fit it out completely. However, it should be noted that the expansion of the Luftwaffe was due primarily to the initiative and drive of Goering. It is estimated that 40% of Germany's total war production was absorbed by the Luftwaffe.

In any case, it was regarded as natural and inevitable that in a future war the role played by air forces would be vital. It was only to be expected that mistakes would be made during the build-up of the Luftwaffe. And there is no doubt that many viewpoints, many technical and strategic conceptions, later proved to be wrong. What could be achieved by the German air arm and by the striking forces at its disposal proved to be greatly exaggerated. In 1940 there was no such thing as a strategic air force of the kind that we were later to see develop to our cost.

The Luftwaffe had to be used in a decisive way in the Battle of Britain as a means of conducting total air war. Its size, technical equipment and the means at its disposal precluded the Luftwaffe from fulfilling this mission. On the other hand, in the absence of the necessary experience, the possibilities, limitations, requirements, methods and forces needed for carrying out strategic air operations were not yet known. Whatever may have been the importance of the tests of German arms in the Spanish Civil War from tactical, technical and operational points of view, they did not provide the experience that was needed nor lead to the formulation of sound strategic concepts.

The Luftwaffe was certainly not created with a view to using it in an offensive war against Great Britain, but when war against that country broke out, in spite of contrary political schemes, all hopes were centred on the Luftwaffe, and especially on the Ju. 88, which was just beginning to be mass-produced.

Above all, it must always be remembered that the role of the Luftwaffe was to try out new technical processes and establish modern operational methods. The following few examples are taken from the period of the war that has been covered in this study:

- modern methods of combat to achieve air superiority;
- total air war based on day bomber operations using fighter escorts;
- the use of fighter-bombers;
- air attacks against warships, merchant vessels, &c.

A mass of practical experience should first have been gained in all these fields. After a close study was made of them, the results could not be applied in practice because the pace of the war was already too fast.

Post-war publications give the impression that after the Battle of Britain the Germans did nothing but commit errors in tactics, strategy and technical matters. But an objective analysis shows that the western Allies profited by the Germans' initial experience, by avoiding the errors they had committed (almost all of them due to the first gropings in unexplored fields). Thanks to the Allies' much greater war potential, they were able to develop strategic air warfare by means of which they conquered Germany.

Germany was unable to withdraw forces from the East and this hindered the prompt establishment of properly organised centres of German air defence which would have ensured mastery of the air, the classic example of which was the Battle of Britain.