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STUDENT REPORT

A REVIEW OF THE BATTLE OF BRITAIN IN
CONTEXT OF AFM 1-1 PRINCIPLES OF WAR

MAJOR JOSEPH E. HUTFLES ⁸⁴⁻¹³³⁰
"insights into tomorrow"

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REPORT NUMBER 84-1330

TITLE A REVIEW OF THE BATTLE OF BRITAIN
IN CONTEXT OF AFM 1-1 PRINCIPLES OF WAR

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Submitted to the faculty in partial fulfillment of
requirements for graduation.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 84-1330	2. GOVT ACCESSION NO. AD-A145315	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A REVIEW OF THE BATTLE OF BRITAIN IN CONTEXT OF AFM 1-1 PRINCIPLES OF WAR	5. TYPE OF REPORT & PERIOD COVERED	
	6. PERFORMING ORG. REPORT NUMBER	
7. AUTHOR(s) Joseph E. Hutfles, Major, USAF, [REDACTED]	8. CONTRACT OR GRANT NUMBER(s)	
9. PERFORMING ORGANIZATION NAME AND ADDRESS ACSC/EDCC MAXWELL AFB AL 36112	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS	
11. CONTROLLING OFFICE NAME AND ADDRESS ACSC/EDCC MAXWELL AFB AL 36112	12. REPORT DATE APRIL 84	
	13. NUMBER OF PAGES	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) UNCLASSIFIED	
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report) STATEMENT "A" Approved for public release; Distribution is unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) ↓ The		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Project provides a historical analysis of the Battle of Britain in context of the AFM 1-1 Principles of War. Section I contains a review of battle combatants, phases, equipment and outcomes of key engagements. Section II analyzes applications and violations of Principles of War by the Germans and British. Section III consists of discussion questions and rationale as an aid for leading a guided discussion.		

PREFACE

In retrospect, the Battle of Britain looms as one of the decisive battles of World War II. The thwarting of the Luftwaife air campaign was significant for two reasons; it was the first check that Hitler had received in his quest for European domination, and it assured the use of England as a staging base for the future operations against the German Homeland.

The purpose of this paper is twofold: First, it has served as a learning tool for the author; second, it is intended to be a vehicle for the reader to better understand the character of the Battle of Britain and the application and violation of AFM 1-1 Principles of War. However, due to the limited scope of this paper, only the most significant features of the air battles were examined. Unfortunately, many people, agencies, and events had to be excluded or covered in limited detail. Hopefully the reader will be enticed to further explore this fascinating and critical phase of the history of World War II.



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Section I

INTRODUCTION

Forty-four years ago one of the most significant air battles of World War II was fought in the skies over Great Britain. The final outcome would later prove to have a profound effect on the history of the free world. The Battle of Britain provides a unique opportunity to examine the application of air power in its purest form as the navies and armies of the combatants were immobilized on either side of the channel. Fought exclusively in the air, separated by the twenty-plus miles of the English Channel, it is unlikely we will ever witness a similar major battle.

The purpose of this research paper is to review, analyze, and compare German and British application and violation of the principles of war (outlined in Air Force Manual [AFM] 1-1) during the Battle of Britain. This examination consists of three sections: Section I describes the battle to include background, combatants, dates, location, and general outcomes of engagements; Section II analyzes the application or violation of the principles of war by each side; Section III consists of a series of discussion questions formulated to provide a vehicle for use in a guided discussion. Implicit in the author's purpose is the hope the reader will comprehend the meaning and use of the principles of war in context of the Battle of Britain. While the principles of war are not generally regarded as absolutes of successful employment of war, they do serve a useful function in

understanding and appreciating the factors of battle that result in victory or defeat.

BACKGROUND

What General Weygand called the Battle of France is over. I expect that the Battle of Britain is about to begin...the whole fury and might of the enemy must very soon be turned on us. Hitler knows that he will have to break us in this island or lose the war. If we can stand up to him, all Europe may be free and the life of the world may move forward into broad sunlit uplands. But if we fail then the whole world, including the United States, including all that we have known and cared for, will sink into the abyss of a new Dark Age made more sinister, and perhaps more protracted, by the light of perverted science. Let us therefore embrace ourselves to our duties, and so bear ourselves that, if the British Empire and its Commonwealth last for a thousand years, men will still say, this was their finest hour (13:151).

The inspired call of Prime Minister Winston Churchill aptly summarized the challenge facing England. In June of 1940, Hitler ruled a vast proportion of Europe after easy victories in Poland, Denmark, Norway, and Belgium. On May 24, 1940, just as the German army was about to encircle the British Expeditionary Force (BEF) in north France, Hitler called for a halt to the ground troops. The reason for this decision, hotly debated over the years, suggests several possibilities. One, Hitler was saving this final battle for the Luftwaffe whose job would be to close the port of Dunkirk. Two, Hitler intended to allow the 250,000 strong BEF to escape--inflicting a humiliating British defeat that would provide them an opportunity to negotiate an honorable peace. Third, Hitler was concerned about a counterattack and halted in order to consolidate the territory captured, secure the flanks, and provide needed relief to over-extended men and machinery. Hitler's actual reason for halting the army's advance

and relying instead on the Luftwaffe probably encompasses all three possibilities (6:116).

Given the go ahead by Hitler, Goering's Luftwaffe began operations against Dunkirk, but were severely hampered by lack of advanced secure airfields, poor weather, and stiff resistance by British Royal Air Force (RAF) fighters operating out of southeast England (6:118). During the nine-day evacuation from Dunkirk, the British through sheer tenacity, valiantly labored night and day to rescue approximately 338,000 British and French soldiers (13:119).

PREPARATION FOR INVASION

The conclusion of the war in France caught the Germans unprepared for the task of invading Britain. Hitler considered four options: One, a submarine blockade of incoming supplies of fuel, food, and material; Two, destroy by night bombing sources of material and production; Three, destroy the British RAF Fighter Command and gain air supremacy over the English Channel and southern England in preparation for an invasion; Four, convince the British through rational appeal that their situation was hopeless and they should recognize German hegemony on the continent.

Hitler initially chose the latter hoping the British would come to their senses. Germany's army and navy staffs had little enthusiasm for any invasion plans as they had neither the trained amphibious troops nor the right equipment--theirs was a continental war (10:50). However, General Hermann Goering, Chief of the Luftwaffe, was biting impatiently at the bit for a chance

at the British. Goering personally delivered his plan for invasion to Hitler in Belgium on the 6th of June, 1940. "Mein Fuhrer," he said, "here is the blueprint for victory!" Hitler listened to the plan calling for an immediate combined air, sea, and amphibious operation before the British had time to recover from Dunkirk. Hitler, while not disagreeing with the logic of the plan, vetoed it because he still believed it would not be necessary. "Do nothing," he told Goering (11:20). The days passed and no British feelers surfaced, so Hitler, on 16 July 1940, issued Directive No. 16 calling for the planning of the invasion.

Since England, despite her hopeless military situation shows no sign of willingness to come to terms, I have decided to prepare, and if necessary to carry out, a landing operation against her. The aim of this operation is to eliminate the English motherland as a base for carrying on the war against Germany and if necessary, to occupy the country completely (11:20).

Although many of the military planners had serious doubts about the probability of success, "Operation Sealion" was commissioned and programmed to begin on 15 Sept 1940. The primary objective being to secure the beachhead, move inland cutting off London, and forcing surrender of the population. This ambitious plan was to be carried out with limited airborne troops, concentrating instead on ferrying three waves of assault troops. The first wave alone called for the landing of 260,000 men, 30,000 vehicles, and 60,000 horses in converted barges, tugs, and motorboats (11:24).

Because of the expected resistance from the RAF, Hitler agreed that Goering's Luftwaffe would have to first neutralize the RAF and gain absolute air superiority over England (8:24). Thus the fighters and bombers of the Luftwaffe could roam at will and be the pseudo-artillery that the Germans were accustomed to in their land campaigns. If the Luftwaffe were not able to wrestle control of the skies over England, then the possibility of an invasion would be negated.

LOCATION OF COMBATANT FORCES

To achieve his objective of neutralizing the RAF Fighter Command, Goering had at his disposal three air fleets. Luftflotten 2 commanded by Feldmarschall Albert Kesselring in Holland and Belgium, Luftflotten 3 under Feldmarschall Hugo Sperrle in northern France, and Luftflotten 5 under General Hans-Juergen Stumpff in Norway and Sweden (15:22). (See Map 1)

Together Goering's resources numbered to some 3500 aircraft of which approximately 2500 were serviceable; including 1215 bombers (JU88s, DO17s, and HE-111s), 280 dive-bombers (JU87s), 755 single-engine fighters (ME-109s), 225 heavy fighters (ME-110s), and 70 reconnaissance aircraft ranging over 53 airfields facing Britain (14:162/3).

Sir Hugh Dowding, Air Chief Marshall of the RAF Fighter Command, was faced with the task of defending England from the numerically superior Germans. Fighter Command was divided into four groups, each responsible for the defense of a large part of Britain. Each group was further divided into sectors, containing a sector airfield and two or three satellite airfields dispersed near the coast. Group No. 11 commanded by Air Marshall Keith Park, covered the whole south of England. Group No. 12 under

Air Marshall Trafford Leigh-Mallary, extended across the midlands to the east coast. Group No. 13 under Air Vice-Marshal Richard Saul defended the north and Scotland. Group 10 commanded by Air Vice-Marshal Sir Christopher Quintin Brand was added later in the battle when it became obvious the territorial responsibilities of the important No. 11 group were too expansive (14:161). Dowding's RAF was able to muster forty-six squadrons of Hurricanes (450) and Spitfires (250) and two squadrons of Defiants by early July of 1940. Four additional squadrons were in the process of being trained and outfitted (15:22). (See Map 2)

PHASES OF BATTLE OF BRITAIN

The Battle of Britain is divided by most historians into five distinct phases:

- Phase I - 10 July to 12 Aug
(Attacks on the Channel convoys and ports)
- Phase II - 13 Aug to 23 Aug
(Offensive against coastal airfields and radar stations)
- Phase III - 24 Aug to 6 Sept
(Assaults on inland airfields and sector stations)
- Phase IV - 7 Sept to 30 Sept
(Attack on London)
- Phase V - 1 Oct to 31 Oct
(Fighter-bomber raids at night against London and secondary targets) (15:23).

These phases are based on the types and locations of targets and usually coincide with changes in strategy, objectives, and intensities.

PHASE I = 10 JULY TO 12 AUG 1940

Scattered night raids over England in June were designed to intimidate the population and test the defenses of the British while contributing to the Luftwaffe's operational checkout of procedures and crews. The raids were limited in scope, avoiding heavily defended areas, usually at night, with minimum losses or damage on either side. Goering's objective during Phase I was to overwhelm Britain's fighter defenses by concentrating heavy attacks on coastal shipping, harbors, airfields, radar sites, and aircraft factories. The German objective was to lure the RAF into battle and force Dowding to consume his resources. Initially, Dowding accepted the challenge, but the RAF quickly surmised the hidden intentions of the Luftwaffe and avoided contact leaving the shipping lanes unprotected (17:499).

German assaults on England from the 10th of July to the early weeks of August consisted of sporadic raids by small bomber forces, usually targeting shipping lanes and ports to keep the pressure on the Channel area. On 7 August German radar spotted a convoy at night transiting the Channel. On 8 August, they responded with an attack by escorted bombers, coming in waves of up to 80 aircraft at a time. The dive-bombers sank nearly 70,000 tons of shipping at a cost of 31 aircraft. The RAF lost 19 fighters (9:98). By 8 August, 18 merchant ships and 8 Royal Navy destroyers had been destroyed. Bad weather slowed flying until the 11th of August when the Luftwaffe struck hard at Portland, Dover, and ship convoys. Thirty-two RAF aircraft were shot down versus 38 of the Luftwaffe (15:269-270).

With good weather predicted for the 12th and 13th of August, the operations staffs of Luftflotten 2 and 3 in France were ordered to prepare for a major air offensive (code-named Eagle Day) to be initiated on the 13th of August. In preparation for the air offensive, August 12th was to be devoted to raids on British fighter airfields and radar stations, in addition to maintaining assaults on shipping and harbors. The air theater had now moved over the island and was the most intensive of this phase (15:271). The 12 August attacks were divided into six waves with feints beginning over Dover at 0730. Heavily escorted German bombers attacked targets simultaneously, attempting to stretch the reserves of the RAF beyond their limit. The forward airfields at Manston, Hawkinge, and Lympne, all on the Coast of the Straits of Dover, were badly damaged. Six radar stations were attacked with five suffering little damage. But the sixth station, Ventnor on the Isle of Wight, was put out of action with delayed action bombs (6:138). The night of 12 August, German aircraft attacked aircraft factories with eleven high explosive bombs hitting the Nuffield factory at Castle Bromwich (Spitfire factory) (6:138).

Dowding was under intensive pressure now to move some of his squadrons nearer the south coast. However, his tactics were aimed at conserving forces for the future. Dowding started the phase with about 585 single engine fighters and 1200 pilots, but by 3 August he had 708 fighters and 1434 pilots. He was thus able to increase his aircrew and aircraft forces by 15% while downing 180 Luftwaffe planes and losing only 70 of his own. We

should also note that the Luftwaffe, in actuality, employed no more than 10% of available aircraft in the west during this phase (18:138).

PHASE II = 13 AUG TO 23 AUG 1940

The grand offensive to destroy the RAF fighter command was fixed for 13 August, Eagle Day. The good weather predicted for Eagle Day did not materialize and the thick layers of clouds lying over the southeast of England forced Goering to postpone the main attack until the afternoon. Several formations already airborne did not get the recall message and proceeded to their targets unescorted. Six aircraft were shot down with minimal damage done to the British. Heavily escorted JUBB formations raided Portland, Southampton, and assorted airfields with mixed success. Even though over 1485 Luftwaffe sorties were launched, the Germans had managed to seriously damage only two of the forward airfields at a cost of 45 of their aircraft. The RAF lost only 13 aircraft (10:52). In this opening offensive, much of the Luftwaffe's efforts were wasted attacking airfields that were not those of Fighter Command. Neither did the Germans destroy the British radar sites (9:99). The German bombers returned that night going for the Spitfire factory at Castle Bromwich, but only four of eleven HE111s found their targets. Damage was not sufficient to disrupt production (15:141).

Sorties on the 14th of August were slashed to one-third of the previous day due to clouds. With clear weather predicted for the 15th, the Luftwaffe exerted its greatest effort of the campaign, throwing in every available fighter and major portions

of the dive-bombers and bomber forces. Over 1800 aircraft, including Luftflotten 5 based in Scandinavia, took part in Goering's effort to destroy RAF bases in the Southeast and installations in the middle of England. The first attacks were against airfields at Hawkinge and Lympne with the latter put out of action for two days (9:100). In the north the Luftwaffe was badly mauled. A hundred bombers accompanied by thirty-five ME-110s attempted to attack airfields near Newcastle and Yorkshire, but met with little success. The ME-110s proved of little protective value and RAF fighters and effective anti-aircraft guns shot down 15 of the bombers with no loss of their own. A second attack in the north by 50 unescorted bombers managed to get through the intercepting fighters of No. 13 Group and caused extensive damage at Driffield airfield. The formation did lose 10 of its bombers on the exit route. The RAF suffered no losses. The 15 August assault was the only time Luftflotten 5 was ever directed into action during the Battle of Britain (10:58).

In the south, the Luftwaffe fared much better over the outnumbered RAF. Heavily escorted raids timed to confuse the RAF radar operators were launched by Luftflotten 2 and 3. Although the RAF was scattered widely trying to engage the massive attacks, lack of coordination by Luftflotten 2 and 3 degraded the overall impact of the operation and allowed the RAF to hold its own (6:141). August 15th was nicknamed "Black Thursday" by the Luftwaffe because never again in the Battle of Britain would they suffer such high losses in one day. Of the seventy-five aircraft downed, approximately fifty were over targets irrelevant to the operations of Fighter Command (6:141). The Luftwaffe had

launched approximately 1800 sorties (520 bombers), but had not eliminated England's southern aerial defense, which was its major goal, and only temporarily damaged a few of the airfields. Although the RAF had lost 39 aircraft, they were still flying at the end of the day from the southern airfields (10:58).

On 16 August, Goering sent 1715 sorties over England confident that the end of the RAF was near. His overconfidence is reflected by his suspension of attacks on radar stations. Goering contended there weren't enough RAF fighters left to benefit from their services. He preferred targeting more sorties against the bases to hasten the collapse of England's aerial defense (10:58). Most of the raids against airfields were fairly effective with some successes against aircraft caught on the ground. However, of eight airfields bombed, only three housed fighter squadrons. The Luftwaffe lost forty-five aircraft and the RAF had 22 fighters downed (15:286). The first American volunteer to die in the Battle of Britain, Pilot Officer W. M. L. Fiske, was killed at Tangmere (12:172). After two heavy days of flying on the 15th and 16th, the Luftwaffe fielded few sorties on the 17th in spite of good weather.

The Luftwaffe's all-out effort to destroy Fighter Command in one week ended with a flourish on the 18th. The main objectives were once again airfields with effective attacks by JU88s hedge-hopping under the radar screen against airfields at Kenley and Biggin Hill (9:101). Second and third major attacks hit airfields at Manston, Craydon, Gasport, Thorney Island, and Ford. Damage was extensive with numerous instances of destruction of

hangars, aircraft, and equipment. The hedge-hopping raid under the radar screen was extremely effective, but the German staff incorrectly assessed the value based on high loss rates and thereafter stuck to high altitude formations. On the 18th, the RAF, in 766 sorties, together with anti-aircraft guns, accounted for 71 aircraft (37 bombers), themselves losing 27 fighters and 10 pilots (15:290). The 18th of August also spelled the end for the JU87 STUKA dive bomber. Slow and extremely vulnerable, their disastrously high loss rate forced their withdrawal from combat (13:175).

From August 15th to 18th, the Luftwaffe had lost 194 aircraft, showing conclusively that the RAF was still very deadly. In response, Goering called another conference of his chief executives on the 19th to reiterate the main objective of destruction of the RAF fighter force and placate the bomber commanders who had lost 167 bombers in two weeks. Goering placed much of the blame for bomber losses on the Luftwaffe's ME-109 pilots. Actually, they had accounted for the majority of the RAF's fighter losses and had lost only 54 machines themselves. However, Goering attributed the high loss rate to a lack of aggression and ordered the fighters to guard the bombers even closer. The ME-109s were even directed to escort the less capable and vulnerable ME-110; fighters escorting fighters (7:181). Goering's directive was what Dowding hoped for as it denied the ME-109s the ability to "free-chase" which up until then had been their most effective weapon (2:60). Tied to the bombers, the fighters were disadvantaged by the slower airspeeds (energy levels) and lower altitudes. Tying the fighters to the bombers

enabled the British to choose their moment of attack and to break off combat at will. The last five days of the phase reflected little activity partly due to deteriorating weather. A majority of the raids during this period were small formations attacking south England airfields and heavy reconnaissance sorties.

Recapping Phase 2, in 6414 day sorties, the RAF lost 114 fighters, the Germans 301 aircraft (about 3-1 for RAF). However, many of the vital British airfields and their communication systems had taken heavy punishment (7:499). While Dowding had sufficient airframes to sustain the effort, he was pressed by the shortage of fighter pilots. Within a week after Eagle Day (13 August), Dowding had lost nearly 80% of his squadron commanders (dead, wounded or withdrawn from battle). Between 8 August and 18 August, 154 pilots had been lost, while the number of new pilots trained was only 63 (1:176). Many of the men now leading had limited combat experience (7:183). A limited number of light bomber pilots, army cooperation pilots and some training inputs were used to bridge the gap (17:499).

PHASE III = 24 AUG TO 6 SEPT

The third phase of the Battle of Britain is considered by many historians as the most "critical" of the five phases. Goering on the 20th of August issued a directive setting the tone and pace for this phase:

To continue the fight against the enemy air force until further notice, with the aim of weakening the British fighter forces. The enemy is to be forced to use his fighters by means of ceaseless attacks. In addition, the

aircraft industry and the ground organization of the air force are to be attacked by means of individual aircraft by night and day, if weather conditions do not permit the use of complete formations (15:300).

Following Goering's directives, the Luftwaffe pulled out all the stops attacking inland airfields protecting London, aircraft factories, and any available defensive target. In this phase, the RAF flew 10,673 day and night sorties and lost 286 fighters while the Luftwaffe generated 13,724 sorties suffering a loss of 378 aircraft (17:500). There was only one day (27 August) where there were fewer than 600 German sorties. The average German sortie rate was 1000 a day--with 2 days (30-31 August) of more than 1600 per day. However, bomber sortie rates of only 250-400 per day pointed out the need to change to heavily escorted raids, which effectively neutralized 50% of available bomber strength. Without sufficient ME-109s, the bomber formations were considerably smaller and that made it more difficult for the RAF to penetrate the fighter defenses to get at the core of the bombers (1:177).

The 24th of August kicked off this phase with 1,030 day sorties over southern England, with the concentration on No. 11 Group and its inner airfields. Previous reconnaissance during the 19-23 August lull led the Germans to believe that the main RAF fighter forces were concentrated around London. By penetrating these inner airfields, the Germans were attempting to reach vital sector stations which controlled RAF fighters and in this way be sure of luring the largest possible number of British fighters to battle (13:178). Manston airfield, damaged by two

attacks, had to be abandoned, while Hornchurch and North Weald suffered heavy damage. For the day, the RAF lost 23 aircraft to the Luftwaffe's thirty-five (6:144).

On the night of the 24th of July, ten German bombers lost their way enroute to targets at Rochester and inadvertently dropped their bombs into the center of London. That mistake led to an immediate raid the following night by some eighty British bombers on Berlin, with additional follow-up raids in the ensuing days. The outraged Hitler ordered reprisal raids on London after his threats were ignored.

Luftwaffe activity from the 25th to the 31st of August was directed at airfields in southeast England. On 31 August, Luftflotten 2 launched a heavy attack (1450 daylight sorties) against five vital sector airfields. Four separate heavily escorted bomber formations blasted Biggin Hill, Hornchurch, Debden, Croydon, and Eastchurch. By nightfall, Fighter Command had lost 39 planes plus 10 Spitfires on the ground. Six out of seven of Park's No. 11 Group airfields were badly damaged. Since the start of this phase more than 25% of Dowding's pilots had been killed or wounded. Desperate for reinforcements, Dowding agreed in the last week of August to use 200 foreign pilots; Poles, Czechs, and Canadians (2:67). As a result of raids on the first five days of September, Biggin Hill was usable by only one of its three squadrons and joined Kenby, Manston, Eastchurch, Lympne, and Hawkinge as airfields that were rendered incapable of functioning adequately (6:145).

The loss rate of the RAF was such that Dowding considered moving his fighter line back out of the range of the ME-109s. From 24 August to 6 September, the Luftwaffe came close to meeting the objective of destroying RAF Fighter Command. Fighter Command lost 273 fighters in combat, with a further forty-nine damaged, whereas the Germans lost 308 aircraft and had sixty-six damaged. From 30 August to 6 September, the Germans actually suffered fewer combat losses than the British. In fighter combat, the Germans, despite operating over enemy territory, enjoyed a marked edge. The ME-109s destroyed 208 Spitfires and Hurricanes, damaging thirty-one, while losing only 146 ME-109s, with twenty-seven damaged (6:146). The RAF was losing 19.5 fighters on the average day, which was prohibitively high and if continued, would prove to be fatal. In fact, losses were exceeding production. Factories turned out 91 Hurricanes and Spitfires the last week of August, while 137 had been completely destroyed and 11 others severely damaged during this same period. Dowding estimated that similar loss rates would deplete his reserves in three weeks, assuming he did not lose any fighter-producing factories (6:146). The dangerous loss of aircraft, combat pilots, and available airfields was now having a serious impact on the Fighter Command's fighting efficiency.

The Germans were also experiencing problems from the extensive offensive campaign. Since the Luftwaffe did not rotate aircrews, crew fatigue was considerable, especially for the fighter pilots who were forced to fly multiple sorties escorting bomber formations (6:146). By 6 September, Luftflotten 2 and 3

had attrited to 1158 bombers, 232 ME-110s, and 787 ME-109s. The past month had cost them roughly one-seventh of their bombers, but only one-eighth of their ME-109s. However, the factory output of ME-109s (190) was about one-half the production rate of the British fighters (6:148).

PHASE IV = 7 SEPT TO 30 SEPT

In the previous phase 295 British fighters had been destroyed and 171 badly damaged compared to a total output of 269 new and repaired Spitfires and Hurricanes (15:332). However, the German timetable for invasion was not going according to schedule due to the stiff resistance of the RAF. Intelligence assessments were unable to determine the actual state of readiness and sustainability of the RAF, or the condition of its airfields (6:330). When Goering met with his commanders on 3 September to discuss the progress of the war, a consensus of opinion focused on attacking the heart of the British Empire; London. Attacks on sector stations enroute to London would clear the way and surely lure the remainder of the Fighter Command to the air and their ultimate demise (6:332). Because of the Berlin reprisal raids, Hitler gave the Luftwaffe his blessings "for the start of the reprisal raids against London." Goering still hoped that the RAF fighter arm might be exhausted and a turn of fortune would pave the way for the much delayed invasion.

On the afternoon of the 7th of September, the Luftwaffe shifted objectives and began to bomb London for the next fifty-seven days. An air armada of 948 aircraft of Luftflotten 2 (300 bomber bombers escorted by 648 fighters) struck out for London

while Goering and Kesselring watched from the cliffs at Cap Blanc Nez. The path was clear to London as most of No. 11 Group's fighters were concentrated north of London expecting an attack on inner sector stations (9:104). The bombers attacked the densely populated area of docks in East London causing considerable damage and starting large fires. Guided by the dock fires illuminating the sky, a force of 225 bombers returned that night attacking the same area. For the day, over 450 people were killed and 1000 injured. RAF losses were 38 planes downed and 20 pilots killed or wounded, while the Germans lost 29 planes (2:69). The Germans had dropped 300 tons of high explosives and 13,000 incendiaries (13:35). Goering, believing the RAF was nearly depleted, ordered an extension of the area of London to be bombed. Kesselring launched his second daylight raid against London on the 9th of September, but Park's No. 11 Group assisted by NOs. 10 and 12 Groups were in position and ready. Interceptions successfully broke up most of the formations before they reached London with few bombs hitting their targets. The RAF destroyed 28 aircraft losing only 19 of theirs. Hitler, impressed by the stiff resistance of the RAF, delayed his decision to invade (2:69). On 15 September, Kesselring launched every available bomber and fighter into two huge assaults. British intelligence was aware of the planned assault and Park had 11 fighter squadrons in the air with 10 more awaiting his call. The RAF broke through the fighter escorts and shot down over sixty aircraft, which compared favorably with the RAF loss of twenty-six fighters. Although some of the bombers got through to London, damage was limited compared to the high bomber losses

and plummeting Luftwaffe morale. Goering still clung to his belief that the British Fighter force could be finished off in four to five more days. On the 17th, Hitler agreed with the naval staff who contended that the RAF was far from finished. Anticipating turbulent weather ahead, Hitler again postponed the invasion "until further notice." The following day he ordered that no more shipping be assembled in the Channel ports, and directed disposal of the transports and barges (9:107). The air offensive designed to gain air superiority as a prerequisite for invasion had stalled.

However, Goering persisted and continued with his daylight raids, but the results were disappointing. Buoyed by successful raids on the 25th and 26th, Goering raided London with fifty-five JU88s from Luftflotten 2 and sent thirty HE-111s from Luftflotten 3 to attack Bristol. However, the day was a disaster, with the Luftwaffe losing fifty-two aircraft to the RAF's twenty-eight (6:15). On the 30th, the last major daylight raid over England, the Luftwaffe flew 173 bomber and 1000 fighter sorties. London and the Westland aircraft factory at Yeovil were the main targets, at a total cost to the Luftwaffe of forty-three aircraft lost, whereas the RAF lost only sixteen fighters (6:158).

PHASE U = 1 OCT TO 31 OCT

Because of disappointing results in the second half of September and heavy bomber losses, Goering began using modified ME-109s (JABOs) as fighter-bombers with occasional use of JU88s. During this period, the German daylight tactics achieved little except to be a nuisance to the RAF. The JABOs, carrying up to

500 lbs of bombs, flew at 25,000-32,000 feet, out of the range of the Hurricanes, and putting the Spitfires at a disadvantage against escorting ME-109s. These formations flew in virtual immunity, but due to the small bomb load and lack of accuracy from high altitudes, little significant damage was done (6:159). As October wore on it became only too clear to all German commanders that the strength and reserve of the RAF's fighters and pilots were increasing. On 12 October, Hitler postponed "Operation Sealion" until the spring of 1941 (13:190). While the bombing continued through November at decreased levels, the Battle of Britain was essentially over. In the course of the Battle of Britain, the Germans lost 1733 aircraft and the RAF lost 915 fighters (9:108). Four hundred and six British crewmen were killed and 295 wounded, while the Luftwaffe lost 1449 men with 530 wounded. Combat over the English interior and Channel cost the Germans an additional 1914 missing in action/prisoners of war. Britain, its people, and the RAF had survived. Hitler, checked for the first time, turned his attention to Russia.

Section II

PRINCIPLES OF WAR

In this section, the eleven "Principles of War" as defined in Air Force Manual (AFM) 1-1, will be reviewed and examined in context of the Battle of Britain. The definitions will be extracted directly from AFM 1-1. Examples and rationale of positive or negative applications during the Battle of Britain will follow each principle.

There exists a small number of fundamental principles of war, which may not be deviated from without danger, and the application of which, on the contrary, has been in all times crowned with glory.

Jomini: *Precis de L'Art de la Guerre*, 1838

All the principles of war are interrelated and interacting elements of warfare. The principles are not a "checklist" from which a commander can pick or choose one or more principles to ensure absolute victory. Rather, the principles of war or "lessons of battle" provide tools we use to logically approach a better understanding of warfare. "These principles form the basic foundation for planning, directing and controlling action of forces. Their proper use enhances the opportunity for success" (20:54).

OBJECTIVE

The most basic principle for success in any military operation is a clear and concise statement of a realistic objective. The objective defines what the military action intends to accomplish and normally describes the nature and scope of an operation....The ultimate military objective of war is to neutralize or destroy the enemy's armed forces and his will to fight....War is a means to achieving a political

objective and must never be considered apart from the political end. Consequently, political imperatives shape and define military objectives. It follows that the objective of each military operation must contribute to the overall political objective.

Success in achieving objectives depends greatly on the knowledge, strategy, and leadership of the commander. The commander must ensure that assigned forces are properly used to attain the objective. This requires that objectives be disseminated and fully understood throughout all appropriate levels of command. Clear and concise statement of objective greatly enhance the ability of subordinates to understand guidance and take appropriate actions...(20:2-4).

German

German violation of the principle of objective was likely the key mistake that resulted in their defeat in the Battle of Britain. After the fall of France in June of 1940, Hitler's political objective (which legitimizes the military strategy) was capitulation of the British. Hitler was so certain of England's acceptance of his terms that he did not order any preparations for the invasion until at least six weeks after the Dunkirk evacuation. Britain's audacious refusal to surrender knee-jerked Hitler into irrationally ordering an invasion that neither the Army, Navy, nor Luftwaffe was capable of executing. Germany had three basic objectives: First, blockade the British Isles by attacking ports and shipping, and mining of sea lanes and harbors; Second, achievement of air supremacy as a preliminary to the invasion, Operation Sealion; Third, annihilation of England by total air warfare (8:12). Goering's Luftwaffe failed to achieve the necessary air superiority because of their failure to properly focus on the immediate objective--destruction of the RAF Fighter Command, airfields and fighter production facilities. The targets selected by Goering and his staff were often indirect

targets that had little to do with Fighter Command and contributed nothing to the objective. Hitler's decision to change objectives in September from RAF destruction to retaliation bombing of London permitted the exhausted and taxed RAF time to recover and rebuild. Sir Winston Churchill was to comment after the war:

If the enemy had persisted in heavy attacks against sectors and damaged their operations rooms or telephone communications, the whole intricate organization of Fighter Command might have broken down. It was, therefore, with a sense of relief that Fighter Command felt the German attack turn on to London on September 7th, and concluded that the enemy had changed his plan. Goering should certainly have persevered against the airfields....By departing from the classic principles of war...he made a foolish mistake (6:154).

British

Survival of Britain was the key objective; it was a total war commitment understood and supported from the young to the old. Dowding and Lord Beaverbrook focused their efforts on building up the maximum number of fighter aircraft, anti-aircraft guns, and ammunition stocks at the expense of more offensive-oriented equipment. British application of the principle of objective was effective and realistic. Churchill's famous words to the British left no doubts:

We shall not flag or fail. We shall go on to the end...We shall fight on the seas and oceans, we shall fight...in the air...we shall fight on the beaches, we shall fight on the landing grounds, we shall fight on the fields, and in the streets, we shall fight in the hills; we shall never surrender (1:31).

OFFENSIVE

Unless offensive action is initiated, military victory is seldom possible. The principle of offensive is to act rather than react. The offensive enables commanders to select priorities of attack, as well as the time, place, and weaponry necessary to achieve objectives. Aerospace forces possess a capability to seize the offensive and can be employed rapidly and directly against enemy targets. Aerospace forces have the power to penetrate to the heart of an enemy's strength without first defeating defending forces in detail. Therefore, to take full advantage of the capabilities of aerospace power, it is imperative that air commanders seize the offensive at the very outset of hostilities (20:2-4).

The principle of offensive is to act rather than react (20:4). Thus the selection by the commander of the time and place for offensive action can be decisive in the success of a battle.

German

One of the tenets of the principle of offensive dictates the use of forces at the outset of hostilities. After Hitler had defeated the English and French in France in May of 1940, the German offensive effort ground to a halt. Rather than press the offensive against the disorganized English, Hitler waited patiently for over six weeks for the British to agree to his peace proposals. This ill-advised delay in his offensive drive permitted the British to regroup and build up production of anti-aircraft guns, fighters, etc.

Examination of the battle reveals many instances of the Germans initiating offensive actions in response to objectives only to fail to sustain the effort sufficiently or with proper focus. For example, when the Germans began the offensive on Eagle Day (Adlertag), 13 August 1940, the assault initially misfired and sputtered due to poor execution and coordination

between Goering and the Luftwaffe commanders. When the offensive was finally wearing down Fighter Command, Goering changed objectives, thereby diluting the gains previously established.

The German offensive was further stymied by two other factors: inadequate planning and unsuitable equipment. First, the German Supreme Command was simply not prepared to invade England. "Operation Sealion was contemplated but never planned" (7:30). The Luftwaffe also came to the Battle of Britain poorly equipped for any invasion attempt. The Germans did not possess any dedicated landing craft, assault trained troops or adequate strategic bombing aircraft (aircraft will be further discussed in the logistics section).

British

The British did not apply the principle of offensive in the classical context. Focusing on surviving to fight again, the RAF adopted a reactive or defensive-offensive posture. While the Luftwaffe dictated the time and place of battle, the RAF selectively chose to engage the attackers when it contributed to their objective. The defensive strategy of the British was necessitated by the initial numerical superiority of the Germans, both in bombers and fighters. If the British had initially engaged the Luftwaffe in a large offensive campaign, they would have risked losing the war, simply due to prohibitive attrition rates. Only by selectively choosing to engage when they had superiority or at least parity, could the British expect to survive and eventually build up to an offensive capability.

MASS AND ECONOMY OF FORCE

Success in achieving objectives with aerospace power requires a proper balance between the principles of mass and economy of force. Concentrated firepower can overwhelm enemy defenses and secure an objective at the right time and place. Because of their characteristics and capabilities, aerospace forces possess the ability to concentrate enormous decisive striking power upon selected targets when and where it is needed most. The impact of these attacks can break the enemy's defenses, disrupt his plan of attack, destroy the cohesion of his forces, produce the psychological shock that may thwart a critical enemy thrust, or create an opportunity for friendly forces to seize the offensive. Concurrently, using economy of force permits a commander to execute attacks with appropriate mass at the critical time and place without wasting resources on difficult objectives...(20:2-5).

Mass conceptually dictates a concentration of numbers and resources over an indefinite area. However, mass must also be integrated or concentrated by focusing the effort on the critical point during a critical period of time (16:27).

German

Although the Germans studied the theories of Clausewitz and Douhet concerning concentration and mass, they failed to equip themselves to carry out or properly apply this principle. Germany entered the Battle of Britain without any long range four-engine bombers or any effective medium bombers capable of striking deep into England. Equally prohibitive was the Luftwaffe's lack of a long-range fighter capable of protecting their extremely vulnerable bombers. During the preliminary phase, the Luftwaffe used small bomber formations to attack a variety of secondary targets. Not until Eagle Day on 13 August did Goering begin to use large formation assaults. On August 15th, the Germans launched a massive attack from all three Luftflottens, coordinated to occur simultaneously, stretching from north to

south. Luftflotten 5 attacking from Scandinavian bases was badly mauled and never participated in any other raids during the Battle of Britain. Luftflotten 2 and 3 did manage to inflict considerable damage. Over 1786 sorties were flown on 15 August of which 500 were bombers, but the Germans lost 75 aircraft to only 34 for the RAF (9:99). It is important to note that more than half of the attacking force were fighters, reflecting the vulnerability of the bombers. Eventually the Luftwaffe ratio of fighters to bombers would climb even higher. On 16 August, 1320 fighters escorted 400 bombers and by 30 August formations of 1600 fighters escorting only 250-300 bombers became the norm (19:46).

The short-legged ME-109 fighter also restricted the bombers to southern England, and eventually the losses suffered forced abandonment of daylight bombing for the less accurate nighttime bombing. The German's proclivity for changing tactics and objectives made it difficult for them to employ economy of force. Attacking secondary targets and strategically useless targets diluted the overall effectiveness of the campaign. Additionally, the Germans frequently failed to accurately assess target damage and failed to recognize the requirement to continue activities to completely achieve their objective. Many attacked airfields, listed as destroyed by the Germans, were in fact operational within hours or days.

British

Committed to conserving his fighter resources while diverting as many German assaults as possible, Lord Dowding, with the help of radar and good communications integration, optimized the utilization of the RAF. Rather than send large formations up

against approaching formations, Dowding used radar to estimate the number of formations and sent defenders against as many as possible to harass them and degrade their effectiveness. While larger formations of fighters would have resulted in more bombers downed in a particular formation, that would have meant some bomber formations would have gotten through to the target area unhampered. After high attrition rates had degraded German capabilities, Dowding began to employ larger formations of up to twenty-two squadrons airborne at one time. Air space became saturated with up to 3000 aircraft airborne over southern England at one time.

SURPRISE

Surprise is the attack of an enemy at a time, place, and manner for which the enemy is neither prepared nor expecting an attack. The principle of surprise is achieved when an enemy is unable to react effectively to an attack. Surprise is achieved through security, deception, audacity, originality, and timely execution. Surprise can decisively shift the balance of power. Surprise gives attacking forces the advantage of seizing the initiative while forcing the enemy to react. When other factors influencing the conduct of war are unfavorable, surprise may be the key element in achieving the objective. The execution of surprise attacks can often reverse the military situation, generate opportunities for air and surface forces to seize the offensive, and disrupt the cohesion and fighting effectiveness of enemy forces (20:2-5).

Clausewitz ranked surprise as one of the most important principles of war. "Surprise of the enemy lies more or less at the foundation of all understanding, for without it, superiority at the decisive point is not conceivable." Clausewitz also believed that in addition to tactical advantages, surprise played a large part in demoralizing the enemy (18:138).

German

Goering's failure to continue attacks against the radar sites after 12 August 1940 made it extremely difficult for the Luftwaffe to use the principle of surprise effectively. However, the Luftwaffe did use surprise to good advantage on several missions. For example, on 16 August, two Junker 88s, flying low to escape radar detection, penetrated to Brize Norton airfield near Oxford (Sector 10). The Luftwaffe's timing was coordinated to assure arrival just as the returning RAF fighters were refueling and rearming. Closely resembling British Blenheim bombers, the JU88s lowered their landing gear and pretended to enter the landing circuit. Instead, the JU88s dropped their bombs on hangars containing fueled-up aircraft. The resulting fires and explosions destroyed forty-six trainers and damaged eleven Hurricane fighters (7:175).

A change in tactics by the Luftwaffe also caught the British by surprise. On 7 September, an assault by 300 bombers and 648 fighters left France escheloned upwards in solid layers between 13,500 and 19,500 ft. Applying a new tactic, the Luftwaffe fighter screen had an advance cadre flying well ahead at a height of 24,000 to 30,000 feet while another group of escorts defended the perimeter of the bomber formation (9:104). The confused RAF was unable to penetrate the fighter screen resulting in the Germans getting through to London (9:105).

British

Because the British were on the defensive, they had few opportunities to use surprise in an offensive mode. However, they did the next best thing by denying the Germans the element

of surprise, particularly through the use of radar and communications interception. The Radio Direction Finding (RDF) equipment gave the British a tremendous advantage by providing the approximate number, type, altitude, and direction of attacking formations. Integrating a crude Identification Friend or Foe (IFF) device, the RAF could wait until the last moment before launching fighters, saving fuel, and avoid diverting resources to diversionary attacks. The IFF was also effectively used to vector RAF fighters to German formations and enhance the RAF's ability to surprise intruders or use the sun as a blinding shield (18:141).

SECURITY

Security protects friendly military operations from enemy activities which could hamper or defeat aerospace forces. Security is taking continuous, positive measures to prevent surprise and preserve freedom of action. Security involves active and passive defensive measures and the denial of useful information to an enemy. To deny an enemy knowledge of friendly capabilities and actions requires a concerted effort in both peace and war. Security protects friendly forces from an effective enemy attack through defensive operations and by masking the location, strength, and intentions of friendly forces (20:2-5).

German

Germany possessed two intelligence agencies, the Abwehr under Admiral Canaris and the Sicherheitsdienst under Heinrich Himmler (15:101). Both had separate services and agents which seldom shared information. The end result was severe antagonism, duplication, and invalid cross-checks conducted by ill-trained officers. The Chief of Intelligence for the Luftwaffe was Major Josef Schmid who inaccurately concluded in June of 1940 that the Spitfire was inferior to both the ME-109 and ME-110. He also

over-estimated the number of RAF fighters by fifty percent; and grossly underestimated the number of anti-aircraft guns (15:110). As the war progressed the inaccuracies of the intelligence network had the Luftwaffe groping in the dark. For example, the Luftwaffe, unaware of the use of British airfields, bombed Eastchurch, Worthy Down, and Upavon in their quest for destruction of Fighter Command. However, these airfields had not regularly based fighters for almost ten years (15:139). The Luftwaffe's intelligence specialists never did comprehend the importance of the sector stations, operation rooms, and Observer Corps posts which were linked by telephone cables and integrated with the radar sites (7:164). Equally amiss was their knowledge of the factories producing Spitfire and Hurricane engines--Rolls-Royce Merlins. There were only two factories producing them, with one being the world famous home of Rolls-Royce at Derby (6:104). The Luftwaffe intelligence experts had the only Spitfire air frame factory listed as a bomber factory (15:105). Instead of attacking these targets prior to Eagle Day, the Luftwaffe chose targets that had little impact on Fighter Command and only served to dilute employed resources. Lack of accurate German intelligence prevented Goering and the Luftwaffe from realistically estimating the health of the RAF Fighter Command. German estimates of RAF losses proved to be five times greater than actual losses (15:120).

British

The British had a greater appreciation for adequate intelligence and devoted more resources and talent to enhance their collection efforts. The British use of the "Enigma" machine reportedly allowed them to break the German coding system. Furnished with the decrypts outlining planned German targets for the massive August 15th raid, Dowding had a definite advantage in preparing his defenses (12:47). The integration of British scientists into the intelligence network, combined with a growing sophistication of message intercepts, gave the British an accurate picture of the German order of battle, scientific advances, and even tactics and operations (12:47). One of the payoffs of this British integration resulted in the discovery of the German's use of a blind and accurate radio bombing system called Knickbein (bent leg). Using scraps of information drawn from crashed German aircraft and interrogation of captured aircrews, the British were able to devise a jamming system to counteract Knickbein. This was one of the first times in history electronic countermeasure (ECM) techniques were used. Additionally, the British employed an effective military and civilian security education program to ensure the people of England realized the importance of communications security. The Ministry of Information published a series of admonitory fliers on what to do during an invasion or paratroop assault and how to secure a downed German airman (14:88). The British were also masters at deception. Mock airfields with wooden aircraft and even fake landing lights were built to decoy German formations;

leading to many pastures being destroyed by unsuspecting Germans. Hardware security included superior armor, and self-sealing fuel tanks for the Hurricanes and Spitfires.

MANEUVER

War is a complex interaction of moves and countermoves. Maneuver is the movement of friendly forces in relation to enemy forces. Commanders seek to maneuver their strengths selectively against an enemy's weakness while avoiding engagements with forces of superior strength. Effective use of maneuver can maintain the initiative, dictate the terms of engagement, retain security, and position forces at the right time and place to execute surprise attacks. Maneuver permits rapid massing of combat power and effective disengagements of forces. While maneuver is essential, it is not without risk. Moving large forces may lead to loss of cohesion and control (20:2-6).

German

Hitler used two Luftflottens in France (#2 and #3) and one in Norway (#5) to force RAF Fighter Command to spread their defenses. Luftflotten No. 5 in Norway was dedicated to ensuring the British maintained a fighter defense in the north, however No. 5 only participated in one major assault during which it received a severe mauling. Hitler used France as a staging base to attack from the fifty-odd airfields simultaneously and from different directions. However, the short-legged fighter escorts (ME-109s) forced the bomber formations to fly directly to their targets instead of zig-zagging or maneuvering to a more advantageous ingress routine (6:132).

Although the Germans used a maneuver tactic of splitting up into separate raids once they had passed the radar screen, the British generally had an excellent Observer Corps to minimize the confusion.

British

As mentioned previously, the British made excellent use of the maneuver principle. Using radar, they chose when and where they would engage and with measured resources to conserve and survive. Although the Luftwaffe used decoys to draw up fighters, the British refused to engage unless they had the advantage. General Kesselring, Commander of Luftflotten 2, remarked,

After costly initial engagements, the English fighters kept out of the way of the superior German forces. By employment of small bomber units to bait the English fighters we managed to bring them up again, until even this chance of a battle became so rare that no decision could be forced...Our difficulty was not to bring down enemy fighters...but to get the enemy to fight (6:129).

The RAF ploy conserved resources in this preliminary phase for what good intelligence had indicated was to be a major assault in August.

The RAF also delayed engaging formations until the accompanying ME109's were low on fuel and then attacked both bombers and fighters on their way out. Because German bombers were limited to southern England where fighter protection could keep bomber loss rates acceptable, the rest of England served as a safe haven for air reserves or a reorganization area. Thus, the Luftwaffe could only impose on Fighter Command an attrition rate its commanders would accept. The Germans were never in a position to attack the RAF over the full length and breadth of its domain (12:46).

TIMING AND TEMPO

Timing and Tempo is the principle of executing military operations at a point in time and at a rate which optimizes the use of friendly forces and which inhibits or denies the effectiveness of enemy forces. The purpose is to dominate the action, to remain unpredictable, and to create uncertainty in the mind of the enemy. Commanders seek to influence the timing and tempo of military actions by seizing the initiative and operating beyond the enemy's ability to react effectively. Controlling the action may require a mix of surprise, security, mass, and maneuver to take advantage of emerging and fleeting opportunities. Consequently, attacks against an enemy must be executed at a time, frequency, and intensity that will do the most to achieve objectives (20:2-6).

German

Effective application of the principle of timing requires the commander to possess and utilize an intelligence structure to identify opportunities and a flexible and responsive command, control, and communications network. The Germans possessed neither resulting in over-inflated RAF loss rates, unrealistic damage assessments, and a dreadful misunderstanding of the capabilities of the British radar network. Goering discontinued radar destruction sorties, let the RAF off the hook by bombing London, wasted sorties on non-military targets, and generally failed to recognize the time or place to gain the momentum. Part of Goering's inability to capture the essence of timing and tempo is directly attributable to his self-imposed removal from the battle scene. Working out of Karin Hall or his plush railroad car, Goering ramrodded the operation on time-delayed, filtered information, seldom taking into account the British decision-time cycle.

British

Because the British were employing a defensive-offensive, their execution was basically reactive. However, radar again allowed the RAF to respond at a "time, frequency, and intensity that would do the most to achieve objectives" (20:2-6). The British correctly avoided the superior Germans initially, conserving resources until the attrition of German forces reduced their dominance. Once the German momentum had been stopped, the RAF seized the opportunity to regain air supremacy over England.

UNITY OF COMMAND

Unity of Command is the principle of vesting appropriate authority and responsibility in a single commander to effect unity of effort in carrying out an assigned task. Unity of command provides for the effective exercise of leadership and power of decision over assigned forces for the purpose of achieving a common objective. Unity of command obtains unity of effort by the coordinated action of all forces toward a common goal. While coordination may be attained by cooperation, it is best achieved by giving a single commander full authority... (20:2-7).

As Chief of the Luftwaffe, Goering had the responsibility and authority for the allocation of resources, assignment of priorities, and direction of activities during the Battle of Britain. Goering selected the targets, directed the tempo, and generally immersed himself in the myriad of operational decisions that should have been delegated to the Luftflotten commanders. Goering had the appropriate authority and responsibility, but his poor leadership skills, technological ignorance, and operational bungling negated a unity of effort towards the objective.

British

Winston Churchill trusted Dowding! Dowding had full responsibility and authority for preparing the RAF for the defense of British skies. Churchill never interfered unless it was to suggest inputs when he felt he could be of assistance. It was a classic case of a united effort of all forces toward a common goal--survival.

SIMPLICITY

To achieve a unity of effort towards a common goal, guidance must be quick, clear, and concise--it must have simplicity. Simplicity promotes understanding, reduces confusion, and permits ease of execution in the intense uncertain environment of combat. Simplicity adds to the cohesion of a force by providing unambiguous guidance that fosters a clear understanding of expected actions. Simplicity is an important ingredient in achieving victory, and it must pervade all levels of a military operation. Extensive and meticulous preparation in peacetime enhances the simplicity of an operation during the confusion and friction of wartime. Command structures, strategies, plans, tactics, and procedures must all be clear, simple, and unencumbered to permit ease of execution...(20:2-7).

German

On the operational level, the German system of Air Fleets was not efficient or conducive to cooperation. Each Air Fleet submitted separate battle plans without any integration of effort or intelligence. Separate meteorology departments often produced contradictory weather forecasts. Separate channels of manpower, fuel, armament, and spares were equally wasteful. An additional violation of the principle was lack of preparation.

Because of the delay in preparation for the invasion, the Luftwaffe was derelict in "closing the loop" on directing and coordinating the complex operations involved in the air campaign against England. Although the preliminary phase started in early

July of 1940, precise instructions did not arrive to the Luftflotten commanders until early August (9:98). No wonder these early day target selections were so spasmodic and unorganized.

British

While British guidance and objectives reflected excellent application of the principle of simplicity, their command and control structure was very vulnerable to disruption. The heart of the British defense system was the complex integration of the radar sites, control and operations room, sector stations, plotting boards, and all the telephone and connecting cable apparatus. Had the Germans recognized the importance and complexities of the system, they likely would have expended considerable resources to knocking the system out. If they had, the British defensive efforts would have been significantly degraded; possibly changing the outcome of the battle.

LOGISTICS

Logistics is the principle of sustaining both man and machine in combat. Logistics is the principle of obtaining, moving, and maintaining warfighting potential. Success in warfare depends on getting sufficient men and machines in the right position at the right time. This requires a simple, secure, and flexible logistics system to be an integral part of an air operation. Regardless of the scope and nature of a military operation, logistics is one principle that must always be given attention. Logistics can limit the extent of an operation or permit the attainment of objectives...Effective logistics also requires a flexible system that can function in all combat environments and that can respond to abrupt and sudden change...(20:2-7).

German

Although the Luftwaffe established on the European continent enjoyed secure logistics lines, they embarked on a difficult offensive campaign with serious deficiencies in numbers and type of equipment. First, the Germans prior to the Battle of Britain pursued an inadequate production program, especially of single-engine fighters such as the ME-109. While technically capable of producing more fighters, the Germans embraced Douhet's bomber philosophy relegating the fighter to a subordinate role. In 1939, 1491 aircraft were produced of which only 449 were fighters (30%). In 1940, of 6618 planes produced, only 1693 (26%) were fighters (8:15). German total aircraft production during the battle never exceeded 460 aircraft a month--with bombers on Goering's order taking priority. Britain gave fighter production priority, turning out 536 fighters alone in July of 1940 (5:273). Aggravating the shortage of fighters was Germany's failure to procure external, jettisonable fuel tanks for the ME-109. Short-legged, the ME-109 had only sufficient range to penetrate to the London area and return to base. The Luftwaffe lost many ME-109s during the battle simply due to their running out of gas over the Channel on their return leg (1:54). Had the Germans used external tanks much earlier, they could have extended the range of the ME-109 another 125-200 miles, thereby facilitating the escort of bombers deeper into England. Further evidence of German equipment problems was their failure to develop a heavy four-engine bomber similar to the B-17 Flying Fortress. Had the Germans continued development of long-range bombers, they could

have carried the war to the north, northwest, and west coasts of England, enhancing its destruction of the RAF and its production factors (8:39). Goering had opted for the twin-engine Junkers 88s, Heinkel 111s and Dornier 17s because "The Fuhrer will ask not how big the bombers are, but how many there are" (15:45). However, the Do17, HE111, and JU88 proved to be too light, slow, and vulnerable; their defensive armament too meager; their range too limited; and their bombload inadequate (3:182).

An equally important shortfall in the German logistic effort was their failure to develop proven radar technology or integrate existing radar equipment with fighter or bomber formations. Part of the blame for these logistic problems can be attributed to Goering, who loathed technicalities of any sort and who was totally unable to understand them (15:58).

British

In examining British efforts concerning logistical efficiency, one must mention two areas: aircraft production and utilization of pilot resources. In May and June 1940, 959 British aircraft (477 fighters) were lost in the fighting over France. The urgency of the situation resulted in the British Air Ministry placing responsibility for research and production into a separate Ministry of Aircraft Production (MAP) under Lord Beaverbrook. Possessing unique drive and determination, Lord Beaverbrook immediately poached personnel and commandeered production assets in an "all out" policy that produced immediate results. Beaverbrook was able to secure an overriding priority for aircraft above all other munitions as well as permission to

use stocks of spares for the construction of new aircraft (13:154). Cutting red tape, extolling great efforts from the factories, and concentrating on surviving for the short-term, Beaverbrook increased front-line fighter strength from 331 at the end of the Dunkirk evacuation to more than 600 a month later (2:51). By mid-summer, the production of fighters had increased two and a half times, and during the whole year Britain produced 4,283 fighters compared with just over 3,000 single and twin-engine fighters produced by Germany (9:92). Contributing to the production increases was the salvage of downed aircraft and recovery of damaged aircraft that were quickly refurbished. Germany, on the other hand, lost both aircraft and crewmembers when downed anywhere west of France to include the Channel.

Unlike Lord Beaverbrook's dramatic rescue of RAF aircraft production facilities, the British rebuild of the decimated fighter pilot forces was slow and precarious. While highly trained, their numbers were seriously short. RAF flying training schools were slow to expand and their shortcomings were instrumental in determining the rules of engagement. Waste had to be kept to a minimum as England would lose a war of attrition. Starting with a strength of 1434 pilots in August of 1940, Dowding was down to 820 by September. He was losing an average of 120 pilots a week while RAF training output was less than 260 per month or a shortfall of 220 per month (9:93). Dowding later recalled, "...the incidence of casualties became so serious that a fresh squadron would become depleted and exhausted before any of the resting and reforming squadrons were ready to take its place" (6:147). The replacement of experienced pilots lost with

newly trained and highly vulnerable pilots exacerbated the situation. Dowding was forced to use some 200 foreign pilots, mostly Polish and Czech, despite the language problems.

COHESION

Cohesion is the principle of establishing and maintaining the warfighting spirit and capability of a force to win. Cohesion is the cement that holds a unit together through the trials of combat and is critical to the fighting effectiveness of a force. Throughout military experience, cohesive forces have generally achieved victory, while disjointed efforts have usually met defeat. Cohesion depends directly on the spirit a leader inspires in his people, the shared experiences of a force in training or combat, and the sustained operational capability of a force. Commanders build cohesion through effective leadership and generating a sense of common identity and shared purpose. Leaders maintain cohesion by communicating objectives clearly, demonstrating genuine concern for the morale and welfare of their people, and employing men and machines according to the dictates of sound military doctrine. Cohesion in a force is produced over time through effective leadership at all levels of command (20:2-8).

German

While the morale of the men would fluctuate in relationship to the outcomes, stresses, and cumulative impacts of continuous combat rigors, the skill, bravery, and tenacity displayed by the Luftwaffe was clearly outstanding. The effective leadership of Galland, Kesselring, Sperrle, etc., inspired incredible displays of warfighting spirit. Unfortunately, the petty and vindictive Goering insidiously affected the morale of the fighter arm by treating them as the stepchildren of the Luftwaffe. He drained many of their best pilots to make up losses in bomber units. Goering continually criticized the fighter commanders for lack of aggression and blamed them for the Luftwaffe's failures. More accurately, the failures were the result of his lack of foresight

and mistakes in planning. Unlike the British, Goering would not allow rest days or the rotation of front lines. Many fighter pilots were daily flying two to five dangerous sorties; weeks-on-end (9:93). By September of 1940, the stress and strain of continuous flying and heavy losses manifested itself in a decline in morale of both bomber and fighter crewmembers. However, true to the German spirit, they gallantly carried out orders and fought on with a determined efficiency.

British

In contrast to Goering's chilling effect on the Luftwaffe's morale, the morale of the British fighter pilots was bolstered by the high esteem they were accorded by Churchill and the nation. The cohesion of the whole British nation, mobilized and energized for a total war effort, is legendary. The spirit of the nation was focused on providing to those few thousand men in RAF Fighter Command the tools for defeating the air invaders. The historians paint these men as young, few over 25, gay of heart, possessing first class training, and harboring a spirit of aggressiveness that approached that of the devil himself. Equally stressed and fatigued like the Luftwaffe, the RAF carried on the fight day after day against tremendous odds for almost four months. It was Churchill who on 20 Aug 1940, so eloquently captured their contributions: "Never in the field of human conflict was so much owed by so many to so few" (11:55). A young pilot humorously responded, "He must have been thinking of our liquor bills" (11:126).

Section III

NOTES FOR SEMINAR CHAIRMAN

The objectives for this lesson point out the dual purpose of the seminar. First, we want the course officers to gain a better understanding of a phase of military history and, second, we want them to comprehend the application of the principles of war in the Battle of Britain. Your job is to coordinate the information provided by lecture, readings, student briefings, and seminar discussion to meet this dual purpose. In working with your briefers, be sure to emphasize that the focus should be on those principles most applicable, however, all of the principles should be covered if possible. If the briefer doesn't adequately cover a principle, attempt to bring the main points out during the discussion section.

Discussion Questions

1. Lead-Off Question

What were the German objectives in the Battle of Britain?
British?

Discussion

By June of 1940, German forces occupied the whole of Western Europe from Norway to France. After numerous unsuccessful attempts to get England to capitulate, Hitler reluctantly ordered preparations for a cross-channel invasion of England. The primary objective was to use Goering's Luftwaffe to establish air supremacy over England, destroying the Royal Fighter Command. Implicit in this objective was the annihilation of England by air

warfare alone as the army and navy forces were only players once air supremacy permitted the sea-borne invasion. In support of the objective, the Luftwaffe had to destroy the RAF airfields, aircraft, production facilities, and radar sites.

The British objective was simply survival. The British Fighter Command was outnumbered in total aircraft, but possessed a similar number and quality of single-engined fighters. The RAF had to inflict more losses on the Germans and outproduce them to survive a war of attrition.

Follow-up Question

AFM 1-1 states, "Success in achieving objectives depends greatly on the knowledge, strategy, and leadership of the commander." Did Goering properly apply the principle of "objective" in the Battle of Britain?

Discussion

Initially, Goering concentrated his efforts on destroying the RAF and its sector airfields. However, not realizing the effectiveness of his bombing success against the radar sites nor the significance of radar to RAF defensive efforts, Goering cancelled all strikes against the radar sites on 12 August 1940. On 13 August, of the nine airfields attacked only three belonged to Fighter Command. Many other instances point out Goering's lack of concentration of resources on what should have been his primary objective--the British Fighter Command. Equally disastrous as the decision to abandon bombing of the radar sites was the switching of efforts to main assaults against London. Goering's fatal decision permitted the RAF time to regroup just

when he had them against the ropes. Bombing London also forced the Luftwaffe to a deeper penetration and thus exposed the bombers and short-legged fighters to greater losses. Instead of demoralizing the British, the London "Blitz" mobilized global sentiment in support of Britain and stiffened English resolve (1:56).

2. Lead-Off Question

Concentrated firepower can overwhelm enemy defenses and secure an objective, but this requires a balance between mass and economy of force. What factors impacted the Luftwaffe's application or violation of these principles?

Discussion

Several factors played a significant role in the Luftwaffe's failure to use the principle of mass correctly. First, the Luftwaffe entered the Battle of Britain with inadequate bomber aircraft. Failure to produce a heavy four-engine bomber negated an opportunity to economically deliver the necessary tonnage of bombs to wreck the British production assets. Second, the twin-engined Junker 88s, Heinkel 111s, and Dornier 17s were prohibitively slow, lightly armored, and vulnerable to RAF fighters. Limited in range and bomb-load, these aircraft had to be heavily escorted to survive. The Germans simply could not bring Britain to defeat solely from the air. The Junker 87 STUKA was withdrawn early from the battle after massive losses. Third, the German fighter force commenced operations with only 700 single-engine ME-109 fighters. Although equal in performance to the two best British fighters, the Hurricane and Spitfire, these numbers were inadequate for counter-air and

bomber escort duties. Additionally, the ME-109's suffered from limited range and could stay aloft only 75-90 minutes. Therefore, actual counter-air or escort support over the target was limited to 10-15 minutes, allowing the British to hold off and engage the bombers when the German fighters were low on fuel. Numerous ME-109s were lost without suffering damage, due only to fuel starvation. Fourth, the Luftwaffe had to abandon the more precise daylight bombing raids due to poor weather and heavy losses. The turn to night bombing reduced the losses, but hampered the effort against significant military targets. Fifth, because of bomber vulnerability, large formations of bombers were impossible due to lack of sufficient ME-109 escorts. The ME-110 twin-engine fighter even needed escort--fighters escorting fighters. On several raids over 1700 fighters would escort only 250-400 bombers. Six, Goering failed to use the bomber resources available in Italy to supplement his forces. Additionally, Luftflotten #5 in Norway was used only once during the entire battle. Those times Goering did employ the principle of mass, the results were limited and frequently diluted against the targets not bearing on the objective--the destruction of the RAF.

Lead-Off Question

Technology played a major role in development of new equipment, particularly fuel-injection, constant-speed propellers, leading-edge slats and radar. What principles of war were most affected by the latter--radar?

Discussion

Radar technology directly impacted on the elements of surprise and security. Strategic surprise for the German Luftwaffe became more difficult to achieve. The Luftwaffe's ability to conceal its capabilities and intentions was significantly degraded. The radar detection of bomber formations allowed the British to delay launching their fighters until the last moment, saving precious fuel and efficiently utilizing resources--economy of force. Further complicating the Luftwaffe's tasks was an inadequate intelligence system which failed to identify proper targets or properly assess damage or British Fighter Command capabilities. The British, however, put major emphasis on security and intelligence and succeeded in breaking the German "Enigma" coding system (19:47). The combination of radar and prior knowledge of intended German targets played a major role in the German defeat.

Follow-up Question

While technology definitely played a factor in the outcome of the Battle of Britain, what, if any, geographical advantage did the British have?

Discussion

First, weather, in a geographical sense, helped the British. Since the winds tended to flow west to east, the British got the weather conditions several hours prior to the Germans on the continent, a subtle but valuable advantage.

Second, the short range of the German fighters and bombers permitted the British to use the northern position of England as a sanctuary for retreating or for use in training inexperienced

pilots. The sanctuary permitted the British to disperse critical production facilities. The need for long-range escort fighters later haunted the Allied bombing efforts.

Third, the Germans suffered loss rates as high as 5 to 1, but equally prohibitive was their inability to recover either the downed pilots or salvagable aircraft. When a Luftwaffe plane went down, everything and everyone was lost. The British recycled both men and metal.

Four, the geographical isolation of Britain provided a natural barrier that negated the advantages provided by the German "Blitzkreig" machine. The short-range JU87 STUKA, ME-109, etc., did not mesh with the strategic/tactical bombing campaign against Britain.

Lead-Off Question

AFM 1-1 states, "Unless offensive action is initiated, military victory is seldom possible...it is imperative that air commanders seize the offensive at the very outset of hostilities." What factors indicate the Germans failed to properly apply this important principle of war?

Discussion

Although the Germans believed England was the real obstacle to German dominance in Europe, neither Hitler nor the German Supreme Command had made any plans or preparations to deal with the British (4:87). Once Hitler made the decision to invade on 16 July 1940, the Germans acted without intensity or speed to

gain the critical air supremacy. It wasn't until Eagle Day on 13 Aug 1940 that the Luftwaffe made their bid. Then the intensity of activity drifted throughout the campaign until Hitler and Goering shifted their attack to London--a non-military target (14:144).

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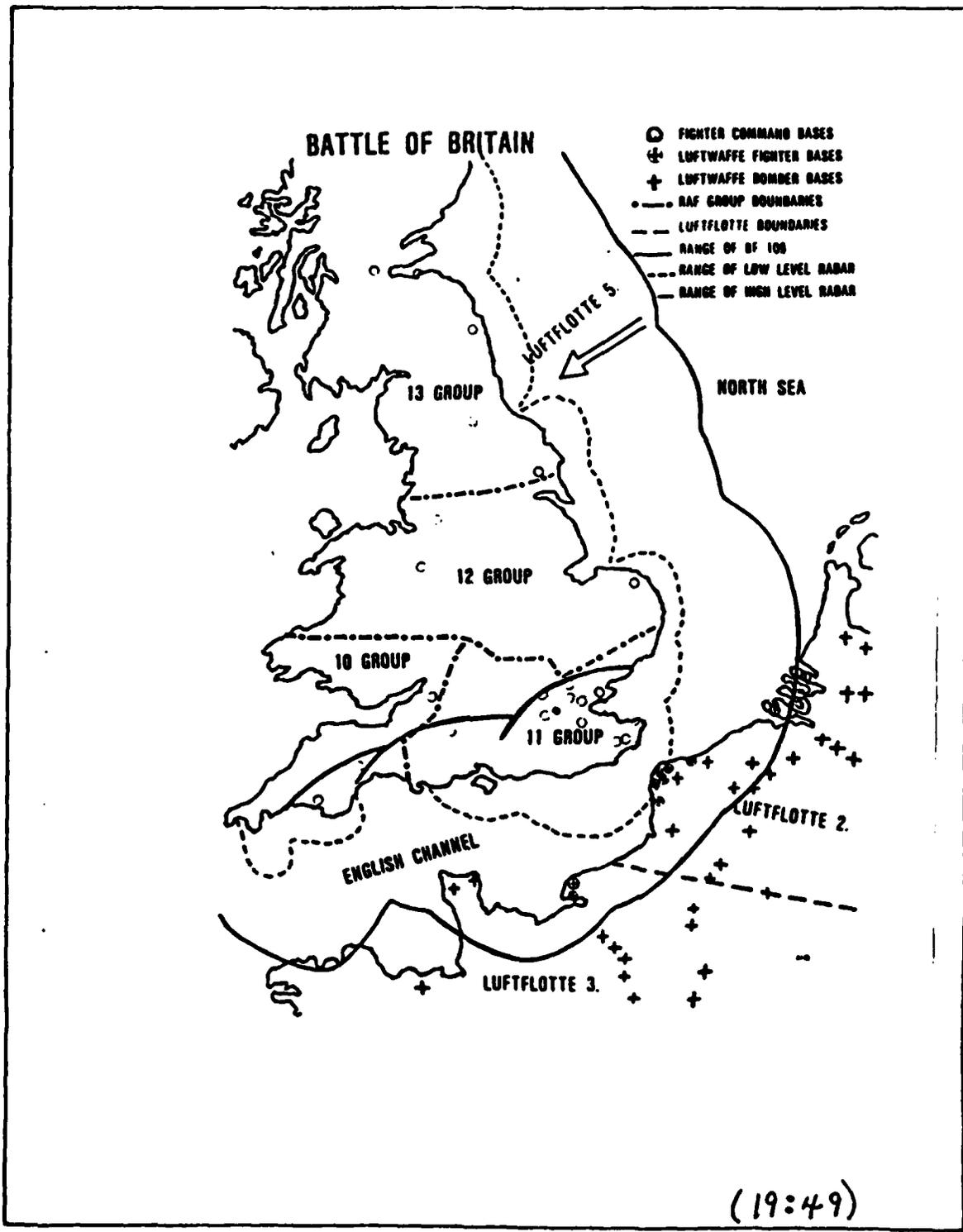
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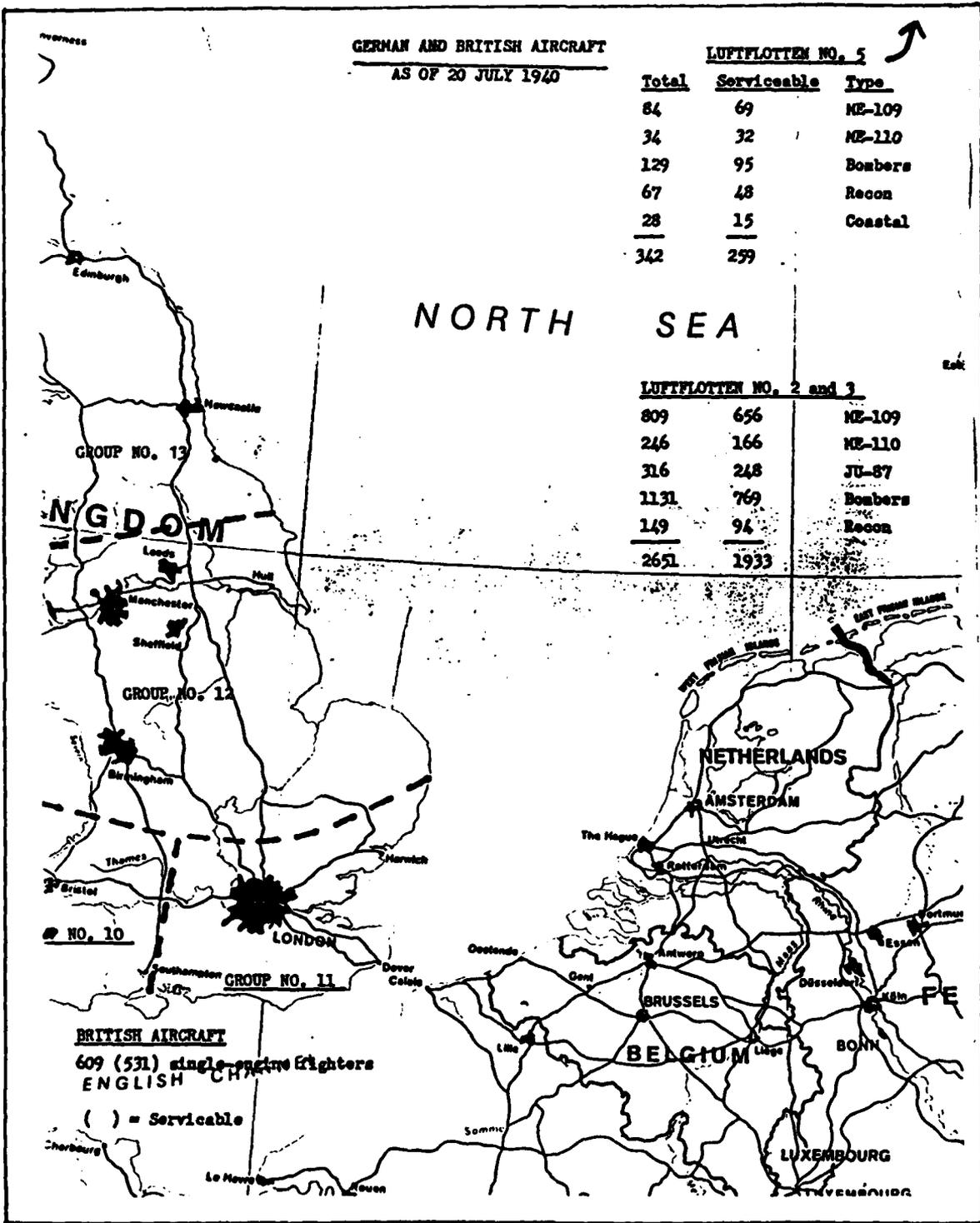


MAP #1

**GERMAN AND BRITISH AIRCRAFT
AS OF 20 JULY 1940**

LUFIFLOTEN NO. 5		
Total	Serviceable	Type
84	69	ME-109
34	32	ME-110
129	95	Bombers
67	48	Recon
28	15	Coastal
<u>342</u>	<u>299</u>	

LUFIFLOTEN NO. 2 and 3		
Total	Serviceable	Type
809	656	ME-109
246	166	ME-110
316	248	JU-87
1131	769	Bombers
149	94	Recon
<u>2651</u>	<u>1933</u>	



BRITISH AIRCRAFT
609 (531) single-engine fighters
ENGLISH CHANNEL

() = Serviceable

MAP #2

(4876)