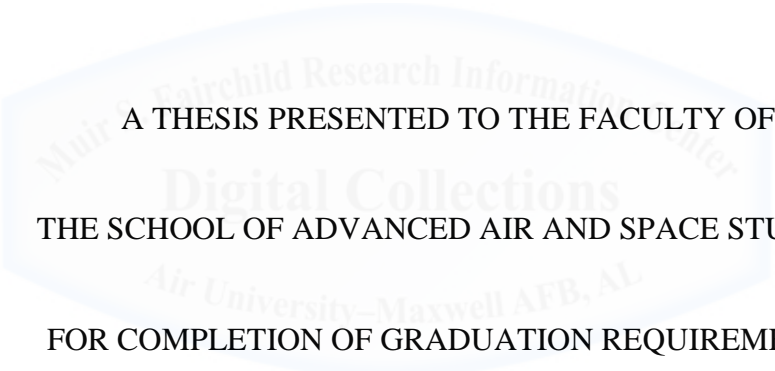


TACTICAL EFFECTIVENESS OF THE FRENCH AIR FORCE
DURING
THE WAR IN THE WEST – 1939-1940

BY

LIEUTENANT-COLONEL XAVIER GALLAIS, FRENCH AIR FORCE



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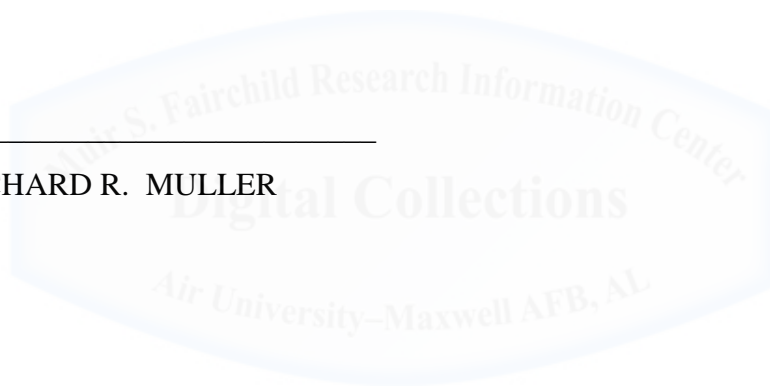
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APPROVAL

The undersigned certify that this thesis meets master's-level standards of research, argumentation, and expression.

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DISCLAIMER

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, or Air University; the French Government, the Ministry of Defense, or the French Air Force.



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ABSTRACT

This study assesses the tactical effectiveness of the French Air Force during the Battle of France from September 1939 to June 1940. The author analyzes the several different factors that shaped, led, and drove the tactical system of the French Air Force during this period. During the interwar years, the French situation in terms of politics, military, and society was characterized by a stalemate that explained the inability of France to prepare for the war to come. This stalemate can be traced through the French Air Force, which adopted tactical approaches, including a pursuit mission, that were not consistent with its strategic objectives, operational capabilities, and support requirements. The same factors had similar effects in terms of French bombing. While the French High Command had no clear vision about how to use the tactical system of French bombing, the latter was plagued by the FAF tactical concept in terms of training, operational capabilities, and supply. This study concludes that, although the French defeat in 1940 had broader roots than the tactical system of the French Air Force, the latter was not organized, trained, and equipped to achieve strategic objectives.



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INTRODUCTION

The only thing harder than getting a new idea into the military mind is to get an old one out.

- B. H. Liddell Hart

Aim

The study of military history has always been one of the greatest sources of future military leaders' education. Napoleon held that a military commander should "read and re-read the campaigns of great captains from Alexander to Frederick." However, military genius is rare, and success or failure in war stems often from other considerations. Behind each successful military campaign, there is always a failure that should deserve special consideration. Most of the historical studies that focus on the French side of WWII describe the Battle of France from the French Army perspective, and just a few have been written in English about the French Air Force (FAF) perspective. Among the latter, as far as I am aware, none takes a tactical view in order to explain the reasons for the defeat from the standpoint of the French Air Force.

This paper addresses this gap by studying the tactical effectiveness of the FAF between 1939 and 1940. How did the FAF fight during the Battle of France? Does the study of tactical effectiveness confirm previous assertions made concerning the FAF failure? Does this study present new elements? Why does it matter today?

Methodology

The methodology applied here comes from the framework provided by Williamson Murray and Allan R. Millett in their book *Military Effectiveness*. Murray and Millett's book presents a recognized typology that explains how to assess effectiveness in military affairs. Thus, Murray and Millett define military effectiveness as "the process by which armed forces convert resources into fighting power." The authors also state that military activity takes place at political, strategic, operational, and tactical levels. Different actions, procedures, and goals characterize each level of military activity. Therefore, one can assess the effectiveness of a military organization by identifying its characteristics at each level. Murray and Millett introduce the tactical

level of military activity as follows: “the specific techniques used by combat units to fight engagements in order to secure operational objectives. Tactical activity involves the movement of forces on the battlefield against the enemy, the provision of destructive fire upon enemy forces or targets, and the arrangement of logistical support directly applicable to engagements.”¹

In that respect, the tactical effectiveness of a military organization can be assessed by answering the following questions:

- a. To what extent are the military organization’s tactical approaches consistent with its strategic objectives?
- b. To what extent are tactical concepts consistent with operational capabilities?
- c. To what extent does the military organization’s tactical system emphasize integration of all arms?
- d. To what extent do a military organization’s tactical conceptions emphasize surprise and a rapid exploitation of opportunities?
- e. To what extent is the military organization’s approach to training consistent with its tactical system?
- f. To what extent are the military organization’s tactical systems consistent with support capabilities?
- g. To what extent do tactical systems place the strengths of military organizations against their adversary’s weaknesses?

The questions above constitute the framework that I applied throughout my research. That research rests essentially on the exploitation of French archives, memoirs of French crews, and secondary sources written both in English and French. One of the limitations of my study is the amount of available French archive material on this side of the Atlantic.

¹ Allan Reed Millett and Williamson Murray, *Military Effectiveness* (New ed. Cambridge ; New York: Cambridge University Press, 2010).

Assessing the French Air Force's tactical effectiveness

The strategic and operational effectiveness of the French Air Force has already been studied by several different historians.² Therefore, I seek here to adopt Murray and Millett's methodology in order to contribute to the existing studies with a new perspective.

By assessing its tactical effectiveness, I argue that the FAF was not organized, trained, and equipped to develop a tactical system that could have achieved strategic objectives. From the airpower perspective, the flaws of the tactical approach during the Battle of France prevented the FAF from applying some crucial principles of war such as freedom of action, economy of forces, and mass. These flaws stemmed especially from strategic assumptions that proved wrong.

First, I synthesize the historical background of the Battle of France, by presenting major actors, the strategic context, and major battles from the air perspective. Then, I successively assess the tactical effectiveness of the fighter, bomber, and reconnaissance components by employing Murray and Millett's methodology. Finally, I draw some implications for contemporary conflicts as well as some recommendations for further study.

²Two of the best works are: Patrick Facon, *L'Armée de l'air dans la tourmente: la bataille de France 1939-1940* (Paris: Economica, 2005), and Anthony Christopher Cain, *The Forgotten Air Force: French Air Doctrine in the 1930s* (Smithsonian History of Aviation and Spaceflight Series. Washington D.C.: Smithsonian Institution Press, 2002).

CHAPTER 1

STRATEGIC CONTEXT

History is, by essence, the science of change.

- Marc Bloch

France was not ready to wage war on 3 September 1939, and this situation stemmed partly from the fact that the FAF had not achieved its transition toward a modern instrument of power. While in 1918 the FAF was arguably the best air force in the world, twenty years later French airpower could hardly be compared to the Luftwaffe or the RAF. What were the factors that led to this situation? As the French historian Marc Bloch argues, the French defeat in 1940 was not due to France being outclassed by the German armed forces, but rather to the inability of French civilian and military leaders to *understand* the nature of the coming war during the interwar years.¹

While Bloch's assertion is arguable, it is still useful for comprehending the complexity of the situation in France during the interwar years. At the time, the problems that faced Europe, and especially France, were broader than solely the inability of military leaders to conceive of and employ a sound doctrine. Even though the present paper aims to analyze the FAF tactical system, it is nevertheless worth studying the broader context in terms of French politics, military, and society in order to explain the several different roots of the French collapse in 1940.

The inability to comprehend WWII in France can be illustrated by successively examining the political context in France, the situation of aviation industry, and French grand and military strategies. The study of the political context in France from WWI to WWII helps to understand the framework in which the evolution of the FAF tactical system occurred. Both grand and military strategies also included some flaws that constituted the seeds of the stunning outcome in June 1940. Moreover, even if the French High Command had developed a sound doctrine, French aviation industry suffered from deficiencies that especially prevented FAF leaders from obtaining the planes required by their tactical system. In that respect, the present chapter aims at

¹ Marc Bloch, *L'Étrange Défaite: Témoignage Écrit En 1940* (Collection Folio Histoire 27. Paris: Gallimard, 1992), 66.

presenting the context that led to the French tactical system as it was at the dawn of WWII.

From World War I to World War II

The French Political Scene in the Interwar Years

During the interwar years, the demographic, economic, and human trauma of WWI was still fresh in French memory. The Great War had a profound and lasting effect in Europe due especially to the losses that were terrible on both sides: 1.4 million French people were killed, which represented 4.29% of the population as opposed to 3.82% in Germany.² In France, the trauma of WWI led to the creation of strong political incentives for pacifism. As the American historian Robert Young argues, during the interwar years, the French population “had watched Hitler opt for rearmament over disarmament, reintroduce conscription, unveil the air force, recover the Rhineland, seize Austria, swallow the Czechs and Slovaks, and then prepare for the conquest of Poland.”³ The “great debate” between utopians and realists, as described in 1939 by E.H. Carr in his book *The Twenty Years Crisis*, was leading to another war for which France failed to be prepared intellectually.

As explained by Robin Higham in his book *Two Roads to War*, the interwar years saw France struggling with economic, political, and social hindrances that prevented her from being prepared to wage war.⁴ From the political side, the defeat was linked to the instability of the Third Republic, which hampered France from adopting fiscal and economic measures that would have promoted the construction of a strong industrial military base. Young explains the instability of the Third Republic by stating that “France knew 43 premiers between Clemenceau’s government of 1917 and Pétain’s Vichy regime of 1940, an average of more than two per year.”⁵ One of the consequences of this political instability was the lack of confidence in the government, which was too

² Nadège Mougel, translated by Julie Gratz, “World War I casualties,” *REPERES*, Centre européen Robert Schuman, 2011.

³ Robert J. Young, *France and the Origins of the Second World War* (The Making of the 20th Century. New York: St. Martin’s Press, 1996), 130.

⁴ Robin D. S. Higham, *Two Roads to War: The French and British Air Arms from Versailles to Dunkirk* (Annapolis, Md: Naval Institute Press, 2012).

⁵ Young, *France and the Origins of the Second World War*, 95.

often seen as “a creature of the parliament stretched and twisted to accommodate too many differences.”⁶ Moreover, this disdain for executive power led to a schism between those who sought to serve France as best as they could by representing French executive power, and those who were supposed to exercise it.⁷

An ideological schism also marked the French political scene during the interwar years. In 1936, the Popular Front, a combination of French left parties such as Radicals, Communists, and Socialists, took power in France. The political program of the newly-elected Léon Blum government aimed at countering the rise of fascism at home and abroad as well as mitigating the consequences of the Great Depression that had eventually taken root in France.⁸ While Léon Blum’s government had a chance to apply a leftist perspective on French domestic and foreign policy, the Popular Front’s ideas clashed with the strong political resistance supported by conservatives. The latter were ideologically close to a bourgeois Republic “more committed to order than to change, to capital than labor, to tradition than innovation,” and conservatives pilloried Léon Blum’s government by organizing a public campaign through the parliament and the press.⁹ The decision of the Air Minister Pierre Cot to establish an airpower alliance with the Soviet Union illustrated the fact that conservatives saw the Popular Front not only as a political threat, but also as a threat to French national interests.

The Popular Front stayed in power two years. The external resistance organized by conservatives in public services, the press, the parliament, and the armed forces as well as the internal competition among Communists, Radicals, and Socialists led in 1938 to the fall of the Popular Front.¹⁰ However, between 1936 and 1938, the political schism in the French political scene extended to the population wherein the French elite – armed forces included – supported conservatives while workers supported the political perspective of the Popular Front. This situation did not end when a coalition of radicals and conservatives led to the installation of Edouard Daladier’s government in 1938. The ideological confrontation continued by tearing apart the French political scene and

⁶ Ibid.

⁷ Ibid.

⁸ Ibid., 88.

⁹ Ibid., 90.

¹⁰ Ibid., 91.

society. Thus, in the crucial period in which France eventually initiated her rearmament, labor unionists and conservatives were fighting each other for ideological reasons that should have been overcome by their common patriotism.¹¹

Political instability and ideological schism characterized French society at the dawn of WWII. Young argues these factors led to indecision: “The leaders of the Third Republic could not make up their minds about how best to deal with the German threat, the Depression, *the challenges contained in modern military technology*, the ideological threats of communism and fascism, the economic and social menace of Anglo-Saxon currency and culture, and the intellectual and moral specter of another war [emphasis added].”¹² Therefore, in September 1939, while the French population accepted with resignation the outbreak of a new war, men and women in France were not convinced that they could handle the German threat, and this uncertainty can also be traced to the French armed forces.

French Air Industry and Acquisition Programs – From WWI to 1936

At the Armistice in 1918, France was considered one of the most significant airpowers in the world. A decade later, French airpower had almost disappeared. During WWI, France produced about 50,000 aircraft and 92,000 engines, but the demobilization put an end to the French air industrial effort. In the 1920s, the number of workers employed in the French air industry decreased from 183,000 to 3,700.¹³ Assembly lines and mass production were unknown to the French air industry (even in the 1930s), and the French industrial policy almost abandoned airpower innovation (just one prototype out of 100 was mass produced in the 1920s).¹⁴ In that respect, the first French Air Minister, Victor André Laurent Eynac, decided in 1928 to support aviation industries by pursuing a prototype procurement policy (*politique des prototypes*).¹⁵ In a time when aviation technology was evolving rapidly, the prototype policy sought to avoid placing large orders for aircraft that were destined to become obsolete in the near future by

¹¹ Bloch, *L'Étrange Défaite*, 168, 173.

¹² Young, *France and the Origins of the Second World War*, 152.

¹³ Patrick Facon, *Batailles dans Le Ciel de France: Mai-Juin 1940* (Saint-Malo: Galodé, 2010), 34.

¹⁴ Ibid.

¹⁵ Cain, *Forgotten Air Force*, 26.

funding small research projects to keep French aeronautical technology up to date.¹⁶ However, the global economic crisis hampered this policy, and aviation industries remained dependent on government subsidies. Thus, the prototype procurement policy failed to turn France's air industry into a modern tool, and only led to the production of small series of aircraft that strove to keep the pace with technological changes.¹⁷ In that context, Pierre Cot took over as air minister in 1933. Sensing a threat from Germany following Hitler's election to the chancellorship in January 1933, Cot set out an air acquisition program that ordered the production in less than two years of 1,365 aircraft. However, French air industry could hardly produce more than 300 aircraft per year.¹⁸

In 1933, Cot and General Victor Denain, the FAF Chief of Staff, decided to acquire a new aircraft, the Bloch 200, also known as the BCR: *Bombardement, Chasse, Reconnaissance*.¹⁹ This decision doomed French airpower to not possess a bomber component worthy of the name until 1939. The application during the interwar years of Giulio Douhet's theory of strategic bombardment led the French government to invest the most significant part of the procurement budget of the FAF in one aircraft: the BCR. Denain in particular believed that pursuit aircraft would be unable to defend against heavily armed bombers. French leaders steered the FAF to a dead end by equipping the French air units with a "jack of all trades, master of none."²⁰ More importantly, as mentioned above, the BCR contributed to the congestion of aviation industries, and the already limited capabilities of France's air industry to produce different aircraft such as pursuit aircraft were significantly hampered. Therefore, Cot's acquisition program eventually congested the industrial chains of aviation industries, and last aircraft ordered in 1933 were delivered new but outdated in 1938.

Cot and Denain acquired the BCR in accordance with a strategy that aimed especially at countering the dominance of the army but by doing so they did not promote the rise of a French air industry. Cot left office in February 1934 when a financial affair

¹⁶ Ibid., 27.

¹⁷ Facon, *Batailles dans Le Ciel de France*, 35.

¹⁸ Ibid.

¹⁹ The English translation of BCR is 'BPR: Bomber, Pursuit, Reconnaissance.

²⁰ Christian-Jacques Ehrengardt, "Autopsie d'une débâcle," *Aéro-Journal*, no. 2, August-September 1998, 11.

forced Édouard Daladier's government from power. When Cot came back to the Air Ministry in 1936, he went about re-building this industry but he did not obtain the necessary funds to invest in the FAF. In 1938, the Air Minister Guy La Chambre got the required budget, made the crucial investments, and was thus able to boost production, but too late.²¹

French Air Industry and Acquisition Programs – From 1936 to 1940

In 1936, despite the aforementioned flaws of the French air industry, France and Germany had similar air forces. Two years later, the comparison of the German and French air forces reveals the creation of a huge gap both numerically and qualitatively.²² “Between June 1937 and January 1938, the French aviation industry delivered only 71 combat-ready aircraft, while German firms produced 4,342, Britain produced 2,335, and the United States produced 293.”²³ When war began on 3 September 1939, France had outdated bombers and reconnaissance aircraft. The situation was better regarding fighters, but most French pursuit aircraft were inferior to the German fighters. France was late in terms of building credible airpower, and she tried to catch up with Germany. The FAF defeat can be explained in part by the inability of French military and political leaders to accept the fact that France was not capable of building her own airpower.

French authorities, both civilian and military, were aware of the situation. After visiting his German counterpart, the French Air Force chief of staff, General Joseph Vuillemin, told La Chambre in August 1938 that in case of war “the French air force will be crushed in few days.”²⁴ The inferiority of French airpower constituted one of the main political concerns for French politicians as emphasized by the French Prime Minister Edouard Daladier in his memoirs: “the situation of the FAF was constantly conditioning my way of thinking. When we considered our possibilities of intervention, we always

²¹ Lucien Robineau, “French Inter-War Air Policy and Air War 1939-1940,” in *The Conduct of the Air War in the Second World War: An International Comparison*, ed. Boog Horst (New York: Berg, 1992), 638.

²² Facon, *L'Armée de l'air dans la tourmente*, 19.

²³ Anthony Christopher Cain, “L'Armée de l'Air, 1933-1940,” in *Why Air Forces Fail: The Anatomy of Defeat*, ed. Robin D. S. Higham and Stephen John Harris (Lexington, Ky: University Press of Kentucky, 2006), 58.

²⁴ *Ibid.*, 30.

came back to the same problem, the inferiority of our aviation compared to the Luftwaffe.”²⁵

As has been mentioned above, La Chambre and Vuillemin strove to fill the gap but they had to cope with an industry which was not ready to mass produce high performance aircraft. With extraordinary efforts, the French air industry succeeded in increasing its production providing aircraft that were able to match the Bf 109... in 1941, months after surrendering to Germany.

At the dawn of WWII, France was inferior to Germany in several different strategic elements. First, France was less industrialized. During the interwar years, France had missed the “industrial revolution train,” and as the French historian Dominique Lormier states, “in 1938, 42,000 French workers performed 1,680,000 hours of work per week, while in Germany 120,000 workers did 6,900,000 hours of work per week at the same period.”²⁶ Second, France was less populous. In early 1938 France had 41 million inhabitants; Germany 67 million. After the March 1938 Anschluss the Reich’s population grew to 75 million, and it swelled to 86 million following the 1939 annexation of the Sudetenland. The numerical superiority of the Luftwaffe in 1940 rested partly on these figures.

French Grand and Military Strategies and Interservice Rivalries

The French political scene was not the sole intellectual cause of the French defeat. As the French Army General Weygand put it during a meeting of the War Committee on 25 May 1940: “France made the huge mistake of entering the war with neither the right equipment nor the military doctrine.”²⁷ Despite the creation of an independent air force and air ministry in 1933, the French armed forces were dominated doctrinally by the army and the navy. This doctrinal dominance induced an intellectual bias regarding the interpretation of the employment of airpower during WWI.

²⁵ Ibid.

²⁶ Dominique Lormier, *La Bataille de France Jour Après Jour: Mai-Juin 1940*, (Collection Documents / Cherche Midi. Paris: Cherche midi, 2010), 48-49.

²⁷ *The Secret Files of the French General Staff* (Auswärtiges Amt 1939/41 no. 6, Berlin, 1941), 142.

In 1917, mass and concentration were two crucial principles of the FAF doctrine.²⁸ Large groups of fighters aimed at winning air superiority over the battlefield. French armed forces had learned that unity of command was essential regarding the operational effectiveness of airpower. Furthermore, after experiencing the air battle at Verdun in 1916, the FAF concluded that the employment of bombers and fighters had to be coordinated at the theater level, and therefore not at the army echelon. Conversely, it made sense to keep strategic reconnaissance attached to an army.²⁹

The good practices learned from WWI did not survive the French interservice rivalries that took place during the interwar years. While in 1923, 36% of air units were assigned at the army level, five years later the proportion had risen to 66%, and therefore the FAF was spread across the army at the division level.³⁰ The latter organization constituted one of the main concerns for French airmen, who perceived the risk of being unable to apply war principles such as unity of command, mass, and concentration.

The defeat of the FAF stemmed also from the inability of military leaders to develop a strategy in accordance with political objectives. In doctrinal terms, the army and the FAF failed to find a common ground between what was perceived as two competing visions of airpower: one committed entirely to support of ground troops, and a French interpretation of Douhet's theory called '*lutte aérienne*' - the air battle.³¹ Besides the army dominance in terms of organization, the FAF doctrine was mainly oriented in 1933 toward supporting ground troops. In reaction, the Chief of Staff of the FAF, General Victor Denain, and Air Minister Pierre Cot developed the concept of the air battle that, following Douhet's theory, sought to strike strategic targets deep inside the enemy's territory. This concept of the air battle was in total contradiction to the army's vision of airpower: "a mere auxiliary arm of the infantry, to be used exclusively for observation, reconnaissance and cover."³² Thus, the development of Douhetian ideas in the FAF aimed at promoting an independent air force not only *de jure* but also in practical terms. However, Cain argues, "without a clearly articulated description of how

²⁸ Facon, *L'Armée de l'air dans la tourmente*, 37.

²⁹ Lee Kennett, *The First Air War*, (New York: Free Press, 2014), 87.

³⁰ Facon, *L'Armée de l'air dans la tourmente*, 46.

³¹ Robineau, "French Inter-War Air Policy and Air War 1939-1940," 634.

³² Ibid.

their operations supported air strategy, the French airmen failed to convince the other services that airpower could make an independent contribution to the war effort.”³³

The reaction from the army was severe, as illustrated by a speech given by General Maurice Gamelin in 1937. Gamelin, who would become the joint force commander of French armed forces in 1939, explained that "we will wage war without aviation."³⁴ At the time Gamelin's statement reflected the lack of understanding among French ground officers regarding both the possibilities as well as the limits of airpower at the time. Thus, everything that did not serve the artillery, the infantry, and the Maginot Line was considered secondary both in terms of doctrine and budget prioritization. In 1938, under the pressure of both French political pacifism and the French Army, the FAF eventually accepted the subordination of the so-called Aerial Forces of Cooperation (Force Aériennes de Coopération) to the land component, while the FAF kept its hand over Reserve Aerial Forces (Forces Aériennes de Réserve).³⁵ The former gathered reconnaissance and observation aircraft as well as a portion of the fighter groups (dedicated to the protection of the army), while the latter gathered the rest of fighter groups (dedicated to the protection of French territory) and bombers. This 1938 decision marked the inability of the FAF to conceive and to impose an employment of French airpower that reconciled the defensive aspect of the French military strategy with the inherent offensive capability of airpower envisioned through the French air battle concept.

On 13 February 1940, by seeking to reaffirm his dominance over the FAF, Gen Gamelin required (during a meeting with the French Prime Minister Edouard Daladier to which Vuillemin was not invited) the control of not only Aerial Forces of Cooperation but also Reserve Aerial Forces. Daladier agreed to Gamelin's request, and one week after the meeting Air Minister La Chambre ordered FAF Chief of Staff Vuillemin to give the operational control of all FAF means to the army when the Germans launched their offensive.³⁶ Thus, in May 1940, four days after the outset of the German invasion,

³³ Cain, *Forgotten Air Force*, 53.

³⁴ Raymond Danel, "En Mai-Juin 1940, Ils Étaient Les Plus Forts," *ICARE*, no. 54. Summer 1970, 66.

³⁵ The Aerial Forces of Cooperation were the branch of the FAF that supported directly the ground forces. Cf.: Pierre Cot, "En 1940, Où Étaient Nos Avions ?," *ICARE*, no. 57. Spring-Summer 1971, 50.

³⁶ Facon, *L'Armée de l'air dans la tourmente*, 114.

Vuillemin transferred operational control of the fighters and bombers that were still under his command to Gen Gamelin.³⁷

The 1938 decision and the reorganization planned in February 1940 implemented the doctrinal and organizational dominance of the army over French military strategy. The achievement of French strategic goals rested mainly on the French Army that envisioned the role of airpower as it had been employed during WWI: a means for protection against enemy's airpower, a reconnaissance tool for detecting the main thrust of the German attack, and a means of observation for adjusting artillery fire. Thus, the FAF was mainly oriented toward ground support and its means were disseminated at the army, division, and even regimental level.

The organizational dominance of the army over the FAF as well as the failure of the latter to impose its own doctrinal perspective led to a strategic dead end for three main reasons. First, the organization of French armed forces, very similar to the German one, supposed a high degree of coordination between land and air components that did not exist at the time. While the lack of radio communication between French aircraft and ground troops was one of the technical limitations of French operations, the doctrinal fracture inherited from rivalry in the interwar years also hampered the critical coordination between both services.³⁸

Second, the fact that the FAF was entirely devoted to supporting ground troops left open the question of how to gain and to maintain air superiority. Yet, the 1937 FAF instruction on the tactical employment of air units specified that "the role of the air force in war is to create, maintain and exploit, by dominating the adversary, a situation allowing the use of the air for all military, political and economic purposes considered useful to the success of war and forbid the enemy to use it for the same purposes. When this situation is created, there is air superiority... General and permanent air superiority is exceptional. All the art of the Air High Command consists in having air superiority over the adversary at the right time and at the desired point."³⁹ The doctrinal base was there but the FAF failed to enforce it. Indeed, how could the French Air High Command

³⁷ Ibid., 175.

³⁸ Ibid., 192.

³⁹ Robineau, "La Conduite de la Guerre Aérienne contre l'Allemagne de Septembre 1939 à Juin 1940," *Revue Historique des Armées*, no. 3, 1989, 101-102.

achieve air superiority without having the operational control of fighter aircraft? Ground leaders were supposed to take into account the critical necessity to gain air superiority; however, they spread aviation assets across the several different field armies for the sake of the air protection of each army rather than the struggle for air superiority on the scale of the whole theater.

The third and last reason that explained the French strategic dead end was the absence of vision beyond the initial defensive posture of the French armed forces. As Cain observes, France's defensive strategy consisted mainly of containing the German assault in the Low Countries (a remake of the Schlieffen Plan) while holding the formidable Maginot Line.⁴⁰ The French strategy was thus based on the assumption that the conflict would be protracted, and therefore a stalemate would buy the necessary time for catching up with German military power. However, achieving a stalemate is very different from achieving a victory, and the purely French defensive posture prevented the development of a strategy that had included airpower for striking Germany after blunting the initial German advance.⁴¹ The attitude of the French military leaders during the Phony War especially illustrated their strategic focus: while most of the German forces were engaged in Poland, they adopted a 'wait and see' strategy because France was not ready to wage war.

The flaws of the French strategy would soon prove to be catastrophic. The failure to create a coherent and comprehensive air doctrine, and the failure to resolve organizational conflicts with its sister services, partly explain the intellectual defeat of the FAF in the Battle of France.⁴²

Assessment

During the interwar years, political instability and interservice rivalries affected the FAF by plaguing both its acquisition programs and doctrine. Moreover, the military doctrinal evolution that occurred in France during the interwar years was not significant, and the strategic and tactical approaches of the French High Command were essentially

⁴⁰ Cain, "L'Armée de l'Air, 1933-1940," 43.

⁴¹ Ibid.

⁴² Cain, *Forgotten Air Force*, 53.

unchanged from WWI. Furthermore, during the interwar years, the social, political, and economic conditions worsened in Europe. While Germany and Italy chose fascism, France strove to find an alternative path but she could not find a compromise between the Popular Front and conservatives. France was stuck in a stalemate due to internal and external uncertainties that led to a situation in which her grand and military strategies were predicated on containing German forces until powerful allies such as the United States could intervene.

This context sheds light regarding the assessment of the French Air High Command during the Battle of France. Even though the strategic and tactical mistakes of FAF leaders must not be minimized, the 1940 defeat cannot be explained by simply claiming that the French Air High Command was stupid. The situation was more complex than that. However, during the interwar years, French airmen did not adapt the tactical system of the FAF to modern warfare, and this limitation altered their vision both strategically and tactically. During the Battle of France, FAF leaders not only faced the deficiencies of the aviation industry and political instability but also suffered from their limited vision concerning how the tactical system of the FAF had to be articulated.

The disconnect between the FAF tactical system and strategic objectives became obvious in 1938 when the weakness of French airpower influenced Daladier's decision to sign the Munich agreement. Moreover, the interservice rivalries of the interwar years had erected an operational wall between the FAF and the French army, which hindered cooperation in peacetime. Thus, by examining Murray and Millett's questions, one can argue that, concerning the bases of the FAF tactical system developed during the interwar years, *the tactical approaches of the FAF were neither consistent with strategic objectives nor did they emphasize a smooth and efficient integration of all arms*. While all the German strengths aimed at restoring the greatness of the Reich, French society, the political scene, the military leaders, the operational capabilities, and therefore the tactical system were torn apart.

The Forces at Play

The Luftwaffe

At the dawn of WWII, the Luftwaffe was organized in four Luftflotten – aerial fleets – which corresponded approximately to four geographical areas. Luftflotte 1 was assigned to the Eastern part of Germany; Luftflotte 2 to the North-West; Luftflotte 3 to the South; and the Luftflotte 4 to the South-East. In addition to the Luftflotten, an instructional division (the Lehrdivision) existed. Finally, the Luftwaffe had a transport fleet of approximately 550 aircraft.⁴³

On 1 September 1939, when Germany invaded Poland, the most significant part of Luftflotten 1 and 4 were involved in this theater. As soon as Britain and France declared war to Germany, Luftflotten 2 and 3 were mobilized on the Western front. On 3 September 1939, Luftflotten 2 and 3 had 1,101 aircraft broken down as follows:

- Fighters: 512 aircraft
- Bombers: 346 aircraft
- Reconnaissance: 153 aircraft

In September 1939, almost all Jagdgruppen (fighter groups) had finished their conversion to the Messerschmitt Bf 109E, one of the best aircraft in the world at the time. The situation was less favorable concerning the Zerstörergruppen (heavy fighter groups). Only three groups had achieved their conversion to the Messerschmitt Bf 110C, and seven groups, designated as long-range fighters but not yet converted, were still flying on older and lighter pursuit aircraft such as the Messerschmitt Bf 109B, C, and D.

When the latter were engaged over Poland and France in September 1939, it created some confusion regarding the overall performance of the Bf 109. At the outset, French fighter pilots did not discern the difference between a Bf 109D and E, and this lack of knowledge led them to underestimate the performance of the Bf 109 in general. French fighter pilots would learn the hard way the difference between the two versions,

⁴³ Information in this chapter comes mainly from the masterful work of several different historians edited by the French historian Christian-Jacques Ehrengardt: Christian-Jacques Ehrengardt ed., *Les Aiglons: Combats Aériens de La Drôle de Guerre, Septembre 1939-Avril 1940* (Paris: C. Lavauzelle, 1983), 11-23.

which stemmed essentially from the new Daimler-Benz D. B. 601 engine that gave a clear advantage in terms of speed and climb to the Bf 109E over French fighters.

Concerning the bombers, almost all units had finished their conversion to modern aircraft. All dive bomber units were flying the Junkers Ju-87 ‘Stuka,’ while the new versions of the heavy bomber Heinkel 111 (He 111) as well as the medium bomber Junkers 88 (Ju 88) were introduced during the Polish campaign. The modernization of reconnaissance units was also on its way with most of the observation wings flying the modern Henschel 126 (Hs 126).

Finally, the Luftwaffe relied mainly on the trimotor transport aircraft Junkers 52 (Ju 52) for covering the several different requests in terms of logistics.

The French Air Force

The FAF acquisition program was steadily improving in 1939 but the FAF developmental delay between 1936 and 1938 worried both French political and military leaders. The bomber component was the branch that presented the most concern. In the thirty-three groups that existed, only five new Lioré-et-Olivier 451 (LeO 451) were available on 3 September 1939. The rest of the French bombers (Amiot 143, Bloch 200, Bloch 210, and Potez 540) were unable to operate in daylight due to their lack of speed in comparison to German fighters.⁴⁴

The reconnaissance and observation branch was also operating antique aircraft that could not survive over the front line. Even though four groups had achieved their transformation to modern airframes such as the Potez 637, the latter did not represent state-of-the-art aircraft.

The situation regarding the fighter component was “the least worst” of the FAF. While the FAF had neither modern bombers nor reconnaissance aircraft worthy of the name in September 1939, the FAF had fighters that could sustain the comparison with the least advanced German fighters. The best FAF fighter was an American aircraft, the Curtiss H-75A. The Curtiss was not as fast as the Bf 109E but it was more maneuverable, and the American fighter was also the easiest aircraft to maintain in the

⁴⁴ Ehrengardt, *Les Aiglons*, 13.

FAF's fleet. The new Morane-Saulnier 406 (M.S. 406) constituted the bulk of French fighters but its performance would quickly disappoint French pilots. The same statement can be made with the Bloch 151/152, which proved to be a solid aircraft but limited in its performance. The production of the promising Dewoitine D.520 had just begun in September 1939 but this aircraft would suffer from the flaws of the French air industry.

La Chambre's efforts regarding the modernization of the FAF had not yet reached operational units that entered WWII with outdated materials. Moreover, all new French bombers, fighters, and reconnaissance aircraft suffered from the teething problems characteristic of new weapon systems. This situation was a source of tension between the air industry and the FAF. The latter received aircraft after some delay, and these aircraft were not operational due to developing, testing, and validating problems.

The French government strove to overcome the inability of the French air industry to produce modern airframes by purchasing new aircraft, especially from the United States. However, the difficulties the American air industry encountered at the time as well as American public opinion hampered further deliveries.⁴⁵ On 3 September 1939, the FAF had around 1,500 aircraft but this figure hid a bad situation:⁴⁶

⁴⁵ Cain, *Forgotten Air Force*, 30.

⁴⁶ Ehrengardt, *Les Aiglons*, 18-19.

Fighters: 341 modern aircraft of a total of 586

- 231 M.S. 406s dispatched in 13 groups in metropolitan France
- 16 M.S. 406s dispatched in one group assigned in Tunisia
- 94 H-75As dispatched in 4 groups in metropolitan France
- 83 (outdated) D.501/510s dispatched in 5 groups in metropolitan France
- One group of 20 (outdated) D.510s assigned in Tunisia
- One wing of six (outdated) D.501s assigned in Senegal
- 68 (outdated) P.631, dispatched in 4 groups in metropolitan France

Bombers: only five modern aircraft out of 364

- Five LeO 451s assigned in metropolitan France
- 169 (outdated) MB-210s dispatched in 12 groups in metropolitan France
- 57 (outdated) MB-200s dispatched in 5 groups in metropolitan France
- 25 (outdated) MB-200s dispatched in 2 groups in overseas France
- 16 MB-200s dispatched in one group in overseas France
- 15 (outdated) F.222.1/222.2s dispatched in two groups in metropolitan France
- 62 (outdated) Amiot 143s dispatched in 5 groups in metropolitan France
- 15 Amiot 143s dispatched in one group in overseas France

Reconnaissance: 53 modern aircraft of 169

- 87 Bloch MB-131s dispatched in 5 groups in metropolitan France
- 12 Bloch MB-131s dispatched in one group in overseas France
- 53 Potez P.637s dispatched in 4 groups in metropolitan France
- 17 (outdated) Potez P.542s dispatched in 4 groups in metropolitan France
- Observation: 359 aircraft dispatched among 32 observation groups

Figure 1: Order of Battle of the French Air Force on 3 September 1939.

Source: Ehrengardt, Les Aiglons, 18 and 19. Even though the Bloch MB-131 was considered a modern aircraft at the outset, it would be withdrawn from the frontline after demonstrating its vulnerabilities against German pursuit fighters. None of the Mureaux 113, 115, and 117, Breguet 270, and Potez 25 and 390 were adapted to fight a modern war.

The Royal Air Force

France and Great Britain found a common ground for establishing an alliance in 1935. However, even though France and Britain shared a common interest in facing Germany together, the Franco-British alliance also reflected important strategic

discrepancies.⁴⁷ These strategic discrepancies prevented the building of a strong operational cohesion within the Franco-British armed forces.

The British Army has historically been considered less important than the Royal Navy or the Royal Air Force. The interwar years had emphasized the significance of the control of the air and the sea in order to avoid a German invasion, which would have to cross the Channel. Thus, at the dawn of WWII, the British Army had forty divisions as opposed to the two hundred German divisions.⁴⁸

To build a complementary force, France logically chose to maintain a large army (120 divisions) based on conscription. French history, strategic defensive posture, and armed service culture explained this choice. For French political and military leaders, the control of the sea was supposed to be ensured by the British Navy. Moreover, from the French strategic standpoint, Franco-British airpower was equivalent to German-Italian airpower because British bombers were supposed to compensate for the deficiencies of French bombing, while British pursuit fighters could also reinforce the FAF if necessary. Thus, on 28 August 1939, during the crucial governmental meeting in Daladier's office that resulted in the French decision to go to war, La Chambre stated that "Britain will initially take responsibility for the bombing in the North of Germany."⁴⁹

However, underneath the Franco-British agreement, each nation sought to put the burden of its defense on the other.⁵⁰ To counter an air attack against her territory, Britain wanted to send only the strict minimum of fighters to France. Indeed, the RAF Chief of Staff, Air Chief Marshal Hugh Dowding, had no faith in the French air defense system. He believed that each Hurricane sent to France had little chance to come back.⁵¹ Britain agreed to send a few fighter squadrons assigned to protect the British expeditionary force.⁵² The Battle of France would prove that Dowding's assessment was correct.

⁴⁷ Robineau, "French Inter-War Air Policy and Air War 1939-1940," 633.

⁴⁸ Arthur Conte, "La France n'avait pas le choix," *ICARE*, no. 53, Spring-Summer 1970, 41.

⁴⁹ Conte, "La France n'avait pas le choix," 42.

⁵⁰ Barry Posen, *The Sources of Military Doctrine: France, Britain, and Germany between the World Wars* (Cornell Studies in Security Affairs. Ithaca: Cornell Univ.Pr, 1984), 103.

⁵¹ Stephen Bungay, *The Most Dangerous Enemy: A History of the Battle of Britain* (Motorbooks Intl, 2015), 101.

⁵² Robineau, "French Inter-War Air Policy and Air War 1939-1940," 633.

Concerning the bombers, the British Bomber Command wanted to strike urban areas deep inside the German territory, while the French military leaders expected British bombers to strike rail and roads line of communications in order to avoid an invasion of France.⁵³ The French vision of the best way to use bombers also came from the land-centric perspective of airpower that dominated French military leaders at the time.

The strategic discrepancies both in terms of the employment of pursuit fighters (defense of Britain vs. defense of the front) and bombers (strategic bombing vs. denial) would partly explain the lack of operational cohesion between the two air forces in French skies.

The Expeditionary Force sent to France was composed of two elements: the Advanced Air Strike Force (AASF) and the Air Component.

These units of the AASF arrived in Reims in September 1939:

- 71st Wing: 15th and 40th bomber squadrons (flying the Fairey Battle)
- 72nd Wing: 105th and 226th bomber squadrons (Battle)
- 74th Wing: 103rd and 150th bomber squadrons (Battle)
- 76th Wing: 12th and 142nd bomber squadrons (Battle)

The Air Component that supported the BEF comprised:

- 50th Wing: 4th and 13th bomber squadrons flying the Lysander, and the 53rd bomber squadron flying the Blenheim IV;
- 51st Wing: 2nd and 26th bomber squadrons (Lysander), and the 53rd bomber squadron (Blenheim IV);
- 60th Wing: 1st, 73rd, 85th, and 87th fighter squadrons (Hurricane);
- 70th Wing: 18th and 57th bomber squadrons (Blenheim I).

To sum up

At the dawn of WWII, the strategic context in France reflected the social, political, and economic tensions in Europe. The combination of these tensions and the weaknesses of the Third Republic led to a grand strategy that was characterized by the

⁵³ Ibid.

desire to maintain a stalemate. In turn, the French High Command developed a military strategy that sought to contain German forces until the services achieved their modernization. French civilian and military leaders failed to prepare military services for war, especially airpower. While the interwar years saw the development of airpower theories in Germany, the United States, and in Britain, the FAF did not develop its theory of victory but rather a “reactive doctrine” in Cain’s terms. Furthermore, the efforts for modernizing the FAF began in 1938, two years after the German’s, and French airpower would eventually fail to catch up to the Luftwaffe. Although the forces at play seemed balanced, French airpower suffered from several flaws in September 1939: no modern bomber force, an ongoing modernization of its pursuit aircraft, and leaders who intended to apply an outdated theory of victory anchored in the principles of positional warfare experienced during WWI. However, the German interpretation of modern warfare would soon pose insurmountable problems to the French High Command.



CHAPTER 2

FROM THE PHONY WAR TO THE BATTLE OF FRANCE

The Phony War

France entered WWII on 3 September 1939, at 5:30 p.m., when the ultimatum that asked for the retreat of German forces from Poland expired. In the following eight months no significant land battle occurred on French soil, but the fight began in the sky. The period from 3 September 1939 to 10 May 1940 (when the Germans invaded France) is thus called the 'Phony War'.¹ While the Phony War is less studied by historians focused on the land battle, this period deserves special attention from the air perspective. The Phony War and the Battle of France constitute two complementary elements of the air battle over the French territory between 1939 and 1940.

Disinclined to attack the opponent, France waited until the enemy invaded. In September 1939, Germany did not want to engage its troops on two distinct fronts, and Hitler would wait for the moment and the place that he would choose to attack the Western Front: after defeating Poland and after the rigorous winter of 1939-1940. This situation led to a stalemate on the ground during eight months – the Phony War – but not in the air, and the fight between the Allies and the Luftwaffe began a few days after the hostilities were declared.

From 7 to 15 September 1939, a limited ground offensive was conducted in Saarland that aimed at easing the pressure on Polish forces. On 28 September, the Polish collapse put an end to the timid French initiative.

In September 1939, while the RAF was engaged against the German Navy and the Luftwaffe in the North Sea, the initial attempts of the FAF were focused on determining when and where the Wehrmacht would launch its assault. The French headquarters expected a remake of the German invasion performed in 1914: a rapid invasion launched through the Low Countries – avoiding the Maginot Line – combined with air attacks on FAF air bases as well as French cities. However, nothing happened as expected, and in

¹ The French translation of the 'Phony War' is 'La Drôle de Guerre,' which can be translated as the 'Funny War.' In Germany the same period was known as the 'Sitzkrieg' (the Sitting War), a play on the word 'Blitzkrieg.'

September 1939 the part of the Luftwaffe that was not engaged in Poland only sought to counter French strategic reconnaissance as well as British strikes against her North Sea fleet.

By the end of September 1939, the FAF had lost 34 aircraft, 60% of them reconnaissance aircraft trying to detect the supposed invasion. On the other hand, about twenty Bf 109s were destroyed by French fighters, primarily by H-75As flown by the 4th and the 5th Wings.² French losses confirmed the vulnerability of strategic reconnaissance and observation aircraft – such as the Potez 637 and Mureaux – against German pursuit fighters.³ Even though the bulk of French bomber units were assigned far from the front in the South of France in order to speed up their conversion to modern aircraft, a few missions were executed by units flying antique BCRs (Bloch 200) and Bloch 131s. They were slaughtered by German fighters. These missions uselessly wasted precious crews and convinced the French headquarters no longer to use these outdated bombers. Moreover, 12 French fighters were lost during this period: 7 Curtiss, and 5 M.S. 406s.⁴ The first dogfights confirmed the flaws of the M.S. 406 which was too slow to escape the Bf 109E and could not catch the German bombers.⁵ Even though the H-75A was inferior in terms of speed and armament to the Bf 109E, its better maneuverability and range allowed French pilots to fight with a better chance than the M.S. 406. The good results obtained by the H-75A can also be explained by the fact that the 4th and the 5th Wings – about 25% of the fighter pilots – were the elite of French fighter groups. Most importantly, the FAF lost 38 crew members during the first month of the war. The FAF knew that it could not afford to lose such a number of crews at this rate, and this attrition would lead the FAF headquarters to conserve as much as possible its crews and its aircraft.

October 1939 saw the growth of both the RAF and the Luftwaffe. Thus, 18 new squadrons were created in the RAF, and most of them were fighter squadrons. Even though these new fighter squadrons would have to wait before being fully operational on the Hurricane or Spitfire, this trend illustrated the advance of the R.A.F in comparison

² Ehrengardt, *Les Aiglons*, 138.

³ Ibid., 46.

⁴ Ibid., 48.

⁵ Ibid., 47.

with the FAF. The ability of the British air industry to produce modern fighters as well as the ability of the RAF to train new crews eloquently emphasized the key differences between both allied air forces. The FAF created only four new fighter groups during the eight months of the Phony War due essentially to the lack of aircraft production and training problems.⁶ While the production of the Spitfire across the Channel was steadily rising, the deliveries of the Dewoitine D.520 – whose performances were similar to those to the Bf 109E – were still delayed due to technical adaptations.

Bad weather over the north-east of France hindered air operations in October 1939, and most of the air fights concerned the RAF on the north coast of Britain. During these fights, the RAF experimented with its air defense system and British fighters punished German offensives, which involved bombers as well as hydroplanes without fighter escort (14 victories for the Fighter Command).⁷ On the other hand, the FAF lost 11 aircraft including 1 brand new LeO 451 and 3 Potez 63.11s, which began to replace the outdated Mureaux. Only four Hs 126s had been shot down by French fighters. October 1939 also saw the collapse of Poland, and German units began their transfer from Poland to the Western Front.

In November 1939, the biggest air fight since the outbreak of the hostilities occurred in the French sky. The so-called “9 against 27” air fight took place on 6 November when, shortly before 2:00 p.m., twenty-seven Bf 109Ds took off from Lachen-Speyerdorff led by the ace of the Polish campaign, Hannes Gentzen.⁸ At the same time, nine Curtisses from the GC II/5 took off from Metz in order to escort a Potez 63.11 for a reconnaissance mission over La Sarre area.⁹ During the following hour, an intense dogfight developed at the end of which five Bf 109Ds were shot down with no loss for the French side. This result can be explained not only by the H-75A’s superiority over the Bf 109D – which was demonstrated throughout the Phony War – but also the fact that the training of the French fighter pilots was at least equivalent to the German. However, the result of this dogfight also fed the belief of the superiority of French materials over

⁶ Ehrengardt, *Les Aiglons*, 63.

⁷ Ibid., 62.

⁸ Ibid., 65.

⁹ GC II/5 means: the second Fighter Group of the 5th Fighter Wing. See also: Ehrengardt, *Les Aiglons*, 65.

German ones among French political and military leaders. The future would contradict this belief.

November 1939 would end with 13 French losses (6 reconnaissance aircraft, one bomber, and 5 fighters) to German fighters versus 17 confirmed enemies shot down.¹⁰ New M.S. 406s arrived in order to replace the older Morane but they still had same flaws (lack of rate of climb and speed, weapons that jammed at high altitude, and lack of agility). The fighter groups that flew the Curtiss H-75A also saw the arrival of the new version (H-75A-2) with two additional machine guns that compensated for the lack of armament of the first version.¹¹

December 1939 was marked by the bad weather in France as well as by one of the deadliest missions of the Bomber Command performed so far. A decision of the British War Cabinet ordered the Bomber Command to plan some missions that would aim at striking German battleships in the area of the Heligoland Bight. After two first missions of armed reconnaissance performed on 3 and 14 December, a formation of 22 Wellingtons took off on the 18th to strike a decisive blow at the German Navy. However, the British were not the only ones to have developed radar, and since 3 December 1939, two additional radar stations 'Freya' had been built in the area. Eleven Wellingtons were shot down on this day by a combination of German flak as well as Bf 110s and Bf 109s. In addition, one Wellington had to make a sea-landing on its way back, and six badly-wounded British bombers crashed on their runway by trying to land.¹² This mission was later called 'the Battle of the Heligoland Bight,' and would prove decisive in debunking the myth of the "bomber always get through" within the Bomber Command. The Germans had reacted slowly but the punishment was eventually terrible for the RAF. On the French side, three losses were recorded in December 1939 (two reconnaissance aircraft, and one M.S. 406) versus three Bf 109s shot down.¹³

The offensive of the "General Winter" continued in January 1940, and air operations almost stopped over France and Germany. Three additional French aircraft (two M.S. 406, and one reconnaissance aircraft) were lost in January 1940 versus four Bf

¹⁰ Ehrengardt, *Les Aiglons*, 80.

¹¹ Ibid.

¹² Ibid., 91.

¹³ Ibid., 96.

109s and two Do 17s.¹⁴ One of the consequences of the rigorous winter was the unveiling of the German invasion plan on the Western Front when, completely lost in the bad weather, a courier plane had to land in distress in Belgium on 10 January 1940. The consequence of both the persistent bad weather as well as the loss of the invasion plan led eventually Hitler to postpone his attack. Finally, the invasion plan would be drastically revised.¹⁵

In February 1940 French bomber groups were supposed to achieve their conversion to LeO 451s but only two groups out of ten had received their full authorization of bombers.¹⁶ Some fighter groups also had to wait before flying modern aircraft due to the fact that the new D.520 and Bloch 151/152 were not fully operational when delivered. Indeed, some equipment such as radios were missing, and the machine guns had still to be harmonized.¹⁷

Spring's arrival came along with the increase of aerial operations. However, while the Luftwaffe had adopted a defensive posture, German fighters became more aggressive by seeking to gain air superiority over the Western front, and the results from March 1940 constituted a fair prediction of the following months.¹⁸ In March 1940, even though the RAF obtained good results with its Hurricane and Spitfire, the FAF lost nine fighters and six reconnaissance aircraft versus no wins.¹⁹

At the end of April and at the beginning of May 1940, bad weather once again hindered air operations. The Luftwaffe performed a few strategic reconnaissance missions, and German fighters seemed to avoid any dogfights unless they were forced. It was the calm before the storm.²⁰ In April 1940, the FAF lost 10 fighters, 3 reconnaissance aircraft, and 1 bomber versus 6 German fighters, and 12 reconnaissance aircraft.²¹ Most of the French and German losses were due to enemy fighters.

¹⁴ Ibid., 104 and 138.

¹⁵ Ibid., 102.

¹⁶ Ibid., 106.

¹⁷ Facon, *Batailles Dans Le Ciel de France*, 204-205.

¹⁸ Ehrengardt, *Les Aiglons*, 112.

¹⁹ Ibid., 119.

²⁰ Lieutenant-Colonel Salesse, *L'Aviation de Chasse Française en 1939-1940* (Paris: Berger-Levrault, 1st Edition, 1948), 73.

²¹ Ehrengardt, *Les Aiglons*, 132 and 138.

On 10 May 1940, the FAF modernization was significant but had not caught up with the Luftwaffe. Four hundred and twelve M.S. 406s still constituted the bulk of French fighters (52%). The number of Curtisses had increased to 126, and the FAF received its first H-75A-3s with a more powerful engine. However, due to the delays, the FAF had only 57 D.520s, the only aircraft that was able to fight equally against Bf 109Es. In the same vein, even though 197 Bloch 151/152s equipped seven fighter groups, only two-thirds were considered combat ready. The rest of Bloch 151/152s were non-operational due to mechanical failure.²² The situation among bomber groups was similar with only 94 Leo 451s delivered to the FAF. Whereas 77 Glenn Martin 167Fs were received by the FAF from the United States, they were still in North Africa with eight Douglas DB-7s. Only reconnaissance and observation wings saw a real change with 396 Potez 63.11s and 27 Bloch 174s delivered.²³ These aircraft represented a huge step in terms of quality in comparison to the outdated Mureaux and Potez 540. Finally, the attrition among the crews became a major concern for the FAF. New trainees as well as Polish and Czech pilots that joined the FAF after the fall of their countries were not able to compensate for the losses.²⁴

To Sum Up

The Phony War demonstrated FAF strategic, operational, and tactical limits. Although in mid-1940, French air industry began to catch up with Britain and Germany in terms of number of aircraft produced per year, operational units still had to implement final adjustments to turn a factory-delivered airplane into a combat aircraft. Moreover, the lack of testing performed in to order to shorten the production delays led to some malfunctions such as the jamming of machine guns as well as flight controls that froze at high altitude. Both malfunctions were due to the type of grease used. Material problems were the consequence of the flawed FAF acquisition programs as well as the lack of improvement among aviation industries during the interwar years that plagued the FAF tactical system. In that respect, considering Murray and Millett's questions, *the Phony*

²² Ibid., 120.

²³ Ibid., 121.

²⁴ Ibid.

War emphasized the inconsistencies between FAF tactical approaches and operational capabilities from a material perspective.

Even if the production of aircraft had been satisfactory in September 1939, the number of crews properly trained would not have been sufficient to compensate losses. Thus, even in the low-intensity air fights that occurred during the Phony War, *the FAF conception of training did not meet the requirements imposed by its tactical system.*

The strategic and operational dominance of the French Army also began to hinder coherent air operations. Limited in number, dispersed organizationally among army divisions as well as the FAF air defense, French airpower could not perform efficient air operations by combining war principles such as mass and concentration. In that context, during the Phony War, one can argue that *the tactical system of the FAF was neither consistent with its operational capabilities nor emphasized integration of all arms by combining mass and concentration.*

Finally, the French High Command cultivated a confidence that would prove disastrous at the tactical level. Reports coming from the French air liaison team sent to Poland concerning how the Luftwaffe gained air superiority, air-land coordination, and efficiency of the flak were interpreted in compliance with the WWI paradigm that dominated the French armed forces at the time. Surprise, another war principle, just seemed outside the equation of the FAF's tactical system.

The scene was set for the Battle of France. The Phony War was not a fake for the air force: 83 French crew members were killed by the enemy, 387 French aircraft were destroyed (all causes considered), and 527 aircraft damaged.²⁵ In eight months, French airmen performed 11,264 sorties on outdated aircraft, demonstrating to the enemy their courage, cunning, and training. Even though important gaps remained, the morale of French airmen was still good because they thought that new and better materials would eventually be delivered; because they saw the confidence in their chief's eyes; and because the unthinkable had not happened yet.

²⁵ Ibid., 132.

The Battle of France

Organization of the French Armed Forces

It is worth noting that almost all French military leaders were 60 years old or older in May 1940, while the average age of German generals was about 55 years old. Gamelin was 68 years old in May 1940. Considered one of the most brilliant officers in the army before WWI, he became a general in 1916 at the age of 44 after demonstrating his organizational as well as tactical qualities on Joffre's staff.²⁶ A man of compromise, Gamelin was known both for his close relationships with French political leaders as well as his determination not to decide in order to preserve his career.²⁷ During the interwar years, facing the disagreement among the French Army military command between the proponents of armored division and those of the Maginot Line, Gamelin chose to accommodate both in order not to annoy political leaders that supported one side or the other.²⁸

At the outset, Gamelin was the Commander-in-Chief of the French joint forces. Thus, Gamelin had authority over army General Alphonse Georges, who was the commander of the North and East Fronts, navy Chief of Staff Admiral François Darlan, and FAF Chief of Staff Joseph Vuillemin. Unlike Gamelin, Vuillemin was better known as a man of action than a man of thought. A WWI war hero, Vuillemin was nevertheless like Gamelin, chosen allegedly to please political leaders rather because of his leadership skills.²⁹ Furthermore, the commander of the North and East Fronts had little experience as a ground commander – he was wounded at the beginning of WWI, and Georges spent most of his career as a staff officer. Georges had especially been chosen because he did not represent a threat to Gamelin.³⁰ On the other hand, the brilliant reformer of the French Army from 1931 to 1935, Gen Maxime Weygand was sent to an honorary position in the Middle-East in 1939. In other words, the French High Command reflected both the delicate balance of the French political-military relationships under the 3rd Republic and the dominance of the WWI generation of generals over French services.

²⁶ Lormier, *La Bataille de France Jour Après Jour*, 34.

²⁷ Facon, *L'Armée de l'air dans la tourmente*, 269, 14-15.

²⁸ Lormier, *La Bataille de France Jour Après Jour*, 36.

²⁹ Facon, *L'Armée de l'air dans la tourmente*, 13.

³⁰ *Ibid.*, 35.

Conversely, the German High Command, which suffered from two military purges (one in 1919, and then after Hitler took power), was composed of officers who understood the lessons of 1918 and proposed innovative ideas.³¹

As a result of the interwar years' doctrinal fracture, Vuillemin controlled the part of the fighter groups which were dedicated to the defense of French air space, strategic reconnaissance, and bomber groups, while Georges controlled via his senior air officer, FAF General Marcel Tétu, the so-called 'Aerial Forces of Cooperation.' The latter included reconnaissance and observation groups placed at army and division levels as well as fighter groups dedicated to the protection of assigned army corps. The separation between Reserve and Cooperation Aerial Forces did not last because as soon as the German invasion started, Vuillemin – following pre-war agreement with Gamelin – gave the authority of all his units to Gen Tétu. The French Army had the reins of the FAF. Nevertheless, Vuillemin and his staff still exerted significant influence over the chiefs of the air zones as well as over Tétu but Vuillemin's influence accentuated rather than eased the organizational problem.³²

³¹ Lormier, *La Bataille de France Jour Après Jour*, 40.

³² Ehrengardt, "Autopsie d'une débâcle," 12.

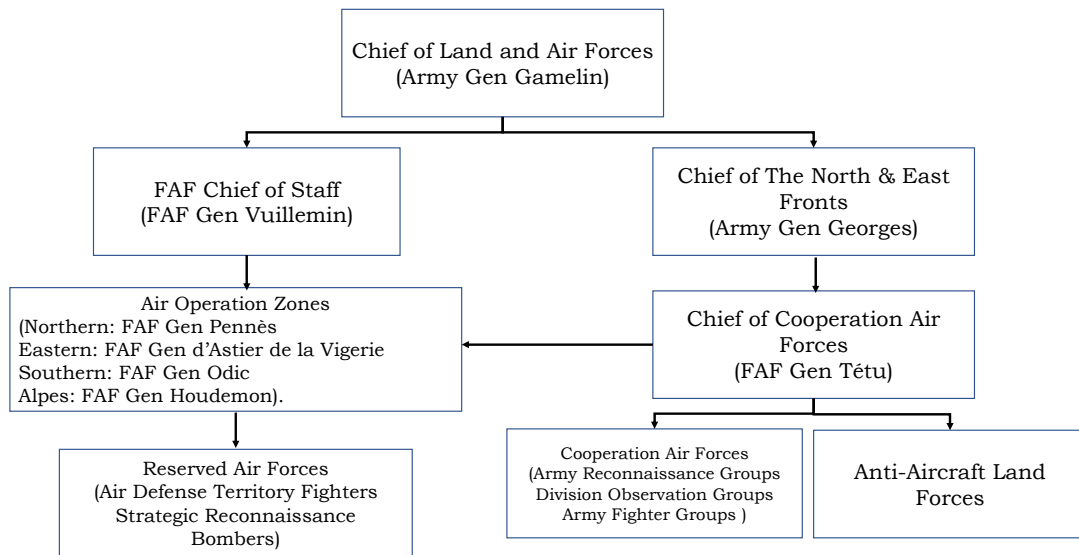


Figure 2: French Armed Forces Organization Feb-June 1940

Source: Facon, L'Armée de l'air dans la tourmente, 269.

The Dyle Maneuver

The Dyle maneuver was the French military plan that aimed at stopping the expected progression of the Wehrmacht on a geographical line from Breda (The Netherlands) to Namur (Belgium). The French plan had been developed by Gamelin, and was supposed to be launched as soon as the German invasion was detected. The Dyle maneuver was designed according to the French High Command's expectation that Hitler would send his troops through the Low Countries in order to avoid the Maginot Line in a similar manner as the Schlieffen Plan.

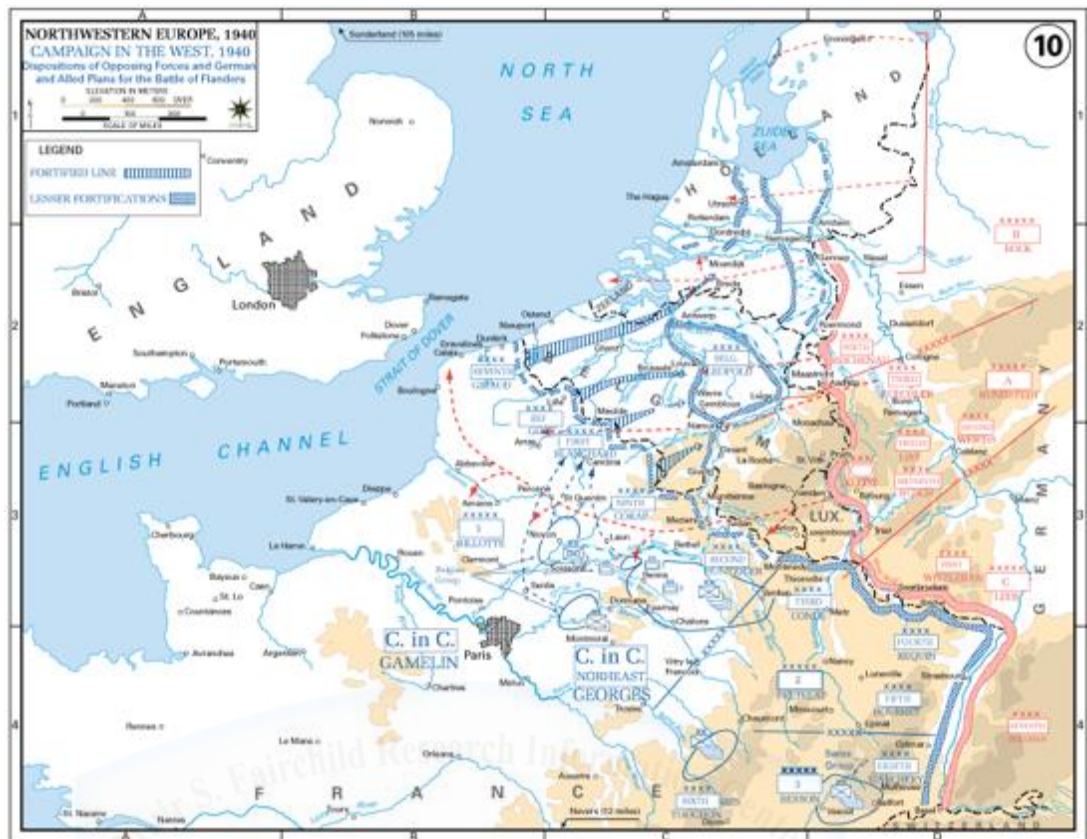


Figure 3: Dispositions of opposing forces and German and Allied Plans for the Battle of Flanders

Source:

<https://www.westpoint.edu/history/SitePages/WWII%20European%20Theater.aspx>

Gamelin's plan was developed in response to the political impact of a German invasion of Belgium after Poland on French public opinion. Moreover, the plan also sought to meet British concerns regarding an invasion of the Low Countries that would have provided access to the Channel for German armed forces. French Army generals Giraud (7th Army), Blanchard (1st Army), Corap (9th Army) and Huntziger (2nd Army) underlined before 10 May the operational risks induced by the Dyle maneuver. They thought that the Belgian defenses were too weak to provide enough time for French troops to establish a strong defensive position, but their arguments did not influence Gamelin.

The best French armies were assigned to achieve the Dyle Maneuver: whereas the 7th Army had to progress toward the North in order to join Dutch forces, and the 1st

Army with the British Expeditionary Corps were supposed to make contact with Belgian forces on the Breda-Dyle line. The weaker 2nd and 9th Army were assigned to the protection of the left flank of the Dyle maneuver by facing the mountainous forest of the Ardennes deemed impenetrable to German armored divisions.³³

In March 1940, the German General Erich von Manstein proposed to Hitler a plan concerning the attack of the Western Front. Manstein's intention was to drag French and British armies into a trap by performing a deceptive attack toward Belgium and the Netherlands. If the deception was successful, Panzer divisions would have performed a breakthrough in the Ardennes in order to achieve an encircling maneuver toward the Channel. After accomplishing the latter task, German armies would have regrouped their forces before attacking toward the south of France. The first part of Manstein's plan was called the 'Yellow Plan,' while the second part was called 'the Red Plan.'³⁴



³³ Lormier, *La Bataille de France Jour Après Jour*, 141.

³⁴ *Ibid.*, 30-31.

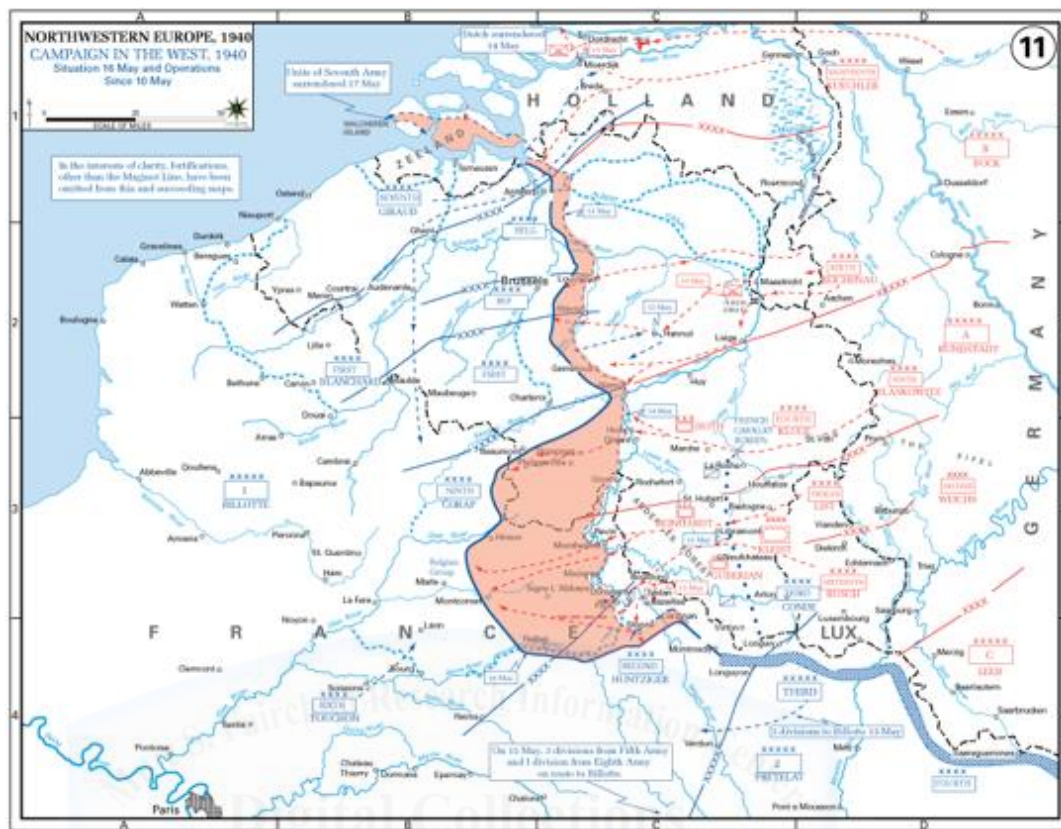


Figure 4: Situation 16 May and Operations since 10 May

Source: <https://www.westpoint.edu/history/SitePages/Our%20Atlases.aspx>

The Battle of Flanders: 10-15 May 1940

On 10 May, in parallel with the land offensive on the Western Front, the Luftwaffe struck 47 Allied air bases seeking to gain air superiority. Thanks to an effective dispersion plan, the FAF limited its losses to about 60 aircraft. Allied air forces had not been destroyed on the ground but the German air attack emphasized several different flaws. First, the ground warning network system did not play its role, and air bases frequently learned that they were under attack only when first bombs hit.³⁵ Second, Allied fighters that took off could rarely catch up with the German bombers due to both the enemy's fighter escort and the deficit in terms of speed of French fighters. The frustration of the French fighter pilots increased rapidly because they were unable to

³⁵ Facon, *L'Armée de l'air dans la tourmente*, 96.

inflict an level of attrition on the German bombers that would have equalized the balance of power.³⁶ Third, while the Luftwaffe powerfully coordinated its efforts through the support of ground troops in the frontline, the strikes on Allied air bases, and by striving to achieve air superiority, British and French airmen were focused on the support of ground forces that were executing the Dyle maneuver.³⁷ This focus was also a consequence of the transfer of authority from Vuillemin to Tétu in just four days, which gave to the 1st and 7th Army the control of almost all the FAF. The German deception offensive was working perfectly.

German air attacks on Allied air bases lasted until 15 May, and decreased after this date to stop eventually on 18 May. The Luftwaffe considered that air superiority had been gained, and German bombers turned out to strike French industry, rail nodes, and other military infrastructures.³⁸

General d'Astier de la Vigerie was in charge of the Northern Air Operation Zone, which had to cope with the main stream of the Luftwaffe offensive. D'Astier de la Vigerie had, in order to support the Dyle Maneuver, 360 fighters and 122 bombers, which were complemented by 72 fighters and British bombers.³⁹ Despite the difficulties described above, d'Astier de la Vigerie organized as best as he could the fight for the control of the air. Thus, on 10 May, the Luftwaffe lost 323 aircraft, including about 170 Ju 52s lost during the paratrooper assault in Belgium and the Netherlands (52% of the Ju 52s), 50 bombers He 111s, and 27 Do 17s).⁴⁰ Despite the asymmetry, the air was still contested.

On the morning of 10 May, German paratroopers took the Eben-Emael fort, which opened the way to several key bridges on the Albert Canal and the Meuse River in the vicinity of Maastricht. On 11 May, German Panzers crossed the river. While the French High Command expected that the Belgian defense would have lasted at least one week, in two days these defenses had collapsed. The tactical situation in Belgium accentuated the strategic focus of Gamelin on the Northern part of the front but the bulk of German

³⁶ Henri Hugo, "Une Expérience Inestimable," *ICARE*, no. 54, Summer 1970, 93.

³⁷ Facon, *Batailles Dans Le Ciel de France*, 95-99.

³⁸ *Ibid.*, 99.

³⁹ Facon, *L'Armée de l'air dans la tourmente*, 177.

⁴⁰ *Ibid.*, 174.

Panzer divisions were at the same time crossing the Ardennes. Thus, air operations on 11 May were focused on bombing the bridges over the Albert Canal, and more broadly the massing of German troops. On the morning of 11 May, a dozen LeO 451s attacked the Maastricht area. These medium-high altitude bombers performed their mission at low level to increase bombing precision, and they came across the German flak. One LeO 451 was shot down, and the others were badly hit by the 20mm and 37mm anti-aircraft guns that accompanying the German infantry. After the LeOs had landed, Tétu asked for a new mission but he was told that the group was unavailable until the next day in order to repair damage. The weakness of French bombing capability was obvious after a few hours.⁴¹

On the same day, air reconnaissance reported intense land activity in the Ardennes, and d'Astier de la Vigerie passed the report to Tétu. The latter ordered the reorientation of the bombing mission in support of the 2nd Army but the chief of the 1st Army successfully argued with Georges in order to maintain the priority of the Belgian Front.⁴²

The 12th marked the end of French assault aviation after only one mission. Eighteen Breguet 193s attacked at low level German columns that were progressing in the Maastricht area, at Tongres, after crossing the Albert Canal. The assault aviation was a brand new tool in the FAF, and was strongly promoted by Vuillemin who oriented a large amount of resources to it in order to build up this close air support capacity. Of the 18 aircraft, 8 were shot down and 6 severely damaged. The result of the mission in Tongres was a terrible shock for both the crews of the assault aviation as well as the FAF leaders.⁴³

On 13 May, Generals Gamelin and Georges had to admit their strategic error, and the effort of Allied airpower was oriented to prevent the seven German Panzer divisions from crossing the Meuse River in the Namur-Sedan area. On the 14th, 71 remaining Fairey Battles available in the AASF were launched to destroy the bridges in Sedan.⁴⁴

⁴¹ Ibid., 181.

⁴² Ibid., 184-185.

⁴³ Facon, *L'Armée de l'air dans la tourmente*, 182-183.

⁴⁴ At the outset of the war, 135 Fairey Battles were operational. On the 14th, only 72 of them were still available, and 71 were serviceable.

Thirty-one were shot down without significantly damaging Sedan bridges. On the same day d'Astier de la Vigerie could assemble only 30 French bombers (a combination of antique Amiot 143s and modern LeO 451s), and these bombers were ordered to strike the German spearhead in the vicinity of Sedan. The result of the French bombing was not significant but the losses increased.⁴⁵

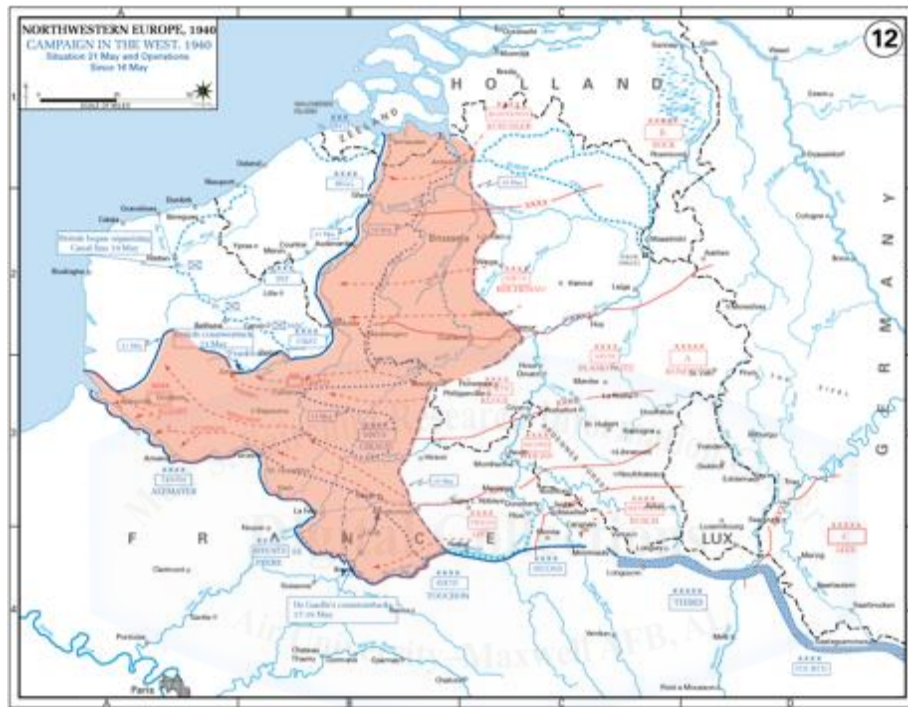


Figure 5: Situation 21 May and Operations since 16 May

Source: <https://www.westpoint.edu/history/SitePages/Our%20Atlases.aspx>

The Race Toward the Channel: 15-30 May 1940

The French frontline was broken at Sedan on 15 May 1940. As the American historian Robert Doughty explains in his book *The Breaking Point*, the breakthrough at Sedan alone did not explain the collapse of French defenses.⁴⁶ German forces opened a huge hole in French defenses by penetrating not only at Sedan but also by crossing the Meuse near Dinant and Monthermé. Thus, as Doughty puts it: “Without the two other

⁴⁵ Ibid., 186-187.

⁴⁶ Robert A. Doughty, *The Breaking Point: Sedan and the Fall of France, 1940* (Mechanicsburg, PA: Stackpole Books, 2014), 339.

crossings, the penetration made by the 19th Panzer Corps would have been extremely vulnerable and would probably not have had the strategic effect the three crossings had.”⁴⁷ After the breakthrough at Sedan, the German High Command decided not to head toward Paris but rather to race toward the Channel by enveloping the right flank of the French armies initially involved in the Dyle Maneuver, and separating them from the rest of the French Army. Doughty concludes by rightly arguing: “During the unfolding of the Dunkirk saga, the remnants of the French army continued to fight, but the final scene had already been written.”⁴⁸

The situation of the FAF was also critical. The combination of the attrition in the air and on the ground inflicted on the French fighters began to take its toll, and the fighter groups were increasingly overwhelmed. Thus, on 15 May, the Fighter Group II/4 had only seven available Curtiss out of an original thirty-four.⁴⁹ Even though the French air industry increased steadily the production of aircraft during the Battle of France (Cf. figure 5), FAF logistics were not efficient enough to bring these aircraft to the front. The reconnaissance and observation branch was too dispersed within the French Army to be really efficient.⁵⁰ The irrelevance of French air doctrine was also confirmed through the sacrifice of naval dive bombers, which attacked German massing of troops in support of the 1st Army on 19 and 20 May. On the 19th, ten in twenty Loire-Nieuport 401/411s were shot down by German flak. On the 20th, the remaining aircraft complemented by twelve American Vought 156s were ordered to perform the same type of dive bombing with the same result: nine of them were destroyed by lethal anti-aircraft artillery (AAA).⁵¹

⁴⁷ Ibid.

⁴⁸ Ibid.

⁴⁹ Max Vinçotte, “Quelques Exemples,” *ICARE*, no. 54, Summer 1970, 113.

⁵⁰ Facon, *L’Armée de l’air dans la tourmente*, 199.

⁵¹ Ibid., 190-191.

	Production expected	Actual production
September 1939		298
October	422	254
November	615	296
December	640	314
January 1940	805	358
February	995	279
March	1,185	364
April	1,375	330
May	1,678	434
June	1,678	

Table 1: Production of French aircraft during the Battle of France

Source: Facon, L'Armée de l'air dans la tourmente, 134.

The lack of understanding about what airpower could do – and could not do – among French Army leaders became obvious during this period. Army leaders envisioned the FAF as a cavalry corps that was supposed to balance out land troops by stopping a division of Panzers from the air. However, FAF pilots were not trained, equipped, and organized to destroy tanks protected by AAA.⁵² Moreover, since French doctrine did not promote the bombing of enemy air bases, the Bomber Command did not consider that these targets constituted a priority.⁵³ Thus, French and British bombers, despite the courage of their crews, were neither able to stop German armored divisions nor to strike beyond the front line the enemy's air force infrastructure.

Another factor hampered air operations: the retreat. Since 13 May, some airfields had to be abandoned due to the German advance. The situation worsened after the 15th, and on the 21st, all fighter groups were positioned around Paris.⁵⁴ France did not have any transport air fleet, and while aircraft could reach without great difficulty their new air

⁵² Ibid., 188.

⁵³ Ibid., 191.

⁵⁴ Ibid., 200-201.

bases, maintenance as well as support personnel had to take congested roads. The road network was overloaded by both the population that was fleeing the combat zone, and ground units that were maneuvering – hopefully in the opposite direction. This is how the maintenance personnel of the fighter groups I/4 and II/8 were captured on 25 May, five days after leaving their airbase for a new airfield assigned to their group.⁵⁵ This situation altered the overall availability of FAF units, and therefore the tactical effectiveness of French fighters. Furthermore, the ground warning network was severely altered from 19 May, which complicated even more than usual the interception of incoming or egressing German bombers by French fighters.⁵⁶

The Battle of Dunkirk began in the skies on 20 May when the RAF took charge of the responsibility for the air defense of the northern part of the Western Front.⁵⁷ FAF leaders desperately asked their British counterparts to increase the number of British fighters in order to compensate for the deficiencies of French air defense.⁵⁸ However, Churchill strove to help France as best as he could while preserving Britain's security, and he rightly preserved the RAF for the next round: the Battle of Britain. Thus, on 13 May the RAF aligned 160 bombers, 224 fighters, and 72 reconnaissance aircraft in France; on the 20th 48 fighters and 112 bombers were still stationed on the continent; and at the end of May, only forty fighters fought from French territory.

⁵⁵ Ehrengardt, "Autopsie d'une débâcle," 16.

⁵⁶ Facon, *L'Armée de l'air dans la tourmente*, 201.

⁵⁷ Ibid., 207.

⁵⁸ Ibid., 217.

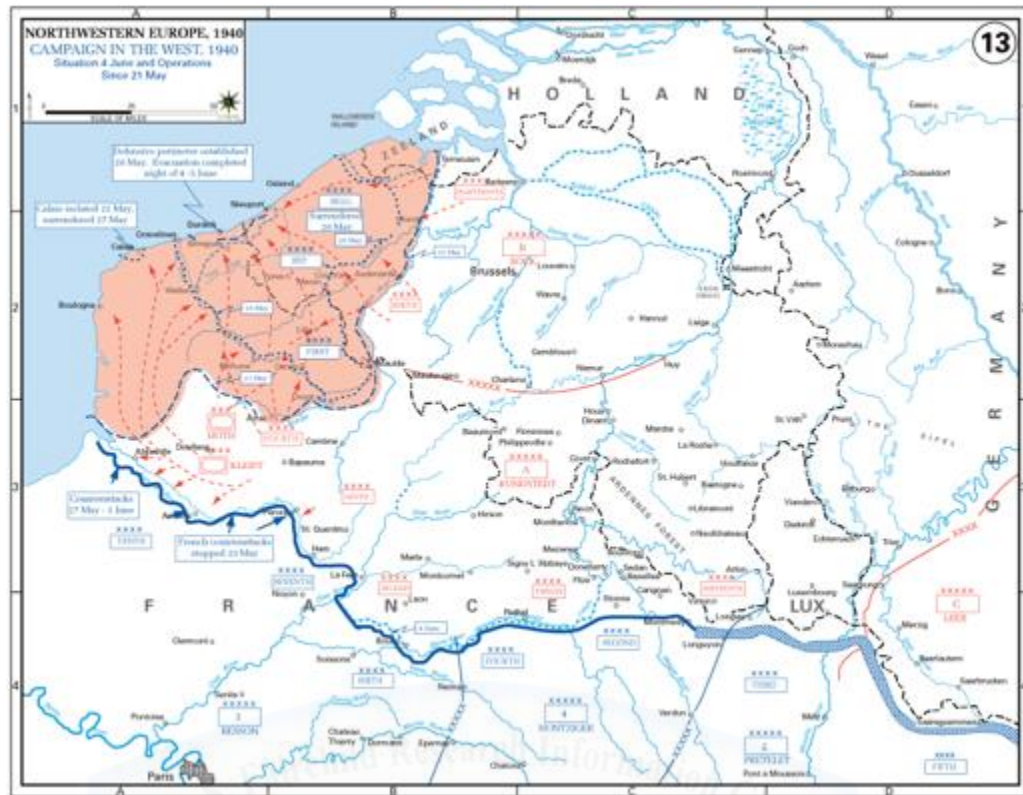


Figure 6: Situation 4 June and Operations since 21 May

Source: <https://www.westpoint.edu/history/SitePages/Our%20Atlases.aspx>

Operation Paula and the Battle of the Somme River: June 1940

A brief lull was observed on the Western Front along with the Battle of Dunkirk and the final encirclement of the armies engaged in the northern part of the Front (26 May – 4 June). This operational pause was due to the fact that the RAF was assuming alone the air defense of Dunkirk, and due to bad weather conditions on the front. The French Army used this opportunity to reorganize a line of defense – the Weygand Line – on the Somme, the Aisne, and the Oise rivers. However, during this period French Army leaders asked the FAF to continue to harass the enemy by attacking ground troops. However, the FAF was exhausted and its leaders successfully argued that dispersed attacks did not worth the subsequent losses. Therefore, the FAF used this period for reorganizing its tactical system by re-establishing a division between Reserve Aerial Forces under Vuillemin's command, and Aerial Forces of Cooperation under Weygand's command. Thus, on 2 June at midnight, 16 fighter groups were assigned to the northern

area of Paris, seven were left in the eastern area of Paris, and one group was sent to the Alps in order to counter a potential attack by Italy. Vuillemin's idea was to promote a more efficient use of airpower by striving to centralize the command of fighters, bombers, and strategic reconnaissance aircraft.⁵⁹ However, neither the pause nor this new attempt to separate the French Air Force and Army lasted long.

FAF leaders had also learned the hard way how to perform bombing of ground troops with more efficiency. The coherence of bomber raids improved in the beginning of June with a better employment of concentration and mass principles as well as better fighter escort than in May 1940.⁶⁰ However, the air-land coordination could still be improved as illustrated on 4 June when land commanders launched a counter-offensive without employing the air means at their disposal: 30 bombers and 40 fighters waited all day long for orders that never came.⁶¹ Moreover, as soon as German forces initiated the Red Plan, French Army leaders argued and opted to retake control of Reserve and Cooperation Aerial Forces. In mid-June, the French High Command decided to stop daylight bombing in order to protect refugee columns that were fleeing combat zones, and French fighters were tasked to perform tank strafing, which proved both ineffective and costly.⁶²

On 3 June, the Luftwaffe launched major air raids toward main French urban areas with a specific effort on Paris. The operation's codename was 'Paula.' The results of the operation were not successful in terms of bombing because a few industrial nodes, air bases, and rail roads were hit, and without significant damage.⁶³ The Germans were also learning the difference between myth and reality in terms of strategic bombing. However, Operation Paula also demonstrated the limitations of French air defense after a few weeks of combat. Most of French fighter groups tried to offer some resistance to the raids, but they eventually failed. The lack of a warning system, the inability of French pursuit fighters to penetrate the German escort, and the relatively light losses inflicted on

⁵⁹ Facon, *L'Armée de l'air dans la tourmente*, 223.

⁶⁰ Ibid., 230.

⁶¹ Ibid., 224.

⁶² Ibid., 233.

⁶³ Ibid., 227.

German bombers translated the fact that the French air defense was overwhelmed by its German counterpart.⁶⁴

A period of relative stabilization allowed the FAF to increase the number of aircraft in its units. However, the lack of equipment and armament led to a rate of aircraft availability of about 30% on 5 June 1940. Thus, about 600 French fighters and 180 bombers were actually combat ready.⁶⁵ These figures represented a notable improvement in terms of bombers delivered to the FAF: the number of French bombers had almost doubled since the beginning of the war.⁶⁶ However, while the number of bombers increased, the number of crews was decreasing. Six bomber groups under the command of General Odic numbered 111 LeO 451s but only 27 crews.⁶⁷

From 5 to 10 June, the Germans attacked the Allies on the Somme River. The FAF put up some resistance to the Luftwaffe tide but these desperate missions produced insignificant results.⁶⁸

The last phase of the Battle of France began on 11 June when the Wehrmacht exploited a breakthrough of the frontline. The disorganization reached the French High Command, and the coordination of the FAF effort to support ground troops became very difficult. French bombers, protected by fighters, harassed enemy troops by attacking choke points. To overcome the weakness of the reconnaissance and bomber branches, French fighters were tasked to perform observation missions as well as to attack enemy columns.⁶⁹

On 10 June, Italy entered the war. Two British bomber squadrons reinforced the three French fighter groups that composed the Area of Air Operations of the Alps under the command of General Houdemon.⁷⁰ Houdemon had no difficulty in countering the few Italian attempts that aimed at bombing the French Mediterranean coast, and the D.520 demonstrated its superiority over Italian fighters and bombers (25 Italian aircraft

⁶⁴ Ibid.

⁶⁵ Facon, *L'Armée de l'air dans la tourmente*, 228.

⁶⁶ Ibid., 229.

⁶⁷ Ibid., 231.

⁶⁸ Salesse, *L'Aviation de Chasse Française en 1939-1940*, 141.

⁶⁹ Ibid., 156-157.

⁷⁰ Facon, *L'Armée de l'air dans la tourmente*, 237.

shot down by French fighters versus 1 French bomber shot down).⁷¹ From 17 to 22 June, the FAF initiated the transfer of its units across the Mediterranean in order to continue the fight from North African air bases. When Vuillemin learned the terms of the armistice signed on 23 June, he ordered a stop to the transfer of the FAF units. On 25 June, 12 fighter, 10 bomber, and 4 reconnaissance groups were still stationed in France. At the same date, 16 fighter, 22 bomber, and 10 reconnaissance groups had been transferred to North Africa.⁷²

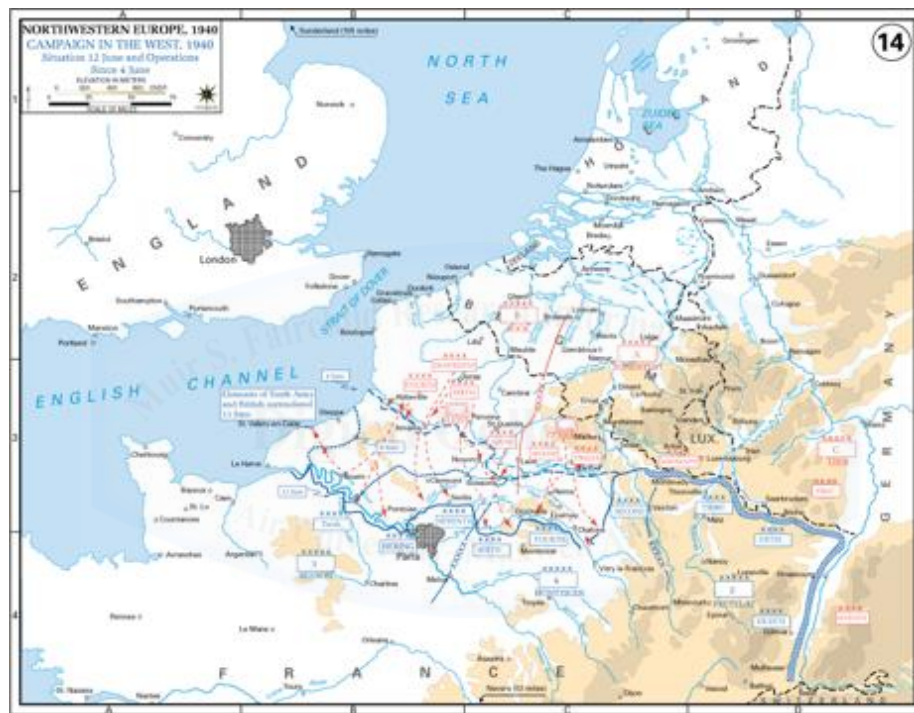


Figure 7: Situation 12 June and Operations since 2 June

Source: <https://www.westpoint.edu/history/SitePages/Our%20Atlases.aspx>

⁷¹ Ibid.

⁷² Ibid., 261.

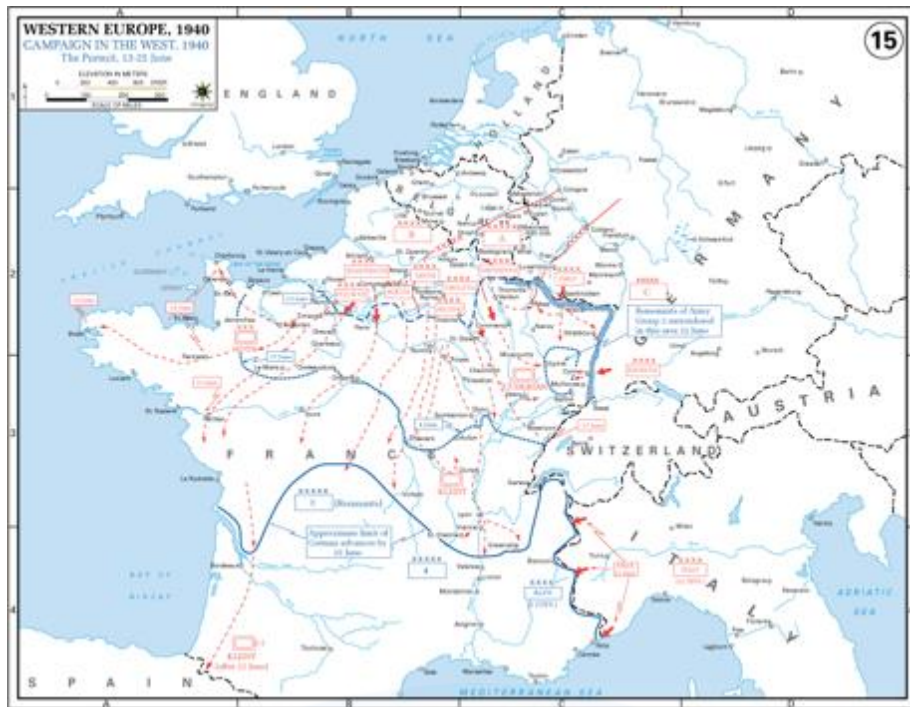


Figure 8: The Pursuit, 13-25 June

Source: <https://www.westpoint.edu/history/SitePages/Our%20Atlases.aspx>

CHAPTER 3

TACTICAL EFFECTIVENESS OF THE FRENCH AIR FORCE DURING THE BATTLE OF FRANCE – PART I – AIR DEFENSE

There are not fifty ways of fighting, there is only one, and that is to win.

- André Malraux

This chapter first examines how the tactical system of the FAF Fighter Command was built, and then assesses its tactical effectiveness. The study of the tactical effectiveness of FAF fighters during the Battle of France emphasizes the flaws of the tactical system. Indeed, the inability of the FAF Fighter Command to apply such principles of war as mass and concentration illustrates the inherent flaws of its tactical system in terms of training, organization, and material. The supposed disadvantage of French fighters in terms of material quantity and quality was actually less obvious than often claimed after WWII, and this assertion is reinforced when one adds to the count of FAF fighters the RAF Expeditionary Force, and its Hurricanes, sent to France. The French fighter component's inability to gain and to maintain air superiority over France constituted first and foremost an intellectual defeat. In fact, the present chapter demonstrates that FAF leaders first failed to construct, and then to employ, a tactical system that would have prevailed over the German air force. However, despite its efforts in the sky and on the ground, the Luftwaffe did not succeed in annihilating the FAF fighter component. At the armistice, on 22 June 1940, the FAF had more fighters than at the beginning of the Battle of France.

The Tactical System

Material

In September 1939, 247 M.S. 406s and 94 Curtiss H-75A-1s were in service in the FAF. Eight months later, the modernization of the FAF increased the amount of modern aircraft up to 412 M.S. 406s, 126 Curtiss H-75As, and 197 Bloch 151/152s.¹ The increase in the number of modern fighters did not imply an augmentation of the number

¹ Ehrengardt, *Les Aiglons*, 120.

of fighter groups. Instead, the new French fighters replaced the outdated ones (Dewoitine 501/510, Potez P.631, etc.). However, in May 1940, the FAF had only received 57 Dewoitine D.520s, which would not be integrated until 14 May due to delivery delays.

Before the arrival of the Dewoitine D.520, and with the notable exception of the Curtiss H-75A, French fighter aircraft were inferior to their German counterparts due especially to a lack of engine power. Indeed, the top speed of the Bf 109 was 65 mph faster than that of the M.S. 406, and therefore the Bf 109 had a better rate of climb that allowed German pilots to escape French fighters just by using their throttle.² The M.S. 406 received most of the criticisms of fighter pilots, who dubbed this aircraft “the champion of missed opportunity, and the enemy’s privileged target.”³ The M.S. 406 had roughly the same top speed as the He 111, Do 215, Do 17, and Hs 126, and this lack of power prevented the former from catching up to the latter.⁴ From the German perspective, the M.S. 406’s lack of power and agility made this French-built aircraft an easier target than the Curtisses.

The lack of power was not the sole problem of the M.S. 406s. The M.S. 406’s operational range was another important limitation that prevented it from protecting reconnaissance or bomber aircraft deep in the enemy’s territory.⁵ The shooting accuracy of the M.S. 406 was also poor owing to the instability of the sighting system, which was installed outside the cockpit.⁶ Furthermore, the type of grease employed in order to lubricate the M.S. 406’s machine guns was not compatible with the cold temperatures encountered at high altitude, and the M.S. 406’s weapons often jammed in the middle of a dogfight.⁷ Besides the jamming problem, the M.S. 406 had only one 20mm gun with a very limited amount of ammunition. This forced M.S 406 pilots to fire at close range to German bombers and therefore exposed them to the bombers’ defensive weapons.

The radio also worked erratically. It was difficult to establish contact within a flight, and almost impossible to communicate with ground stations or with other fighter

² Salesse, *L’Aviation de Chasse Française en 1939-1940*, 7-8.

³ Raymond Clausse, “Une Découverte Brutale Mais Tardive,” *ICARE*, no. 55, Fall-Winter 1970, 67.

⁴ Henri Hugo, “Une Expérience Inestimable,” *ICARE*, no. 54, Summer 1970, 93.

⁵ Salesse, *L’Aviation de Chasse Française en 1939-1940*, 60.

⁶ Clausse, “Une Découverte Brutale Mais Tardive,” 67.

⁷ *Ibid.*

groups.⁸ Radio failure constituted one of the principal flaws of the FAF during the Battle of France. After taking off, it was impossible for the French command and control authorities to reorient the fighters toward a new mission. Moreover, in flight, the lack of a proper means of transmission relegated the coordination between fighters to visual communication, which was inefficient. More importantly, because radio communications between French fighters, bombers, and reconnaissance aircraft failed most of the time, the coordination between them never existed in flight.⁹ As a result, when at the beginning of hostilities bombers and fighters planned a meeting point just before crossing the front line, the rendezvous point was missed most of the time, and bombers or reconnaissance aircraft had either to push on without escort or to cancel their mission. This situation forced bomber packages to meet their escort above the airfield of the latter, and conversely fighter escort to reach the base of reconnaissance aircraft, which constituted a significant limitation in terms of loiter time for each formation.

Even though it was more modern than the M.S. 406, the Bloch 152 had many of the same flaws: frequent radio failures, limited operational range, lack of agility, lack of engine power, guns that froze at altitude, and an inaccurate sighting system. This last problem was addressed by maintenance specialists who replaced the original with an older but more reliable sighting system that equipped the outdated Dewoitine D.510.¹⁰

The flaws in the acquisition process of French fighter aircraft were obvious, and more specifically concerning the evaluation and test phase. The pressure put on the French industry to deliver hundreds of aircraft in the short term had consequences. Most of the equipment of each aircraft was not incorporated at the end of the production chain but only once the fighter was delivered to the FAF. However, the latter did not build a strong logistics chain that was able to absorb this additional workload. In other words, not only the FAF but also its parent ministry did not understand the significance of equipment, accessories, and spare parts that were at least as important as the airframes.¹¹ Moreover, to avoid additional delays, the test and evaluation phase of modern French

⁸ Ibid.

⁹ SHD., Série 3D, carton 511, Col Lefort, "Enseignements à Tirer des Opérations de Mai-Juin 1940," GB 6, 30.

¹⁰ Victor Veniel, "Depuis la Guerre d'Espagne, j'étais inquiet...", *ICARE*, no. 53, Spring 1970, 119.

¹¹ Facon, *Batailles Dans Le Ciel de France*, 204-205, 211.

aircraft was reduced to a minimum. Thus, new fighters were not combat ready when they arrived in operational units: a sighting system had to be implemented, a radio was missing, and weapons had to be harmonized.¹² This time pressure on the test and evaluation phase also explained why grease problems were revealed during the Battle of France and not before.

In terms of logistics, the lack of replacement parts for all types of fighters had a significant impact on air operations. From 10 to 15 May 1940, during the critical period that led to the breakthrough at Sedan, most fighter groups did not receive any new aircraft or replacement parts.¹³ Spare parts became rare in fighter groups, and despite the efforts of the FAF logistics chain, the resupplying and repair of non-operational fighters was greatly hampered. The flaws of the logistics chain had not been detected during the Phony War due to the low intensity of fights, and therefore the FAF faced a *fait accompli*. From the tactical standpoint, since the initial quantitative deficit in terms of FAF fighters was significant but not unbearable, after a few days of war, the difference between the allocation of aircraft and combat-ready aircraft became huge (seven operational aircraft as opposed to thirty-four in allocation to the GC II/4 on 15 May 1940).¹⁴ The flaws of the FAF logistics chain dramatically increased the quantitative deficit between the FAF and the Luftwaffe in terms of fighters at one of the most crucial moments of the Battle of France.

After 15 May 1940, and until the end of the Battle of France, fighter groups sent pilots to FAF depots in order to take new aircraft or new parts, and to bring them back to frontline units. The FAF neglected the need for ferry pilots, and the back and forth of frontline pilots reduced automatically the number of mission that could be performed by fighter groups.¹⁵ Moreover, when the pilots arrived at FAF depots, they were stunned to see hundreds of fighters perfectly aligned that seemed to be waiting for them. However, as a fighter pilot put it: “All these aircraft would have been perfect if only machine guns had had strikers and radio had worked.”¹⁶

¹² Joël Pape, “Parfois J’ai Envie d’oublier” *ICARE*, no. 54, Summer 1970, 105.

¹³ Salesse, *L’Aviation de Chasse Française en 1939-1940*, 23.

¹⁴ Max Vinçotte, “Quelques Exemples,” *ICARE*, no. 54, Summer 1970, 113.

¹⁵ Facon, *Batailles Dans Le Ciel de France*, 204-205, 220.

¹⁶ Henri Dietrich, “Point de Vue d’un Réserviste,” *ICARE*, no. 54, Summer 1970, 122.

The logistics set before the war altered the FAF tactical effectiveness during the Battle of France by decreasing the overall number of available fighters on the frontline. As the French historian Patrick Facon states, the story of the FAF logistics system was a story of “a slow but inescapable asphyxiation. Projections made after the defeat revealed that if the campaign had continued beyond the end of June, the FAF would have had to stop fighting probably in the middle of July” due to logistical shortcomings of the FAF’s tactical system.¹⁷

The study of the materials of the French fighter tactical system seen through the lens of Murray and Millett’s assessment in terms of tactical effectiveness emphasizes two main elements. First, in response to the question “*To what extent are military organizations' tactical systems consistent with support capabilities?*,” it must be concluded that the French fighter tactical system required a greater support than the FAF could provide. The FAF underestimated the significance of ferry pilots, pulling qualified fighter pilots away from frontline units at critical moments as well as increasing their cumulative levels of fatigue to no operational advantage. Furthermore, the FAF did not design a supply chain that could support a sustained combat period. The consequence was the inability of the FAF “to maintain combat operations at the tempo required by the tactical system.”¹⁸

Second, in answering the question “*To what extent do tactical systems place the strengths of military organizations against their adversary's weaknesses?*,” one can argue that the French fighter tactical system did not correspond to French military strengths. During the crucial period from January 1938 to May 1940, air force and civilian leaders chose to equip the FAF with essentially French-built fighters. However, the French aviation industry was unable to produce modern fighters that would be qualitatively equivalent to German ones. This industrial policy led the government to invest in several different aircraft manufacturers such as Morane Saulnier (M.S. 406), Bloch (Bloch 152), and Dewoitine (D.520), instead of coordinating the industrial efforts for the sake of both the performance of the selected fighter and the FAF supply chain. The best aircraft of the FAF at the outset of the hostilities seemed to be the Dewoitine

¹⁷ Ibid., 220.

¹⁸ Millett and Murray, *Military Effectiveness – Volume 1*, 25.

D.520 but the production limitations of the aviation industry prevented the FAF from equipping all its fighter units with this aircraft. Thus, the best aircraft in the FAF at the outbreak of the war was actually the American-built Curtiss H-75A, which should have been bought in greater numbers. As Murray and Millett explain: “Strengths and weaknesses refer to the range of weapons and human characteristics that affect combat power. For example, *an armed force based on a large national population and a backward industrial base would obviously be in error if it adopted tactical systems that required small forces equipped with sophisticated weapons* (emphasis added).”¹⁹ The situation of the FAF Fighter Command illustrated Murray and Millett’s assertion, and therefore one can argue that the FAF chose a tactical system that was based on the weaknesses of the French industrial base rather than on the latter’s strengths.

Organization

The Structure of the French Air Force

In August 1939, the French Fighter Command was organized around three brigades: the 21st at Chartres, the 22nd at Dijon, and the 23rd at Reims. Each brigade had at least three fighter groups, and each fighter group included two squadrons.²⁰ According to the organization of the FAF, each brigade was assigned either to the air defense of French territory (Reserve Aerial Forces) or to the protection of a specific army (Aerial Forces of Cooperation). On 10 May 1940, thanks to the FAF modernization, two new brigades had been created: the 24th and 25th Brigades. Five days later, Vuillemin had transferred the authority of all Reserve Air Force units under his command to General Tétu (chief of the Aerial Forces of Cooperation). Because the latter was directly under the command of General Georges (ground commander of the Northeastern Front), one can argue that the army held the reins of FAF’s fighters.

The Different Layers Of The Functional Chain Of Command

In February 1940, General Vuillemin ordered the creation of a new layer in the French air C2: the Area of Air Operations. This creation increased the complexity of an

¹⁹ Ibid., 25-26.

²⁰ Salesse, *L'Aviation de Chasse Française en 1939-1940*, 1.

already stove-piped organization. Two main reasons explained the complexity of the FAF organization. The first reason stemmed from the will of the Air Minister Pierre Cot, who (during his second term: 1936-38) foresaw the building of a powerful Allied air force through several alliances.²¹ Led by a FAF commander, the rise of an European air power would have aimed at containing German power from the East thanks to a partnership between France, the Soviet Union, and Poland, and from the West through a Franco-British alliance. Unfortunately, this alliance of European airpower would eventually fail owing primarily to Stalin's decision to sign a non-aggression agreement with Hitler.

As a FAF leader put it: "the FAF had a big head, a small body, and tiny fists."²² The first layer was General Vuillemin's staff, which was in charge of the air defense of French territory, especially in case of an in-depth German bombing attack. The second layer was at the head of each Area of Air Operations, wherein one could find an air general and his staff. For instance, General d'Astier de la Vigerie was the commander of the Northern Area of Air Operations with a staff of about 80 officers. Moreover, each Area of Air Operations had authority over one or two fighter brigades. Each fighter brigade had a headquarters with an air general at its head and a staff of twenty officers. Furthermore, from the land component perspective, each French army had a headquarters in charge of the of air operations working for its own benefit. Designed for leading an European air force, all these layers and their staffs were disproportionate in regards to the resources of the FAF, and this situation increased the confusion within the French C2.

The second explanation for the complexity of the FAF organization, came from the doctrinal debate of the interwar years, which never fully satisfied either the French Army or the FAF. Between September 1939 and January 1940, French Army leaders argued against the control of the FAF over fighters, strategic reconnaissance aircraft, and bombers. Prime Minister Édouard Daladier eventually heard the Army's grievances, and Vuillemin had to give the reins of the FAF to the Army through the new organization established in February 1940.²³ Furthermore, General Vuillemin used this reorganization

²¹ Pierre Cot, *L'armée de l'air 1936-1938* (Paris: Grasset, 1939), 124.

²² Ehrengardt, "Autopsie d'une débâcle," 12.

²³ Facon, *L'Armée de l'air dans la Tourmente*, 109.

to ward off a threatening rival, General Mouchard, for the head of the FAF.²⁴ While the creation of the Area of Air Operations corresponded to a step backward in terms of doctrine by adopting an organization similar to the one that had been used during WWI, the reorganization of French airpower generated confusion due essentially to the fact that the unity of command of FAF forces on the Northeastern Front was no longer respected.²⁵

Communication Problems In The French C2

At each hierarchical level described above, telephone was the sole means of communication. In May 1940, after a couple of days of fighting, German bombers attacked the French C2 infrastructures and cut wired communication lines. The communication between each layer of the French C2 was dramatically altered due to the fact that French headquarters did not have radio communication. Thus, on 11 May, air liaison officers embedded in the 1st Army did not know which fighter groups were at their disposal. For the same reasons, it was almost impossible for the 1st Army's air liaison officers to send their air requests to the Area of Air Operations concerned.²⁶ Moreover, overwhelmed by air requests coming from the 1st, 2nd, and 5th Armies, General d'Astier de la Vigerie did not have the situational awareness to allocate his air resources to the army that needed them the most.²⁷ Thus, in the northern part of the front, between 10 to 12 May, the first priority for the fighters tasked by d'Astier de la Vigerie was to cover the advance of land troops in Belgium, according to the Dyle maneuver. However, the progress of Allied troops in Belgium was not hampered by the Luftwaffe, which was mainly supporting the advance of German armored divisions across the Ardennes.²⁸ Furthermore, after 21 May 1940, due to the German encirclement of French armies involved in the Dyle maneuver, the communication between the latter and the Northern Area of Air Operations was definitely cut.²⁹ In that context, the failure of

²⁴ Ibid., 108.

²⁵ Cain, *Forgotten Air Force*, 123-124.

²⁶ SHD., Série 3D, carton 513, "L'Aviation dans la Bataille des Flandres," 29 August 1940, 8.

²⁷ Ibid.

²⁸ Ibid., 5.

²⁹ Ibid., 3.

communication in the French C2 accentuated the flaws of an ill-defined organization, and led both to a dispersion as well as to a waste of the meager fighter aircraft available.

The Organization of Fighter Groups

The last organizational element which deserves to be emphasized here is the organization of FAF fighter groups. The operational rhythm within a FAF fighter group was divided into three distinct parts: alert, flight, and rest. However, each FAF fighter group had only two flights.³⁰ Therefore, it was impossible for a group to respect the operational rhythm prescribed before the war.³¹ A close coordination between the activity of the different fighter groups was supposed to overcome this organizational shortfall, but the operational pace imposed by the Germans prevented such coordination. Thus, as soon as the Phony War began, group commanders had to maintain, from dawn to dusk, one flight on alert and one on standby, and therefore the pilot's rest was sacrificed.³² After three weeks, fatigue became one of the most important difficulties encountered by FAF fighter pilots, and this fatigue took its toll in terms of attrition. Moreover, the ongoing modernization of FAF fighter groups increased pilot fatigue because the absence of the fighter groups that were undergoing conversion training on new aircraft increased the operational burden of those who were still on the front line.

The Assessment Of The French C2's organization

By examining Murray and Millett's question "*To what extent do a military organization's tactical conceptions emphasize surprise and a rapid exploitation of opportunities?*," one can argue that the French air C2 had great difficulties in coordinating air operations due essentially to its cumbersome organization, the lack of communication between its different layers, and the fighter groups' organization. In turn, this confusion prevented the French air C2 from exploiting opportunities and to surprising German forces.

³⁰ A flight included three pursuit aircraft either in a V-formation or in an echelon formation.

³¹ Jean Romatet, "Les Causes de Notre Défaite," *ICARE*, no. 54, Summer 1970, 82.

³² Salesse, *L'Aviation de Chasse Française en 1939-1940*, 33.

Training

The training of French fighter pilots seemed, all things being equal, one of the FAF's positive points by providing before May 1940 a highly skilled pilot who could meet German standards in dogfights. However, the inability to generate a sufficient quantity of well-trained pilots after May 1940 demonstrated the failure of the FAF to build an effective tactical training system. As argued by the French historian Christian-Jacques Ehrengardt, on 10 May, while 511 fighters were in service in the northern and eastern Area of Operations, only 395 pilots were available, which represented a ratio of 0.77 pilots per aircraft.³³ Thus, the combination of the losses due to the Phony War with the FAF's inability to train fighter pilots at a rapid pace led to a situation, on 15 June, in which only 246 pilots had reinforced the different fighter units while 362 pilots had been lost so far.³⁴ Moreover, after May 1940, the quality of new recruits did not match pre-war standards, and subsequently the survivability of the "rookies" was by far inferior to the more experienced pilots. Even worse, some of the new recruits were simply not properly trained to fight, and fighter group leaders had to count mostly on experienced pilots who were already exhausted.³⁵ The conversion of fighter units to new aircraft accentuated the difficulty of the tactical training system. The Dewoitine D.520 was a capable fighter, but its pilots did not have the time to understand properly their new aircraft. Some D.520 pilots flew their first sortie in the aircraft on combat missions against Bf 109s.³⁶

Germany and Japan encountered similar problems during WWII, however, the threshold in terms of attrition that initiated the incapacity to produce a sufficient number of pilots in order to compensate for the losses seemed higher for the German and Japanese training systems in comparison with the French one. The lack of pilots was so important in the fighter component that the latter would have virtually ceased to exist in September 1940, one year after the onset of the Battle of France.³⁷

³³ Ehrengardt, "Autopsie d'une débâcle," 19.

³⁴ Ibid.

³⁵ Facon, *L'Armée de l'air dans la tourmente*, 158.

³⁶ Henri Hugo, "Une Expérience Inestimable," *ICARE*, no. 54, Summer 1970, 94.

³⁷ Ehrengardt, "Autopsie d'une débâcle," 19.

The failure of the FAF training system began well before the war. In 1938, Air Minister Guy La Chambre initiated a program that aimed at increasing the number of FAF personnel in order to match the growth of fighter aircraft. La Chambre's goal was to train in two years 500 officers instead of 200, 600 enlisted pilots instead of 200, and 6,000 maintenance specialists.³⁸ However, the situation in the FAF school system was close to chaos. Under Pierre Cot's tenure, the FAF had increased the number of schools in response to the growing tension in the international environment but the additional schools were created (twelve were formed during the period 1937-40) without the adequate personnel, especially flight instructors.³⁹ Thus, the inability of the training system to produce the required number of pilots assigned by La Chambre's program became obvious late in 1939, and an inspection team was sent to one of the fighter pilot schools. After the inspection, Vuillemin sought to fix the lack of instructors in the school system by transferring flight leaders from operational units as well as by transferring teachers from the flight instructor school.⁴⁰ General d'Harcourt, who was in charge of the fighter component within the FAF, argued against Vuillemin's proposition by explaining that such a solution would heal the symptoms and not the disease, but he did not sway Vuillemin.⁴¹ Vuillemin's directive was signed, and as Cain argues: "With less than one month before Germany was destined to invade French soil, the air staff decided to strip the front line units of their most experienced combat veterans."⁴² Vuillemin's directive required time to improve the situation of the school system, and the Luftwaffe did not intend to slow down. The French losses increased, and later in the year, fighter instructors and flight leaders left their trainees to come back to operational units due to the lack of pilots at the front. According to the predictions of the FAF staff (confirmed later during the war), at least 130 pilots should have been formed per month in order to compensate for losses. However, while from 3 September 1939 to 15 April 1940, 147 pilots were trained, from 15 April to 15 May only 42 new recruits joined their assigned

³⁸ Facon, *L'Armée de l'air dans la tourmente*, 162.

³⁹ Cain, *Forgotten Air Force*, 69.

⁴⁰ *Ibid.*, 74.

⁴¹ *Ibid.*

⁴² *Ibid.*, 76.

operational units.⁴³ Therefore, the FAF also lost the battle of training. By failing to understand the flaws of the FAF school system *before* the war, military and political leaders altered the overall tactical effectiveness of French airpower *during* the war in terms of quality as well as quantity of fighter pilots trained.

By considering Murray and Millett's question "*To what extent is the military organization's approach to training consistent with its tactical system?*," one can argue that the FAF training system was unable to produce a sufficient amount of new fighter pilots to sustain the pace of combat attrition during the Battle of France. Even though the aircraft in the fighter groups were not up-to-date, FAF leaders believed in the superiority of French fighter pilots over their German counterparts. However, while the training of French fighter pilots seemed satisfactory at the outbreak of hostilities, the flaws of the French training system induced a steady decrease in terms of flight skills among the new recruits. The FAF failed to train its fighter pilots for achieving the tasks required by the FAF tactical system.

Assessing the Tactical Effectiveness of FAF Fighters

Fighter Escort

After assessing the tactical effectiveness of the fighter escort mission, it appears that the FAF tactical system failed to adapt the principles of mass, concentration, and economy of force to the operational circumstances.

Defined well before the war through fighter regulations, the mission of fighter escort was based on principles such as freedom of maneuver of the escort, the concentration of protected aircraft in pre-defined areas as well as time periods, and the employment of surprise by quickly concentrating the escort in a limited zone of airspace.⁴⁴ However, the dramatic losses inflicted on reconnaissance and observation aircraft led French Army leaders to ask for a reconsideration of the pre-war regulation in order to spare aircraft and crews. Thus, in October 1939, the different Areas of Air Operations – under the authority of land commanders – began to task escort missions that

⁴³ Ehrengardt, "Autopsie d'une débâcle," 19.

⁴⁴ SHD., Série 3D, carton 513, Lt Col Bourdier, "La Mission de Protection en Chasse d'Armée," 17 August 1940, 2-3.

no longer favored the defense of a specific zone but rather the escort had to follow the reconnaissance aircraft assigned along with its mission.⁴⁵

Fighter groups criticized the modification of coherent pre-war rules without swaying either reconnaissance crews or Army leaders. The range of French fighters was limited, and prevented any fighter escort from protecting in-depth reconnaissance missions.⁴⁶ Moreover, the very survivability of reconnaissance and observation missions became hazardous after only 10-15 minutes. That was the period of time necessary for German fighters, which were scrambled by an effective warning system, to intercept French intruders.⁴⁷ This brief period of safety partly explains why the French fighter regulation stipulated that the best tactical approach for fighter escort was to cover a specific zone for a specific time period. When the operational significance of a reconnaissance mission justified it, different fighter groups protected specific zones all along the track of the reconnaissance aircraft. In any case, the solution promoted by Army leaders and observation crews induced that the fighter escort, stuck to its assigned reconnaissance aircraft, would have been overwhelmed after 15 minutes over the enemy territory without increasing the overall chance of success of the mission.

The quality of reconnaissance and observation aircraft in September 1939 also explained French losses. Indeed, the top speed of the outdated Mureaux 115 and Potez 390 (respectively 170 and 120 mph) did not match Bf 109s with their 310 mph.⁴⁸ Reconnaissance crews had little chance to escape once detected: while a part of German pursuit fighters took care of the escort, the rest of the former attacked their prey. The asymmetry between outdated French reconnaissance aircraft and German pursuit fighters constituted a better explanation concerning French losses rather than the fighter escort formation employed.

For all these reasons, the defense of a specific zone for a pre-defined period of time tactically made sense. More important, by forcing fighter escorts to stay with one aircraft, the mission of protection no longer respected the principles of freedom of

⁴⁵ Ibid., 6.

⁴⁶ Salesse, *L'Aviation de Chasse Française en 1939-1940*, 60.

⁴⁷ Ibid., 61.

⁴⁸ SHD., Série 3D, carton 513, Lt Col Bourdier, "La Mission de Protection en Chasse d'Armée," 17 August 1940, 5.

maneuver as well as concentration. Concerning freedom of maneuver, the escort was stuck to an aircraft, which in turn was focused on the ground activity.⁴⁹ Concerning concentration, fighter groups had to set up a formation that was disproportionate with regards to the means available. For protecting a single observation aircraft during five minutes over the enemy lines, fighter escorts were up to 27 aircraft.⁵⁰ An alternative would have been to engage nine fighters as a close escort, and to task an additional escort that also included nine pursuit aircraft in reserve on the other side of the front line. However, this formation required a level of coordination through radio communication that neither the command and control authorities nor the pursuit aircraft had.⁵¹ The solution adopted by FAF leaders was thus to maximize the number of fighters in charge of the escort. The FAF could not sustain such formation, and fighter groups had progressively to reduce the number of fighters assigned to protect reconnaissance missions. However, from the German side, the number of fighters sent to intercept French intruders did not decrease.

Fighter groups had to protect not only reconnaissance aircraft but also Allied bombers. Fighter groups assigned to Reserve Aerial Forces had to engage their means to oppose German bombers that were conducting in-depth bombing missions, and on the other hand fighters under the Aerial Forces of Cooperation had to protect reconnaissance and observation missions against enemy fighters that sought to take control of the air.⁵² However, neither Reserve Aerial Forces nor Aerial Forces of Cooperation had sufficient means to perform all their assigned missions. The modification of the escort mission illustrated how the FAF tactically misapplied such principles as concentration of forces, freedom of maneuver, and mass that in turn gave de facto air superiority to the Luftwaffe.

Finally, assessing how the FAF envisioned the fighter escort mission also revealed the difference of perception between the Luftwaffe and the FAF in terms of battle rhythm. German armed forces imposed a high-paced operational maneuver that was the opposite of the French vision. As explained in chapter 1, FAF doctrine promoted a defensive posture, which fed the strategic assumption that the conflict would be

⁴⁹ Ibid., 6.

⁵⁰ Ibid., 8.

⁵¹ Ibid.

⁵² Facon, *L'Armée de l'air dans la tourmente*, 233.

protracted. Therefore, in order to last, French airpower had to be conserved. Accordingly, fighter groups limited the number of sorties per pilot in order to conserve human potential as well as materiel. General Pinsart, who was the commander of the 21st Fighter Brigade, limited the number of sorties of French fighters to two per pilot in May 1940.⁵³ Thus, on 13 May, the average of the fighter sorties did not exceed 1.5 per pilot. Moreover, 25 percent of the fighter sorties lasted less than 45 minutes while the aircraft were able to fly at least 1 hour and 30 minutes.⁵⁴ This characteristic of the FAF tactical system had a direct consequence: by limiting the number of sorties, fewer fighters were available to escort reconnaissance and bomber missions. On the other hand, the Luftwaffe applied a different perspective in terms of economy of force: German fighter pilots often flew seven times per day.⁵⁵ As the French historian Raymond Danel explains, on 12 May, 1940, 85 Bf 109s of JG 27 performed 340 sorties, while 237 French fighters under General d'Astier de la Vigerie's command only performed 254 sorties.⁵⁶ German fighters were employed four times more than French ones. Therefore, the FAF was outpaced by the Luftwaffe, and this difference in terms of battle rhythm accentuated the fact that French airpower was overwhelmed by its opponent.

Organizational innovation can have good consequences, however, beside its relevance, the timing of such innovations matters. As the American scholar Peter Rosen argues, "When military innovation is required in wartime, however, it is because an inappropriate strategic goal is being pursued, or because the relationship between military operations and that goal has been misunderstood."⁵⁷ In that respect, the modification of the fighter escort mission in wartime demonstrated *the lack of consistency between the FAF's tactical approach and its strategic objectives* in Murray and Millett's terms. By employing its fighters to protect bombers and reconnaissance aircraft for the sake of the French Army, the FAF abandoned the initiative, and subsequently yielded the control of the air to the enemy. By accepting the modification of the tenets of the escort mission,

⁵³ Danel, "En Mai Juin 40, Ils étaient les Plus Forts," 66.

⁵⁴ Ehrengardt, "Autopsie d'une débâcle," 15.

⁵⁵ Danel, "En Mai Juin 40, Ils étaient les Plus Forts," 66.

⁵⁶ Danel, "Au Service de l'Armée de Terre," *ICARE*, no. 59, Fall-Winter 1971, 78.

⁵⁷ Stephen Peter Rosen, *Winning the next War: Innovation and the Modern Military* (Ithaca: Cornell Univ. Press, 1991), 35.

the FAF acquiesced in the denial of its ability to apply mass, concentration, and economy of force war principles. In doing so, the FAF also defaulted in its duty to gain and to maintain air superiority, and therefore FAF leaders put aside their own strategic objectives for the achievement of those of the land component. In that context, one can argue that the victim of the FAF choice was eventually French joint maneuvers.

Bomber Interception

The Context

In the beginning of June 1940, the Luftwaffe launched its bombers against three French urban areas. On June 1st, German bombers struck Marseille; on the 2nd, Lyon; and the 3rd, Paris. During the first two days, German bombings not only tested the French air defense but also strove to hide the Luftwaffe's main target: Paris. By striking Paris and its suburbs, the Luftwaffe aimed at French morale and war-making industry, as well as the attrition of FAF fighters before they could engage German land forces in the second part of their invasion plan: the Red Plan. The Germans labelled the Paris bombing "Operation Paula". It is worth noting that, since 23 May 1940, French intelligence services had known that such an attack would occur.⁵⁸ Therefore, the surprise was not on the German side, and Operation Paula could have been the opportunity for the FAF to exploit this advantage.

The German bombers attacked during a period that marked the end of a short lull. The Wehrmacht was reorganizing itself after halting before Dunkirk, and the air defense main effort was led by the RAF, which was fighting over Dunkirk to prevent the Luftwaffe from stopping Operation Dynamo. On 2 June 1940, by seizing the opportunity offered by the Wehrmacht, General Vuillemin convinced the French war cabinet to approve a reorganization of the FAF.⁵⁹ After three weeks of fighting in which most of the airpower involvement had been directed by and in support of the land component, Vuillemin sought to reorient the employment of French airpower by regaining control over fighters and bombers.

⁵⁸ Ibid., 60.

⁵⁹ Facon, *L'Armée de l'air dans la tourmente*, 223.

The analysis of Operation Paula offers a typical sample concerning the fight between the FAF and the Luftwaffe for air superiority. To intercept German bombers, the FAF grouped three fighter brigades around Paris, which included 218 fighters:⁶⁰

- the 21st with two fighter groups flying the Bloch 152 (GC I/1 and II/1), and one the M.S. 406 (GC I/6)
- the 22nd Fighter Brigade with two groups flying the Curtiss (GC I/5 and II/5), two other groups the M.S. 406 (GC I/2 and II/2), and one group the D.520 (GC II/7)
- and finally the 23rd Fighter Brigade with one group flying the D.520 (GC I/3), one group the Bloch 152 (I/8), and two groups the M.S. 406 (GC III/1 and III/7).⁶¹

Operation Paula

The German attack on Paris occurred on 3 June during lunchtime. The first information arrived too late to the 21st and 23rd Fighter Brigades in charge of the interception of incoming bombers, and their fighter groups took off either under the bombs or only after French pilots saw German bombers flying over their airfields. On the airfields of Bretigny and Plessis-Belleville, a few pilots of GC II/1 (Bloch 152) and III/1 managed to take off by avoiding the bomb craters but they were immediately under the fire of the German escort. After a short fight, they returned to their bases without significant results. At Coulommiers, alerted by the roar of He 111 engines, nine M.S. 406s (GC III/7) took off but they were unable to catch up to the He 111s. They were, however, engaged by about sixty Bf 109s and Bf 110s, and they were saved from slaughter by D.520s (GC I/3), which was the sole unit that received the alerting message sent by the French command and control authorities that was transmitted from the Eiffel Tower.⁶² Regarding the 22nd Fighter Brigade, its commander Colonel Dumemes received at 1245, with a 30-minute delay, the first information about the two enemy formations of bombers converging on Paris. Alerted in time, the fighter group I/5 (21 Curtiss H-75As) took off as fragged in order to intercept German bombers on the return.

⁶⁰ Ehrengardt, "Autopsie d'une débâcle," 26.

⁶¹ Danel, "En Mai Juin 40, Ils étaient les Plus Forts," 60.

⁶² Pierre-François Rivière, "3 Juin 1940 L'Opération Paula," *ICARE*, no. 54, Summer 1970, 126-127.

They intercepted 40 Do 17s above Reims, and they shot down 3 German fighters for 2 losses.⁶³ After receiving information, with a 25-minute delay, from the ground alerting network, eleven M.S. 406s (GC I/2) took off from Damblain in order to intercept twenty-five German bombers. These pilots never saw the bomber force, and they came back safely to their base.⁶⁴ Because Dumemes did not have information concerning one of his fighter groups (GC II/5), he called the operations room only to be told that most of the pilots of the group were out for lunch, and they were expected to come back at 15:00. Dumemes could hardly contain his rage and decided not to send the few pilots that were still on duty in order to avoid what would surely have been a bloodbath.⁶⁵

At 1715 Operation Paula was finished; all German aircraft had left the French sky. Thirteen French airfields were struck with six fighters destroyed, seven damaged, thirty-two airmen killed, and six runways rendered non-operational. Twenty-two railways were hit but the damage was quickly fixed the day after; fifteen French factories suffered from minor damage; two hundred and fifty civilians were killed; twenty-six German aircraft had been shot down but the FAF had lost a total of twenty-five fighters.

Even though the Luftwaffe failed to destroy FAF fighters, the results of Operation Paula demonstrated that the FAF failed to gain air superiority over Paris or even to offer a significant resistance to German raids. Furthermore, the loss ratio for French fighters was 1:1, which was not disgraceful in absolute terms but in relative terms constituted a catastrophe.⁶⁶ The FAF could not afford such a loss ratio due to the already significant quantitative asymmetry between both air forces. The failure of the FAF to gain air superiority over Paris stemmed from the flaws of the FAF tactical system, and more precisely from the latter's inability command and to control air defense efforts against bombing raids.

Assessment - The 'Reactive Air Doctrine'

⁶³ SHD., Série 3D, carton 510, Col Dumemes, "Actions du GC 22 les 1, 2, 3 juin 1940," 30 December 1940, 19.

⁶⁴ Ibid.

⁶⁵ Ibid., 18-19.

⁶⁶ Pierre-François Rivière, "3 Juin 1940 L'Opération Paula," *ICARE*, no. 54, Summer 1970, 127.

Three main reasons explain this failure. The first reason melds training and tactics, and therefore finds its roots in the FAF doctrine. It was not the first time that FAF fighters had to face German bombers and their escorts. In May 1940, FAF fighters had experienced an unpleasant surprise by facing unexpected concentrations of massive bomber raids that included heavy fighter escorts. Apart from the overwhelming number of aircraft, the German tactics also surprised French pilots. As a French fighter pilot put it, the fighters-bombers coordination as well as the coordination between the close and distant escorts, were of such efficiency – in addition of the unimaginable disproportion of fighters in presence – that French fighters quickly realized they had little chance to engage German bombers.⁶⁷ The results of the doctrinal struggle of the interwar years against the French Army led to a situation in which the FAF doctrine was torn apart between the necessity to achieve air superiority and the cooperation with land forces: a ‘reactive air doctrine’ in Cain’s terms.⁶⁸ Thus, the FAF was not prepared to fight the kind of air warfare imposed by the Luftwaffe because the French air doctrine did not make enough room for independent action such as gaining and maintaining air superiority.⁶⁹ Therefore, pre-war exercises emphasized an interpretation of airpower focused on the cooperation with the French Army, and left by the wayside the fundamentals regarding the interception of bomber raids observed during the Spanish Civil War as well as the Polish campaign.⁷⁰

Assessment - Tactical Considerations

In June 1940, after three weeks of fighting, the FAF tactical system had not found a solution to counter the tide of German bombers. Since the outbreak of hostilities, the focus of French fighters had not been to gain and maintain air superiority but rather to protect the advance of land troops during the Battle of Flanders, and to escort bombers and reconnaissance aircraft during the desperate attempts to stop German progress.⁷¹

⁶⁷ Raymond Clausse, “Une Découverte Brutale Mais Tardive,” *ICARE*, no. 55, Summer-Fall 1970, 67.

⁶⁸ Cain, *Forgotten Air Force*, 6.

⁶⁹ Facon, *L’Armée de l’air dans la tourmente*, 176.

⁷⁰ Cain, *Forgotten Air Force*, 81.

⁷¹ SHD., Série 3D, carton 510, Col Dumemes, “Actions du GC 22 les 1, 2, 3 juin 1940,” 30 December 1940, 21.

Therefore, after Vuillemin's reorganization, French fighters were rediscovering the air defense mission.

When 200 German bombers escorted by 150 fighters attacked Paris on 3 June 1940, French fighters were in the same tactical mode as in May 1940: whereas the initial surprise concerning the employment of large concentration of bombers was duly noticed, no solution had been developed to counter effectively German tactics. The German bombers were mainly He 111s, and their protection were a combination of a close escort (Bf 110s), and a distant escort (Bf 109s) that flew at a higher altitude. FAF leaders assigned M.S. 406s and Bloch 152s to attack the German bombers, while the more modern and faster D.520s were tasked to attack the enemy's fighter escort.

From the tactical perspective, French fighters made the same mistakes that had already been made in May 1940. M.S. 406 and Bloch 152 pilots strove to attack German bombers from the rear but the lack of relative speed between French fighters and He 111s prevented the former from effectively maneuvering in order to find a good firing position. Moreover, He 111s had an efficient rear-defensive armament, and the German pilots' flight discipline in maintaining a tight formation accentuated the He 111s' defenses. Thus, M.S. 406 and Bloch 152 pilots were forced to shoot from a farther distance than the effective range of their own weapons, and the results were unsurprisingly poor.⁷² A better option would have been to perform a head-on attack but this kind of maneuver was not taken under consideration before the war, and therefore fighter pilots were not trained for this type of interception.⁷³

Operation Paula also emphasized further limitations of French in-flight tactics. The FAF had adopted as its basic fighter element the three-aircraft. Developed after WWI, the formation with three aircraft provided, in theory, an efficient mutual support. On the other hand, as argued by the French historian Christian-Jacques Ehrengardt, this formation had a flaw: in case of a violent turn, the external wingman was disconnected from the rest of the flight. In such circumstances, the external wingman could no longer provide any mutual support, but more importantly he was also vulnerable to enemy

⁷² Ibid., 7.

⁷³ Ibid.

fighters.⁷⁴ An alternative consisted of switching both external wingmen during a steep turn but this maneuver required good coordination. Unfortunately, erratic radio operation hampered communication within the flight, and flight leaders had to rock their wings to warn their wingmen before maneuvering.⁷⁵ While engaging German bombers, the cohesion of the French flights was extremely vulnerable to the reaction of enemy escorts. Without in-flight cohesion, the fight turned into a free-for-all struggle that degraded the tactical effectiveness of French fighters. Conversely, under the influence of a new generation of fighter pilots such as Werner Mölders, the Luftwaffe adopted a two-ship line abreast formation that proved more agile in a dogfight: the wingman “only” had to follow the wake of his leader, while in turn the former secured the rear of the latter.⁷⁶

Assessment - Organizational Considerations

The second reason that explains the failure of the FAF to command and control bomber interception goes back to the organization of the French air-defense tactical system. War is among other things an organizational struggle, and the FAF lost its duel with the Luftwaffe in part because the leadership of the former did not organize a proper air-defense tactical system. The first element that illustrates the organizational flaws of the French tactical system is the failure of its ground alerting system. Since May 1940, the ground alerting system suffered from two main flaws: slow wired transmission and the low density of spotter positions.⁷⁷ It is worth noticing that during the interwar years, France had experimented with an electronic alerting system based on radar technology but this radar-like technological solution proved to be operationally inadequate.⁷⁸ Thus, the French ground alerting system consisted of two main components. First, the interdepartmental service called “le réseau de guet du service de sécurité générale” (ground alerting network of the general security service), which was focused on the

⁷⁴ Ehrengardt, “Autopsie d'une débâcle,” 25.

⁷⁵ Ibid.

⁷⁶ Ibid.

⁷⁷ SHD., Série 3D, carton 510, Col Dumemes, “Notes sur l’Organisation des Transmissions de Guet,” 6 Avril 1940, 1.

⁷⁸ For a description of the French radar-like system see: Cain, *Forgotten Air Force*, 96.

For an assessment of the French radar-like system’s operational efficiency see: Ehrengardt, “Autopsie d'une débâcle,” 14.

protection of Paris. This “ground alerting network of the general security service” constituted the main source of intelligence for the FAF headquarters to command and control air defense. Second, several alerting ground teams were dispatched among French armies, and these teams were responsible to relay through the appropriate hierarchical chain their observations concerning enemy air activity.

Regarding the results of both elements of the French alerting network, as Cain put it, “The alerting network was so inefficient that by the time observers detected approaching German airplanes, formatted the proper messages, forwarded these to the appropriate headquarters elements, and scrambled the nearest French pursuit units, the Germans would have come and gone.”⁷⁹ In June 1940, after three weeks of fighting, the situation worsened due to the collapse of the Northeastern Front, and the subsequent disorganization concerning the French ground alerting alert.

On 3 June 1940, German bomber tides were detected far too close to Paris (when they were detected at all). It was therefore too late for French fighter pilots who managed to take off to offer an organized resistance. While French fighter pilots strove to climb in order to reach a hypothetical meeting point with their wingmen, German pursuit fighters immediately engaged them.

This situation could have been mitigated because fighter groups knew perfectly well the flaws of the ground alerting system, and they had developed tactical alternatives. Thus, by the end of May 1940, within the 21st Fighter Brigade, when an air base was under attack, an alert was broadcasted to the rest of the brigade, and available pilots took off to counter the threat.⁸⁰ This initiative did not last because French fighter groups were forced to move due to the advance of the Wehrmacht, and the subsequent disorganization within fighter groups prevented them from pursuing this “plan B.” In any case, the FAF leadership did not take the appropriate measures that would have permitted them to overcome the flaws of the alerting network by organizing alternative solutions.

The second element that illustrates the organizational flaws of the French tactical system is the failure of the FAF leadership to take into account the significance of radio communication in operational warfare. During the Battle of Flanders, the senior air

⁷⁹ Cain, “L’Armée de l’Air, 1933-1940,” 52.

⁸⁰ Michel Marias, “Souvenirs d’un Combattant Résolu et Furieux,” *ICARE*, no. 55, Summer-Fall 1970, 93.

officer in charge of the Northern Area of Air Operations divided his headquarters into two echelons, and through this reorganization, the signals officer was separated from the senior air officer.⁸¹ Such behavior was not isolated, and it illustrated the lack of consideration from French military leaders regarding the significance of communications in modern warfare.

As mentioned above, the telephone constituted the main means of communication, on which rested the transmission of orders and intelligence. One of the lessons of May 1940 was that French wired transmissions proved too slow and vulnerable, and therefore the FAF High Command strove to find a reliable alternative. Therefore, after the German strikes performed on 1 and 2 June, the FAF staff decided to use the Eiffel Tower in order to relay the alert from the air C2 to fighter groups with radio communication. However, the Germans were expecting such a decision, and on the 3rd they jammed radio communications emitted from the Eiffel Tower. Thus, even though the detection of German raids was delayed due to the inefficiency of the ground alerting system, some fighter groups never received the alert because of German radio jamming. One month before, when the Luftwaffe had launched its offensive against French airfields, most of the fighter groups knew that German bombers were attacking their area of responsibility when bombs hit their airfield. Only three groups in ten received and understood the alerting radio message from the French air C2. The French fighter pilots that successfully took off were either immediately shot down by the German pursuit escort or could barely engage a few He 111s.⁸²

While the significance of radio communication was also obvious at the unit level, the French air defense tactical system suffered from the lack of pre-war consideration regarding this crucial factor in modern warfare. While a fighter group commander was considered an administrative *and* an operational leader, he was not supposed to lead his men at the head of an in-flight formation (even though some of them did it) but rather to manage the day-to-day tactical activity of his group.⁸³ Thus, fighter group commanders used the radio of the command post installed in a trailer close to their airfield in order to

⁸¹ SHD., Série 3D, carton 513, "L'Aviation dans la Bataille des Flandres," 29 Août 1940, 4.

⁸² SHD., Série 3D, carton 510, Col Dumemes, "Actions du GC 22 les 1, 2, 3 juin 1940," 30 December 1940, 19.

⁸³ Ehrengardt, "Autopsie d'une débâcle," 26.

control air operations at the unit level. However, the limited range as well as the erratic operation of the radio rendered the control of air operations at the fighter group level very difficult. The failure of radio communications between a group commander and his pilots prevented any attempts to reorient or merely to conduct air operations.⁸⁴ Moreover, since May 1940, fighter brigades did not hesitate to combine different types of aircraft in order to increase the number of available fighters against German bomber raids. However, while in-flight radio communication were difficult within a fighter group, it was impossible to communicate by radio from one fighter group to another.⁸⁵ On 3 June 1940, the in-flight coordination between fighter groups flying D.520s, M.S. 406s, and Bloch 152s was almost nonexistent due to the lack of radio communication, and the tactical effectiveness of the French air defense was greatly hindered. Thus, the lack of consideration of FAF leadership concerning military communication, and the flaws of the ground alerting network constituted the most significant elements that explained the organizational failure of the French air-defense system.

Assessment – How To Apply Mass And Concentration

The third reason that explained the inability of the FAF to gain air superiority during Operation Paula was the failure to command and control bomber interception by combining mass and concentration. As explained above, three fighter brigades were in charge of the protection of Paris. Despite the quantitative asymmetry between French fighters and their opponent, the FAF staff decided to divide the 218 fighters available by tasking the 21st and 23rd Fighter Brigades to intercept incoming German bombers, and the 22nd Fighter Brigade to intercept German bombers while they were returning to their base.⁸⁶ Whereas the Luftwaffe was concentrating a massive raid (200 bombers and 150 fighters) that aimed at destroying the French air defenses on the ground and in the air, the FAF divided its forces. Furthermore, even though the 21st Fighter Brigade was officially in charge of the interception of incoming German bombers, it had no authority over the 23rd Fighter Brigade that was supposed to contribute to this mission.⁸⁷ The supported-

⁸⁴ Rivière, "3 Juin 1940 L'Opération Paula," 125.

⁸⁵ Clausse, "Une Découverte Brutale Mais Tardive," 67.

⁸⁶ Danel, "En Mai-Juin 1940, Ils Étaient Les Plus Forts," 60.

⁸⁷ Ehrengardt, "Autopsie d'une débâcle," 26.

supporting relationship among the French fighter brigades did not exist, and therefore the lack of coordination between fighter brigades hampered the French air defense tactical effectiveness.

In the same vein, the tasking order sent to the 22nd Fighter Brigade explicitly stipulated that its fighter groups had to protect not only Paris but also the French industrial areas in Lyon and Le Creusot. After the German raids on 1 and 2 June that aimed especially at Le Creusot and Lyon, Colonel Dumemes asked to move his five fighter groups closer to Paris. Dumemes was not allowed to make such a move, and on 3 June, he still had to protect the three areas that had the same operational priority. Thus, only three in five of Dumemes' fighter groups were able to intercept German bombers while they returned from Paris.⁸⁸

Regarding the inability of the FAF to apply mass and concentration, the lack of available pilots also hindered the French air defense tactical system. The modernization of French fighter brigades was still ongoing, and some fighter groups were performing their conversion to the Dewoitine D.520 or the Bloch 152. Thus, fourteen pilots of the III/3 fighter group (21st fighter brigade) were sent on 3 June to Toulouse airbase (250 miles to the southwest of Paris) in order to attend a training session concerning their new D.520.⁸⁹ The absence of these pilots increased the workload of those who stayed at the front.

In addition to the elements mentioned above, one of the factors that contributed to the FAF's inability to combine mass and concentration against German bombers concerned the very tactics employed by fighter brigades. Fighter brigades strove to compensate for the failure of the alerting network by launching several flights of aircraft, staggered in time, in order to protect the most likely targeted areas. Each flight had to stay on-station for four hours. These proactive tactics proved to be a waste of resources because these missions initiated a priori did not intercept a single German aircraft. By assessing the results of Operation Paula, Col Dumemes proposed to adopt a reactive posture for the sake of the concentration of forces instead of the proactive posture that

⁸⁸ SHD., Série 3D, carton 510, Col Dumemes, "Actions du GC 22 les 1, 2, 3 juin 1940," 30 December 1940, 17.

⁸⁹ Ehrengardt, "Autopsie d'une débâcle," 26.

proved inefficient.⁹⁰ On the other hand, the missions launched a priori increased the fatigue of the fighter pilots, and more importantly these missions also augmented the disorganization of the fighter groups.

Summary

Even though the Luftwaffe failed to destroy the French fighters on 3 June 1940 as planned, the FAF could not afford such a 1:1 loss ratio. The failure of the FAF to achieve air superiority did not only come from the quantitative and qualitative asymmetries with its opponent but also from flawed training, tactics, C2 organization, alerting system, military communications, and application of war principles such as mass and concentration. The whole FAF tactical system was neither designed nor resilient enough to face the operational problem posed by the German armed forces during the Battle of France. By considering Murray and Millett's question "*To what extent are military organizations' tactical approaches consistent with their strategic objectives?*," one can argue that the training and tactics adopted by the FAF prevented the French air defense tactical system from achieving strategic objectives such as gaining and maintaining air superiority. The French reactive airpower doctrine constituted the roots of the subsequent flaws in terms of fighter pilot training and tactics regarding the specific issue of bomber interception. Moreover, the inefficient French ground alerting system combined with the lack of consideration regarding military communication in the FAF led to the inability of the French air C2 to apply principles of war such as mass and concentration of efforts. Thus, one can argue that *FAF tactical concepts were neither consistent with its operational capabilities nor emphasized a rapid exploitation of opportunities.*

⁹⁰ SHD., Série 3D, carton 510, Col Dumemes, "Actions du GC 22 les 1, 2, 3 juin 1940," 30 December 1940, 21.

CHAPTER 4
**TACTICAL EFFECTIVENESS OF THE FRENCH AIR FORCE DURING THE
BATTLE OF FRANCE – PART II – BOMBERS**

Hope is not a planning tool.

- Mark August

On 3 September 1939, because of doctrinal, political, and industrial dithering, France did not have a bomber component worthy of the name. The modernization was ongoing but at a pace that was too slow for catching up to the delay accumulated during the interwar years. Moreover, the offensive nature of bombers did not match France's strategic defensive posture. Consequently, during the Phony War, French bombers were rarely involved, and when they were, they mostly performed strategic reconnaissance missions.

One of the first missions performed by French bombers illustrates their activity during the Phony War. On 9 September 1939, the Bomber Group GB I/31 was ordered to perform a daylight reconnaissance mission over the Saarland region. The mission was tasked in order to season the crews by experiencing a wartime mission, and the three most senior officers of the group participated in the operation. Three outdated Bloch 200s took off from Connantre (close to Reims), and headed to Metz. After taking off, the last bomber of the formation experienced an engine problem that forced the pilot to reduce the speed of the aircraft. Over Metz, the leader of the formation made a navigation mistake that was duly noted by the trailing aircraft. However, crew leaders had been told to take one more gunner rather than a radio specialist. Therefore, the sole pilot who noticed the navigation mistake could not warn his leader, and the formation kept going forward. When the three aircraft flew over Saarbrücken, the first two bombers were shot down by German fighters. The engine failure of the distanced aircraft, which strove to escape pursuit fighters, eventually forced the pilot to crash in France. The results of the mission that aimed at "hardening the crews" was five killed, five prisoners, and three aircraft lost.¹

¹ Robert Hirsch, "Bombardier au GB I/31," *ICARE*, no 53, Spring-Summer 1970, 91.

This experience illustrated most of the flaws of French bombing during the Battle of France: lack of training, lack of radio transmission, a crew that performed a mission for which it was not specialized, a technical failure, and losses that appeared disproportionate with respect to mission results. A few days later, General Vuillemin withdrew Bloch 200s from any wartime mission, and he assigned Amiot 143s (a more recent but still outdated French bomber) to perform only night bombing operations unless exceptional conditions would force to employ them during daytime.² Once delivered to bomber groups (and once the personnel trained on the new aircraft), the modern Lioré-Et-Olivier 451 (LeO 451) was supposed to undertake daylight missions. On 10 May 1940, the modernization of French bombing was far from being achieved, and the FAF was caught off guard when the Germans ignited the hostilities. However, the quantitative and qualitative inferiority of French bombing did not fully explain the failure of the latter's tactical system, as illustrated by the mission on 9 September mentioned above.

The Tactical System of French Air Force Bombers

Materials

Modern French bombing did not exist in 1939. During the interwar years, France had demonstrated neither the political and military will nor the industrial capability for developing bombers. After the mission described in the introduction of the present chapter, the FAF decided to restrict the employment of the outdated Bloch 200/210s and Amiot 143s that constituted most of the French bomber force for night missions. At the same time, the aviation industry doubled its effort to deliver modern bombers to the FAF.

The lack of modern bombers in the FAF was also the consequence of the reluctance of French political and military leaders to accept the limitations of the aviation industry. As the commander of the French Fighter Command, Air General Jean d'Harcourt, stated after the war: "The idea that we were no longer able to produce airpower means in quantity and quality by ourselves, came to light only relatively late, too late for the American aircraft finally ordered to change significantly the outcome."³ In other words,

² Outdated bombers had a maximum speed that was about 350 Km/h (220 mph), and therefore could not escape German fighters.

³ Jean d'Harcourt, "Les Chasseurs Ont Fait Tout Leur Devoir," *ICARE*, no 54, Summer 1970, 44.

France bought from her American ally modern bombers just before WWII, but the aircraft were too few and came too late to make a difference. Therefore, at the dawn of WWII, Allied bombing relied essentially on British bombers until France could build a modern bombing capacity.

In the following paragraphs, two bombers are detailed: the modern medium bomber called the LeO 451, which was supposed to constitute the backbone of French bombing; and the new attack bomber labelled the Breguet 693.

The Breguet 693 was a light twin-engine monoplane with two tailplanes not designed for ground attack but rather for medium bombing. The FAF did not acquire a specific aircraft that fit with its close-air-support concept developed during the 1930s. The Breguet 693 was chosen because it could be mass produced and partially fulfilled the requirements for ground attack. After assessing the employment of French airpower in the counter-insurgency conflicts that occurred in the 1920s, the French Air General Maurice Armengaud supported during the following decade the development of a light bomber dedicated to air-to-ground support that was labelled “assault aviation.”⁴ Despite Armengaud’s efforts, the FAF did not realize the significance of assault aviation during the interwar years, and the decision to produce attack bombers was delayed many times. Therefore, Breguet 693s were eventually delivered to bomber groups during the Phony War, and this situation provided only a few months for the French assault aviation to prepare for the coming invasion.

The tactical doctrine of French bombing rested on assumptions that proved erroneous. In 1939, the French doctrinal perspective concerning assault aviation foresaw a combination of strikes against ground troops, communications nodes, and enemy airfield.⁵ This doctrine was the fruit of the French interpretation of the Italian General Amedeo Meccozzi, who had presented during the interwar years his airpower theory mainly based on multiple light aircraft that aimed at harassing enemy ground troops as well as communication nodes.⁶ Meccozzi’s theory was completely opposed to Douhet’s

⁴ Facon, *L’Armée de l’Air dans la Tourmente*, 57.

⁵ Fleury Seive, *L’Aviation d’Assaut Française dans la Campagne de 1940* (Paris: Berger-Levrault, 1st Edition, 1948), 56.

⁶ Ibid., 27.

ideas, and therefore was used by Armengaud as a theoretical framework for countering Douhetian supporters within the FAF.

The tactical employment of French assault bombing stemmed from the belief that a light aircraft, which performed a high speed attack at very low level against aforementioned targets, would be invulnerable from both flak and enemy fighters. Low-level attack was deemed to guarantee the effect of surprise against flak, while enemy fighters were supposed to be less agile at low altitude. Therefore, the FAF did not consider seriously dive-bombing attack and instead favored low-level attack for its assault aviation.⁷ The efficiency of German flak would demonstrate that the French tactical assumption was erroneous. Indeed, by means of the Condor Legion in the Spanish Civil War and the Polish campaign, the Germans had developed, and then refined, their AAA procedures. Thus, French assault bombing learned the hard way that the effectiveness of the German AAA system rested on the combination and the connection through radio communication of alerting aircraft (Hs 126), an alerting ground system, and multiple AAA installed on armored as well as infantry combat vehicles.

During the Phony War, the FAF tested and evaluated the Breguet 693, and the less powerful but more reliable Gnome-Rhône 14M engines which replaced the initial Hispano-Suiza 14AB engines. However, while Gnome-Rhône 14M engines allowed a maximum speed of 300 mph at 13,000 ft. the top speed at low altitude was only about 210 mph. The lack of power at low altitude prevented French assault bombers from escaping from German pursuit aircraft, and this factor played a significant role in the attrition of attack bombers.⁸ Moreover, the two-seat Breguet 693 was considered a robust but not agile aircraft, and its limited maneuverability was dangerous at low altitude. This lack of agility also played a significant role by preventing bomber pilots from reacting effectively against German AAA as well as fighters.⁹ French crews also pointed at the lack of firepower of this ground-attack bomber evidenced by the fact that Breguet 693s could only carry six to eight 50 kg bombs (110 lb.), which proved insufficient against armored vehicles, unless they achieved a direct hit. The forward-firing armament of the

⁷ Seive, *L'Aviation d'Assaut Française dans la Campagne de 1940*, 28.

⁸ SHD., Série 3D, carton 511, Cne Jeuret, "Enseignements à tirer de la guerre" – GB 18, GB II/54, August 9, 1940, 21.

⁹ Ibid.

aircraft consisted of a cannon and two machine guns that allowed the pilot to fire respectively 60 shells and 500 bullets. An additional rearward-firing machine gun was fitted under the fuselage, and the rest of the rear defense was provided by the rear-seated gunner's 7.5mm machine gun.¹⁰ The defensive armament of Breguet 693s was considered too weak to counter either AAA or the Bf 109's guns. Moreover, while the pilot was effectively protected by a set of armored plates, the rear-gunner did not have this protection. Thus, when attacked by Bf 109s, the gunner was frequently hit at the beginning of the interception due to the lack of firepower and protection.¹¹ Defenseless, the pilot could then only strive to escape by maneuvering his aircraft away from pursuit aircraft. Breguet 693 crews suffered heavy losses: from 12 May to 15 June 1940, the bomber group GB II/54 committed twenty-three aircraft to action and lost seventeen of them (ten due to fighters and seven due to flak), while the GB I/54 lost twenty-four aircraft during the same period.¹² Despite their losses, Breguet 693 crews achieved some successes during the Battle of France by delaying German forces, especially at the Battles of Sedan and Somme River. However, these limited successes did not stop the ineluctable progression of the German forces.

Produced by a different aviation company, the French medium bomber LeO 451 shared with the Breguet 693 some of the latter's weaknesses. Lioré-Et-Olivier 451 was a French medium bomber that carried 1,500 kg (3,300 lb.) of bombs with a maximum range of 1,000 km (620 miles) at 5,000 meters (16,400 ft.). A crew of four airmen flew the LeO, which was a low-wing monoplane with two tailplanes. Like the Breguet 693, the LeO 451 required an engine upgrade due to the lack of reliability of the initial Hispano-Suiza 14AA engines demonstrated during the aircraft's test and evaluation phase. Thus, instead of 1200 hp. per engines, the LeO was powered by two Gnome-Rhône 14N engines (generating only 1060 hp each). The maximum speed of the aircraft was 260 knots at 16,000 ft, and 215 knots at 2,500 ft.¹³

The piloting of the LeO 451 was delicate but once mastered, the pilot could enjoy an aircraft with remarkable flying qualities despite its 12 tons and less powerful engines.

¹⁰ Seive, *L'Aviation d'Assaut Française dans la Campagne de 1940*, 69-71.

¹¹ SHD., Cne Jeuret, "Enseignements à tirer de la guerre," 26.

¹² Christian-Jacques Ehrengardt, "Fiches Techniques," *ICARE*, no. 53, Spring-Summer 1970, 174.

¹³ Jacques Lecarme, "Triste Campagne de France," *ICARE*, no. 57, Spring-Summer 1971, 148-151.

Moreover, the airframe of the LeO 451 was especially robust, and saved a lot of lives by allowing the pilot to return to his base despite several hits.¹⁴ On the other hand, the main weaknesses of the LeO 451 were the reliability of its equipment and its defensive weapons. The former included too complex hydraulic, electrical and pneumatic elements that impacted the functioning of the crucial parts of the aircraft.¹⁵ During the Battle of France, the rate of non-operational LeO 451s due to equipment failure heavily degraded bomber group activity.¹⁶

LeO 451 crews considered their aircraft badly defended. The defensive weapons of the LeO 451 included on the front a fixed 7.5mm machine gun; a top rear-defensive 20mm cannon; and a lower rear-defensive 7.5mm machine gun. The front-oriented machine gun was almost unusable: pilots performed either dive attacks or engaged enemy fighters by pointing the nose of the aircraft at them. The cannon proved to be very efficient against pursuit aircraft but only 60 shells could be shot with it. These 60 shells corresponded to ten seconds of combat, which was clearly insufficient against Bf 109s.¹⁷ Moreover, the two tailplanes dramatically limited lateral movement of the gun, and Bf 109 pilots quickly learned how to fly in the dead corner of the LeO 451.¹⁸ Only an efficient coordination between the top rear-gunner and the pilot of the LeO 451 could lead to a hit on enemy fighters. However, such a maneuver implied a rotation of the aircraft in pitch, which meant that the formation of bombers was broken, and therefore the mutual protection between LeO 451s was no longer possible.¹⁹ The Luftwaffe gained the control of the air on 6 June 1940, and from that date, French pursuit aircraft were too few to provide an escort to the LeO 451s, which performed most of their missions without fighter escorts. In May 1940, the main threat to LeO 451s was flak.

From 10 May 1940 to the cessation of hostilities, the French medium bomber LeO 451 was employed as an attack bomber.²⁰ When FAF leaders had to respond to the

¹⁴ SHD., Col Lefort, "Enseignements à Tirer des Opérations de Mai-Juin 1940," 10.

¹⁵ Pierre Paquier and Joseph-Marie Thonon, *Le Groupe de Bombardement II/12* (Paris: Berger-Levrault, 1st Edition, 1947), 157.

¹⁶ SHD., Col Lefort, "Enseignements à Tirer des Opérations de Mai-Juin 1940," 11bis.

¹⁷ Ibid., 12-14.

¹⁸ Paquier, *Le Groupe de Bombardement II/12*, 160.

¹⁹ SHD., Col Lefort, "Enseignements à Tirer des Opérations de Mai-Juin 1940," 12-14.

²⁰ SHD., Série 3D, carton 511, Cdt Malardel, "Enseignements à Tirer des Opérations de Mai-Juin 1940," GB 6, GB I/12, 4.

urgent needs for air support to ground troops both in Belgium and at Sedan in May 1940, they reacted without clear tactical ideas of how to employ medium bombers. Thus, FAF leaders rushed LeO 451s into the heat of battle by requesting low-level attacks in support of ground troops, as had been done during WWI.²¹ After a few weeks of combat, when the losses of LeO 451s demonstrated the weakness of such a tactical employment of medium bombers, FAF leaders chose to maintain low-level attacks in order to show the presence of French wings over demoralized soldiers that were under the permanent pressure of the Luftwaffe.²² Therefore, with medium bombers designed to work only at night, or at least at very high altitude in daylight, LeO 451s were engaged at altitudes less than 800 meters (2,600 ft.). Even though the LeO 451 was robust, it was not armored, and the French medium bomber could not survive under the fire of German flak. Moreover, while at 16,000 ft. the LeO 451 had a little chance to escape enemy fighters by playing on its top speed as well as vertical maneuver, at low level LeO 451's had no chance to survive against Bf 109s.

One of Murray and Millett's questions considers: "*To what extent do tactical systems place the strength of military organizations against their adversary's weaknesses?*" In that respect, one can argue that, during the Battle of France, by employing its light and medium bombers through low-level attacks, the FAF's tactical choice proved catastrophic because the material was ill-designed for low-level attacks, and this tactical employment perfectly matched the strengths of both German AAA system and pursuit aircraft with the weaknesses of the French bomber force.

Organization

As has been mentioned in the historical background chapter, the organization of the FAF evolved during the Battle of France, and Daladier's decision taken in February 1940 especially marked this organization. Four days after the German invasion of France, General Vuillemin transferred the command of French bombing to General Tétu (commander of the Aerial Forces of Cooperation on the Northern and Eastern Fronts).

²¹ Facon, *L'Armée de l'Air dans la Tourmente*, 189.

²² Ibid.

On 10 May 1940, the FAF had 33 bomber wings (the same number as in September 1939); 23 of these bomber wings were stationed in metropolitan France, while 9 of them were in North Africa, and 1 in Indochina.²³ Each bomber wing had at least two bomber groups, and each bomber group had two flights. The theoretical allotment in each bomber group was about 25 aircraft but this figure fluctuated during the conflict.

Among bomber groups, one could find light bombers (Douglas DB 7s, Glenn Martin 167s, and Breguet 693s), medium bombers (LeO 451s, Amiot 354s, Amiot 143s, and Bloch 200/210s), and heavy bombers (Farman 221/222s). Moreover, the analysis of the Polish campaign during the Phony War led the FAF to create an assault bomber brigade in December 1939. The latter would employ modern French light bombers (Breguet 693s), and would essentially be dedicated to striking enemy ground troops.

As has been mentioned in the introduction of the present chapter, the Phony War revealed the obsolescence of several different types of French bombers. Thus, on 10 May 1940 Bloch 200/210s, Amiot 143s, and Farman 222s were assigned to fly night bombing missions, unless the situation on the front would force the French High Command to employ them in daylight.

French bombing was hierarchically organized as follows: group, bomber wing, air division, area of air operations, and the army level. On 10 May 1940, the order of battle of French bombing is described in the table below.

²³ Raymond Danel, "Le Bombardement dans la Bataille," *ICARE*, no 57, Spring-Summer 1971, 59.

Table 2: Order of Battle, 10 May 1939

Northern Area of Air Operations (1st Air Division)			Eastern Area of Air Operations (3rd Air Division)			Area of Air Operations of the Alps. (Bombing Instruction Wing)		
Wings	Groups	Aircraft Ops	Wings	Groups	Aircraft Ops	Wings	Groups	Aircraft Ops
GB 6	GB I/12	14 x LeO 451	GB 10	GB I/38	12 x Amiot 143	GB 1	GB I/62	Martin 167
	GB II/12			GB II/38			GB II/62	Martin 167
GB 9	GB I/34	17 x Amiot 143	GB 15	GB I/15	6 x Farman 222	GB 7	GB I/23	LeO 451 Bloch 210
	GB II/34			GB II/15			GB II/23	LeO 451 Bloch 210
GB 18	GBA I/54	25 x Breguet 693				GB 6	GB I/31	LeO 451
	GBA II/54						GB II/31	LeO 451
						GB 9	GB I/21	Bloch 210 Amiot 354
						GB 11	GB I/11	LeO 451 Bloch 210
							GB II/11	LeO 451 Bloch 210
						GB 19	GBA I/35	Breguet 691
							GBA I/51	Breguet 691
							GBA II/51	Breguet 691

Source: Raymond Danel, "Le Bombardement dans la Bataille." ICARE No 57, 60-62. Most of the bomber wings in the Area of Air Operations of the Alps were in the process of conversion on modern aircraft. Therefore, these bomber wings depended on the Bombing Instruction Wing, which played the role of an air division. GB: Groupe de Bombardement (Bombing Group). GBA: Groupe de Bombardement d'Assaut (Assault Bombing Group). The Breguet 691 was the training version of the ground attack aircraft Breguet 693.

As has been emphasized above, the modernization of French bombing was ongoing during the Battle of France, and consequently the number of bombers assigned to bomber groups varied significantly. As shown in the table below, even though the number of bombers at the end of the Battle of France was higher than at the outset, the FAF inability to reduce the number of not mission-capable aircraft plagued the tactical effectiveness of French bombing.

Table 3: Modernization of French Bombing, 1939-1940

Aircraft Type (Modern)	Aircraft delivered to the French Air Force			Aircraft operational in bomber groups		
	9/3/39	5/10/40	6/25/40	9/3/39	5/10/40	6/5/40
Amiot 354	0	38	66	0	13	25
LeO 451	10	222	373	5	94	123
Breguet693	8	114	217	0	54	67
Martin 167	0	137	231	0	26	46
Douglas DB 7	0	29	76	0	1	17
Total	18	540	963	5	188	276

Source: Raymond Danel, "Le Bombardement dans la Bataille," ICARE, no 57, 67.

The FAF developed an organization that aimed at sustaining its air bases as well as its aerial means. This organization also fit the defensive posture of the French armed forces. From the Maginot Line, more than 200 airfields were dispersed in depth along a 150 miles strip in the northeast of France. In addition of these airfields, the FAF created during the interwar years a network that included buried aviation fuel tanks and munition depots. Thus, the FAF developed an organization regarding its logistical support system that rested on:

- twenty maintenance depots (*Secteurs de l'air*, in charge of the storage and distribution of aviation parts)
- two hundred air companies (*Compagnies de l'air*, in charge of airfield infrastructures as well as the surveillance and protection of their assigned airfield)
- thirty aviation fuel companies
- fifteen air munition companies
- twenty airfield companies (*Compagnies de terrains*, in charge of communication means, weather forecast, photo maintenance, etc.)²⁴

This network, which connected logistical support units with bomber groups, was manned primarily by reservists. Thus, whereas by 1939 France had the second largest air force among the major powers (213,654 personnel), the FAF only ranked sixth with its

²⁴ SHD., Série 3D, carton 511, Cdt Malardel, "Enseignements à tirer de la guerre – GB I/12," 1.

reserve component subtracted from the total.²⁵ The logistical support system of the FAF relied upon the stability along the front line, a certain harmony regarding relationships between bomber groups and logistical support companies, and a proper military education and training of reservist personnel.²⁶

When the front line collapsed on 15 May 1940 at Sedan, and then along the Somme river on 6 June 1940, the pressure of German forces forced French bomber groups to move from one airfield to another. As reported by the commander of the 6th Bomber Wing, each of his group had to move at least ten times during the Battle of France.²⁷ The study of French archives shows that the experience of the 6th Bomber Wing was not unique: each bomber group had to move at least six times during the Battle of France. Furthermore, each bomber group had maintenance specialists and repair means that also moved with their assigned bomber group, however, they moved by trucks, and it took at least two days for a bomber group to reach its minimum operational readiness after being moved. Despite the theoretical support provided by the several different support elements attached to an airfield, a bomber group had almost no operational value without its maintenance trucks.²⁸

After moving onto a new airfield, the commander of a bomber group experienced the fact that he was cut from the logistical support system because the organization of the latter was too stovepiped and heavy for keeping the pace with the several different moves of bomber units.²⁹ Indeed, the relationships between bomber units and support elements were anything but harmonious. Support units had kept a peacetime mindset based on bureaucratic relationships that did not fit with the urgency of the wartime context. Concerning reservists, the FAF failed to set a pre-war system that would provide the necessary education and training for mobilized personnel. As Cain emphasizes: “[mobilized troops are] undisciplined, military training insufficient... NCOs with no

²⁵ Cain, “L’Armée de l’Air, 1933-1940,” 61.

²⁶ SHD., Série 3D, carton 511, Cdt Malardel, “Enseignements à tirer de la guerre – GB I/12,” 1.

²⁷ SHD., Série 3D, carton 511, Col Lefort, “Enseignements tirés des Opérations de Mai-Juin 1940 – GB 6,” 4.

²⁸ Raymond Brohon, “Le GB 10 d’après les Cahiers du Lcl Aribaud,” *ICARE*, no 57, Spring-Summer 1971, 84-85.

²⁹ SHD., Série 3D, carton 512, Lcl Demery, “Enseignements à tirer de la guerre – GB 18,” 7.

military preparation, having no idea of service, no knowledge of command or obedience... knowing perfectly their rights but ignoring their duty.”³⁰

By considering Murray and Millett’s question: “*To what extent are military organizations’ tactical systems consistent with support capabilities?*,” one can argue that the breakthrough of the front line at Sedan also led to the collapse of the FAF supply system. The reason stemmed from the fact that the FAF tactical system was not designed to adapt itself to the operational circumstances imposed by German forces. One of the most significant impacts of the inconsistency between the FAF organization’s tactical system and support capabilities was the fact that it was almost impossible for bomber groups to obtain the necessary parts to repair non-operational aircraft, and, as a result, the availability rate dramatically shrunk.³¹

Training

The study of French bombing seen through the lens of training reveals some of the flaws of the tactical system of French bombing. While the pre-war training standards of French fighter pilots included strong requirements in terms of flying skills, technical training was not so emphasized in the realm of French bombing. Moreover, tactical training was limited due to the ongoing transition experienced by French bombing from outdated material to modern bombers. Therefore, both for assault and medium bombing, while technical training of French crews was not satisfactory, the FAF leaders’ vision for medium bomber employment diverged from French bomber crews’ experience of tactical training.

Regarding the transition to modern aircraft, from 1938 to 1939 restrictive regulation hindered the training program of future crews designated for assault aviation. French bombing regulations required that a bomber pilot was operational when he had reached the threshold of 200 flight hours in daylight, and 20 flight hours in night time. However, this threshold could have been reached by doing laps around the airfield in outdated aircraft.³² Moreover, the regulation concerning twin-engine aircraft imposed

³⁰ Cain, *Forgotten Air Force*, 123.

³¹ Cain, *Forgotten Air Force*, 132.

³² SHD., Cne Jeuret, “Enseignements à Tirer des Opérations de Mai-Juin 1940,” 24.

that the trained pilot had to take the aircraft command *in flight*. Thus, one could have reached the threshold of “1st class pilot” without landing at least once.³³ During the same pre-war period, the FAF High Command required that conditions for tactical missions had to be optimal otherwise the mission was cancelled.³⁴ Thus, unlike its British counterpart, French crews only performed training missions in daylight and under good weather conditions. In addition to training restrictions, bomber wing commanders had to manage the impact of the creation of new flight schools, and the best crews of each wing were transferred at the dawn of WWII to these new schools in order to become instructors.³⁵ The combination of the elements listed in the present paragraphs partly explains the lack of technical flight skills of bomber pilots. It is worth noting that during the Battle of France, the instruction of trainees was accelerated as well as more pragmatic. Those student pilots did well thanks to a condensed (120 flight hours) but realistic training program.³⁶

The regulation was the same for both assault and medium bombing flight training. As a LeO 451 flight commander put it by describing a wartime mission on 17 May 1940: “I was leading twelve bombers in clouds without any visibility, we had never done that in peacetime, even with only two aircraft.”³⁷ Furthermore, while assault aviation was somewhat specific because trainees had to comprehend an entirely new mission, both types of bombing encountered the same difficulties in terms of technical failure that hindered their training. Both the Breguet 693 and LeO 451 were new aircraft that suffered from several different technical failures (engines, landing gears, radio equipment, etc.). Thus, from 1938 to 1939, the lack of operational aircraft hampered training programs, and the full operational capability of modern bombers was subsequently delayed.³⁸ The situation was therefore problematic not only regarding technical flight skills but also considering the tactical instruction.

³³ Ibid.

³⁴ Raymond Brohon, “Le GB 10 d’après les Cahiers du Lcl Aribaud,” *ICARE*, no 57, Spring-Summer 1971, 84.

³⁵ This phenomenon has already been described p. 51-52 concerning fighter pilots. See also: Cain, *Forgotten Air Force*, 69.

³⁶ SHD., Cne Jeuret, “Enseignements à Tirer des Opérations de Mai-Juin 1940,” 24.

³⁷ Paquier, *Le Groupe de Bombardement II/12*, 99.

³⁸ For a description of the situation in assault mission see: SHD., Série 3D, Carton 512, Lcl Demery, “Enseignements à Tirer des Opérations de Mai-Juin 1940,” 10 August 1940, 4.

The FAF doctrine envisioned the employment of specialized bombers for specific targets but the doctrine also included the possibility of employing a bomber group in a non-specialized mission in case of a “crisis event.”³⁹ Thus, the crews of assault aviation were trained not only for performing air support to friendly ground troops but also for attacking just behind the front line: communication nodes, lines of communication, airfields, and ground troops. The doctrine assumed that assault bombing would be more effective against mobile convoys but less effective against stationary ground troops (due to camouflage, protection, etc.). Moreover, despite the risk of crash, assault aviation was supposed to be safer because of its high speed, low-level attacks.⁴⁰ Medium bomber doctrine focused on in-depth attacks by stating in 1940: “the main mission of bombing aviation rests on neutralization or destruction of targets that are beyond the range of land and maritime components.”⁴¹ Thus, the crews of LeO 451s were trained to attack enemy war-making industrial air capabilities, air infrastructures, and targets that contributed to ground maneuver.

Neither assault nor medium bombers performed their primary mission as illustrated by fact that, instead of applying the “*lutte aérienne*” strategy by tactically striking lines of communication as well as ground troops just behind the front line, assault aviation was mostly assigned for providing air support to ground troops.⁴² Breguet 693 crews were trained for this type of mission but this training program was built according to pre-war assumptions that proved catastrophic. Therefore, Breguet 693 crews performed missions for which they were actually poorly trained. Similarly, LeO 451 crews were trained to perform either low-level night bombing or high altitude daylight deep attacks but they were tasked to provide air support by striking enemy ground troops at low altitude. In other words, LeO 451 crews also performed bombing missions for which they were not trained.

For a description of the situation in medium bombing see: SHD., Col Lefort, “Enseignements à Tirer des Opérations de Mai-Juin 1940,” 9-10.

³⁹ Facon, *L'Armée de l'Air dans la Tourmente*, 232.

⁴⁰ SHD., Cne Jeuret, “Enseignements à Tirer des Opérations de Mai-Juin 1940,” 25-26.

⁴¹ Jérôme de Lespinois and Centre d'études stratégiques aérospatiales, *La Doctrine Des Forces Aériennes Françaises, 1912-1976: Textes et Documents*, (Stratégie Aérospatiale. Paris: La Documentation française, 2010), 190.

⁴² For a description of the denial strategy see: Robert Anthony Pape, *Bombing to Win: Air Power and Coercion in War*, (Cornell Studies in Security Affairs. Ithaca, N.Y: Cornell University Press, 1996), 69-79.

The present brief study concerning the training of French crews aims also at providing an answer to Murray and Millett's question "*To what extent is the military organization's approach to training consistent with support capabilities?*" In that respect, one can argue that the FAF tactical system did not provide a coherent technical as well as tactical training to its bomber component. French crews were both poorly trained for their primary missions, and on the other hand, they were mainly involved in missions for which they were not trained.

Assessing the Tactical Effectiveness of French Bombing

First Strikes – Maastricht – 11-12 May 1940

The Context

On 10 May 1940, as a result of the delay inherent in the modernization of French bombing as well as the dispersion of bombers throughout the different Air Operation Areas, General Tétu, chief of the Aerial Forces of Cooperation of the Northeastern Front, had only five bomber wings available to counter the German invasion. Two of these five bomber wings could perform daylight mission: the 6th (14 LeO 451s) and 18th (25 Breguet 693s). The three other bomber wings (GB 9, 10, and 15) flew outdated Amiot 143s that were supposed to perform only night-time missions.

Ready to intervene, bomber crews had nevertheless to wait until ground leaders eventually decided to employ French bombing. While the best French armies reacted on 10 May to the German push into the Low Countries by applying the Dyle maneuver, the FAF contributed to Gamelin's plan as fragged by supporting the advance of land forces with fighter protection and reconnaissance missions. The latter reported the presence of long columns of German armored units that rushed toward Belgian and Dutch defenses. In the morning of 10 May 1940, despite several requests from Gen d'Astier de la Vigerie, Gen Georges (the joint commander of the Northeastern Front) still restrained the employment of airpower to fighter protection and reconnaissance missions. The laudable desire not to strike Belgian and Dutch civilians while bombing German troops explained Gen Georges' decision. However, the tactical situation was already critical, and RAF Air Chief Marshal Sir Arthur Barratt logically reacted to this threat by sending his Fairey

Battles against German columns.⁴³ It was only three hours later that d'Astier de la Vigerie obtained the authorization for engaging FAF bombers but with one restriction: "do not strike German troops in urban areas."⁴⁴ Gen Georges's fear of collateral damage suddenly became secondary when, on 11 May 1940, the Wehrmacht took strategic bridges that allowed German units to cross the Albert Canal. The main Belgian line of defense was broken in Maastricht.

During the first days of the war, the employment of French bombing also demonstrated the lack of French Army leaders' views on the contributions and limitations of aerial bombardment. When Gen Georges asked for air support in Maastricht on 11 May, it was to counter the bold German tactical move of taking Fort Eben-Emael with paratroopers. After intense fights from 10 to 11 May 1940, glider-borne German paratroopers, though outnumbered, took Eben-Emael, a Belgian strategic stronghold that covered with its artillery the access to the bridges on the Albert Canal.⁴⁵ Regarding the tactical situation on the ground, the combination of the loss of Eben-Emael and the first signs of the collapse of the Belgian defenses constituted two strong incentives for Gen Georges to request air support. The objectives of the bombing mission over Maastricht was therefore to strike not only the bridges on the Albert Canal but also the incoming German armored units spotted along the main access roads leading to Maastricht.

Gen Georges' decision to employ airpower was also due to the fact that French armies were unable to prevent the Wehrmacht from crossing the Albert Canal. French ground leaders expected that Belgian defenses would hang on at least one week, the time required for French armies to reach Maastricht and to strengthen this line of defense. The objective of Generals Georges and Gamelin was, in accordance with their pre-war strategic conceptions, to establish a stalemate on the front line. When French ground leaders found themselves in a tactical position that threatened their strategic plan, Gen Georges required air support in order to compensate for the inability of French land forces to prevent the Wehrmacht from crossing the Albert Canal. As General d'Astier de la Vigerie put it: "Ground leaders employed French bombing as an extension of artillery,"

⁴³ Facon, *L'Armée de l'Air Dans la Tourmente*, 180.

⁴⁴ Ibid., 179.

⁴⁵ Lormier, *La Bataille de France Jour Après Jour: Mai-Juin 1940*, 104-106.

without a clear tactical idea about how twelve medium bombers could stop the German tide or even destroy the bridges on the Albert Canal.⁴⁶

The Mission

After receiving their mission order, twelve LeO 451s from the 6th Bomber Wing (GB I/12 and II/12) took off at 1100 A.M. on 11 May 1940 to reach the rendezvous point with their escort over the airbase of the latter. However, the rendezvous was missed due to the lack of radio communication between bombers and their escort.⁴⁷ Once the formation was eventually ready, the twelve bombers and their fighter escort flew in the direction of Maastricht. LeO 451s flew in sections of two aircraft, and each bomber was fitted with 110- and 220-lb. bombs. On arriving just over the target, German flak (so far quiet) suddenly opened fire, shooting down one LeO 451 and severely damaging the others. The flak forced bombers to maneuver, which broke the formation, and the accuracy of the bombing was subsequently altered. Regarding the results of the bombing, while the 110- and 220-lb. bombs proved to have little effect on armored units, and only one bridge was successfully destroyed by LeO 451s.⁴⁸ The bombing over Maastricht proved both ineffective in preventing German troops from crossing the Albert Canal and costly in terms of French assets. Even though only one aircraft was shot down, the others were so severely damaged that the 6th Bomber Wing announced on the evening of the 11th that it would be unable to perform any mission the day after. The French High Command thus decided that it was the time to engage the assault aviation in the battle.

On 12 May 1940, the 18th Bomber Wing received the order to strike German convoys that had crossed the Albert Canal and the Meuse River the day before. Eleven Breguet 693s of the GB I/54 (three sections of three aircraft, and one of two) took off from Montdidier, while nine Breguet 693s of the GB II/54 (three sections of three aircraft) took off from Roye. Each section was tasked to attack a specific part of a road in the triangle formed by Maastricht, Namur, and Tongres.⁴⁹ Whereas the strike order

⁴⁶ Facon, *L'Armée de l'Air dans la Tourmente*, 181.

⁴⁷ Paquier, *Le Groupe de Bombardement II/12*, 80.

⁴⁸ Lormier, *La Bataille de France Jour Après Jour: Mai-Juin 1940*, 104.

⁴⁹ Seive, *L'Aviation d'Assaut Française dans la Campagne de 1940*, 105-106.

was received at 1120, the whole formation was expected at 1215 over Maubeuge in order to join their fighter escort. This timing did not offer the necessary period of time that was required to prepare carefully the mission, and this situation was to be repeated throughout the Battle of France. The delay induced by the flawed organization of the French C2 concerning the exploitation of intelligence as well as the transmission of strike orders prevented bomber groups from preparing their mission as they had been taught, by paying the necessary attention to all details of mission planning.⁵⁰

Leaving the Meuse valley at very low altitude to maintain the effect of surprise over the enemy, each section took the direction of its assigned target in the vast Belgian plains that no longer hid the aircraft from the enemy warning system. Once the German infantry combat vehicles were detected, attack bombers began their strikes but it was their turn to face the efficiency of German flak. While the nine aircraft of the GB II/54 benefited from the surprise effect with only one Breguet shot down, German flak took its toll on the GB I/54: 10 aircraft were shot down. The only survivor, severely damaged, miraculously returned to Montdidier.⁵¹ After being spotted by either the enemy's ground alerting network or Hs 126s used as "snitches," a wall of iron had welcomed the Breguet 693s over their targets. The first mission of French assault aviation revealed the main flaw of its aircraft: the Breguet 693 was a light bomber used as an attack bomber, and it had not been specifically designed for assault aviation. When the French military and civilian leaders took the decision in August 1939 to choose the Breguet 693, it was the only aircraft suitable for assault aviation that could be mass produced.⁵² It is worth noting here that the FAF employed the U.S.-built light bomber Douglas DB 7 as an attack bomber as well. When the FAF employed DB 7s in the same tactical framework as Breguet 693s, the consequences were similar. As the commander of the 2nd Bomber Wing explains: "the DB 7 was an unshielded light bomber, lightly armed, which was engaged as an attack bomber while it had neither been designed for this purpose nor the personnel trained for this mission. [...] Of course French bombing regulation included the possibility to employ a certain type of bomber not in its primary mission in case of

⁵⁰ SHD., Cne Jeuret, "Enseignements à Tirer des Opérations de Mai-Juin 1940," 20.

⁵¹ Seive, *L'Aviation d'Assaut Française dans la Campagne de 1940*, 121.

⁵² Ibid., 173.

crisis event... In that respect, the Battle of France was a long series of crisis events.”⁵³ The myth of invulnerability and effect of surprise provided by low altitude ended on 12 May 1940 with the stunning failure of assault aviation, but the French tactical system did not change its bombing requirements.

Assessment

When on 11 May 1940, LeO 451s were eventually authorized to strike the bridges in the Maastricht area, the transmission of the strike order from the 1st Army to bomber groups revealed some of the flaws of the tactical system of French bombing. It took six hours to transmit the strike order from General Blanchard, commander of the 1st Army, to the bomber groups. The process was the following: Gen Blanchard asked for bomber strikes from General Tétu (chief of the Aerial Forces of Cooperation), who in turn sent the strike order to General d’Astier de la Vigerie (chief of the Northern Area of Air Operations), who sent the request to the Air Division, which transmitted the order to the bomber wing, and eventually to the bomber group.⁵⁴ This process was maintained throughout the war, and became even more complex when bomber groups had to move from one airfield to another.

One can argue that the transmission of strike orders to the bombers was even longer by considering the time required for the exploitation of the reports provided by reconnaissance aircraft. Indeed, information collected by reconnaissance and observation aircraft had to be exploited through a bottom-up process along the several different layers of the French C2. Once the exploitation was completed, the intelligence had to take the inverse top-down path in order to reach bomber groups. However, the German High Command imposed a rapid operational pace by fully exploiting the mobility of its ground units. Therefore, the useful lifetime for intelligence was about thirty minutes to one hour while it took at least four hours for the French High Command to complete the loop from sensor to shooter.⁵⁵ The transmission of information was even more complicated after a

⁵³ SHD., Série 3D, Carton 511, Col Rignot, Enseignements à Tirer des Opérations de Mai-Juin 1940,” GB2, 10-11.

⁵⁴ Facon, *Batailles Dans le Ciel de France*, 137.

⁵⁵ SHD., Série 3D, Carton 511, Cdt Houpert, “Enseignements à Tirer des Opérations de Mai-Juin 1940,” GB II/19, 5.

few days of combat when wired communication lines were cut by the Germans. The six-hour delay required for the transmission of strike orders on 11 May illustrated the limitation of the French C2 that prevented bomber groups from performing timely strikes on highly mobile targets either.

The competition for employing French bombing between the FAF and the French Army also altered the effectiveness of the tactical system of French bombing throughout the Battle of France. As a French liaison officer embedded in the 1st Army headquarters states: “One wonders what effect bombings would have produced: when bombings were performed at the request of the Army, they were only accomplished several hours later; and if they were performed at the initiative of the FAF, these bombings had little connection with land operations.”⁵⁶

The strikes on the bridges in the vicinity of Maastricht constituted one of the rare occasions for French bombing to strike a target that was at the core of medium bomber doctrine. Most of the bombing missions during the Battle of France aimed at striking German troops.⁵⁷ Besides the target itself, the tactical approach of the mission over Maastricht was in contradiction with every precept that had been taught to medium bomber crews during pre-war training. This training consisted of bombing German infrastructure at night time (or even in daylight but at high altitude). However, on 11 May, LeO 451s were tasked at low altitude, in the middle of the day, and in clear sky conditions to bomb not only the bridges on the Albert Canal but also German troops. The altitude required by the French High Command for this mission was 2,600 ft. due to the pre-war belief that low-altitude attacks provided both surprise and invulnerability to bombers.⁵⁸ Even though the Spanish Civil War and the German invasion in Poland seemed to contradict the belief that low altitude was the best option for French bombing, FAF leaders in charge of air operations were WWI veterans, and their understanding of the capabilities of flak was badly dated.

Summary

⁵⁶ Ibid.

⁵⁷ SHD., Col Lefort, “Enseignements à Tirer des Opérations de Mai-Juin 1940,” 3.

⁵⁸ Paquier, *Le Groupe de Bombardement II/12*, 80.

The missions performed over Maastricht on 11-12 May 1940 demonstrated several flaws of the tactical system of French bombing. By considering Murray and Millett's question "*To what extent are tactical concepts consistent with operational capabilities?*," the employment of medium bombers as assault aviation revealed the lack of understanding in the French High Command about what airpower could and could not do. LeO 451s were employed in a tactical context that was the opposite of the pre-war doctrinal concepts. This situation reflected more a lack of understanding about both the operational defensive capabilities of German flak as well as the potential offensive capabilities of twelve LeO 451s employed as assault aviation than a sound tactical concept developed for the specific operational context in Maastricht. The results of the 11 May mission performed by LeO451s were eloquent: a tactical failure and significant losses. German armored divisions eventually crossed the Albert Canal without being significantly delayed, and the meager medium bomber means at the disposal of the Northern front were out of action for 24 hours.

By considering Murray and Millett's question "*To what extent are military organizations' tactical approaches consistent with their strategic objectives?*," one can argue that the bombing missions undertaken on 11-12 May that aimed at delaying the advance of the Wehrmacht in the Low Countries were consistent with the French pre-war strategic objectives. However, by refusing to strike urban areas on 10-11 May, Generals Georges and Gamelin denied the ability of Allied airpower to alter the progress of German columns at a crucial time. Indeed, before the outset of ground operations, British and French High Commands had planned strikes that aimed at cutting the access to the Low Countries of German troops, and most of the targets selected were in urban areas.⁵⁹ Gen Gamelin had argued before WWII that "the French Army could win a war without airpower." This intellectual bias anchored in French ground leader's minds, as remnants of the doctrinal fight that occurred during the interwar years, might have prevented them from conceiving and employing tactical approaches consistent with French strategic objectives. In fairness, the question whether Allied bombers employed in accordance with the planning mentioned above would have stopped German columns during the first

⁵⁹ Facon, *L'Armée de l'Air dans la Tourmente*, 179-180.

hours of the war or not is highly arguable. Indeed, the twenty-four available French bombers would hardly have been able to perform massive aerial raids on German troops.⁶⁰

The Breakthrough – Sedan – 14 May 1940

The Context

During the night of 11/12 May 1940, the reconnaissance group II/33 – the greatest unit of the FAF – carried out a mission over the Ardennes in support of the 9th Army. Flying a Potez 63.11, the crew saw numerous vehicles progressing in columns along the roads in the Belgian Ardennes. The vehicles' headlights were perfectly visible from the sky, as the Germans seemed to sacrifice discretion for speed.⁶¹ After landing, the crew sent a written report to the Air Division, which in turn diffused the information throughout the multiple layers of the French C2 structure. The 9th Army reacted by asking for a new mission the night after in order to confirm the information. On 12 May, 1940, a Potez 63.11 of the GR II/33 took off at dusk with, among the crew, a spotter who was an armored cavalry officer detached by the French Army to the reconnaissance group. The spotter confirmed the information collected the day before, and estimated the volume of force to at least one German armored division that was crossing the Ardennes. After landing with twenty-one bullet impacts and two oil tanks hit, the crew made its report. In light of the degree of urgency concerning this information, the leader of the crew also called the headquarters of the 9th Army directly in order to speed up the transmission of the intelligence. Despite all his efforts and those of the spotter, the French army officer could not convince his interlocutor that armored German units were crossing the Ardennes. "Were these vehicles really German?," asked the senior intel officer of the 9th Army.⁶² In order to identify without any doubt the spotted vehicles, the crew of the Potez 63.11 performed its reconnaissance mission at very low altitude, which excluded the possibility of photography.⁶³ Thus, on 11 and 12 May 1940, reconnaissance

⁶⁰ Facon, *L'Armée de l'Air dans la Tourmente*, 180.

⁶¹ Henri Alias, "Le II/33 Avait Vu Les Allemands Percer Sur La Meuse," *ICARE*, no 57, Spring-Summer 1971, 73-74.

⁶² *Ibid.*, 74.

⁶³ Henri Alias, "Le II/33 Avait Vu Les Allemands Percer Sur La Meuse," 74.

crews took risks for collecting crucial information, and the French ground leaders did not believe them.⁶⁴

The Ardennes was deemed an insurmountable barrier for armored units, and this eventuality had been neglected during the pre-war planning process by the French High Command. Therefore, it was not until the afternoon of 13 May that Gen Georges authorized the reorientation of the French bombing effort from Belgium to the vicinity of Sedan. At noon on that day, 700 German bombers struck the French fortifications that protected the access to the bridges on the Meuse river at Sedan. At the end of the day, the Wehrmacht took the bridges and established bridgeheads across the river. However, the confusion was at its height in the French High Command, and Gen Georges' subordinates changed several times the reorientation order by successively allocating French bombers to the 2nd Army, the 1st Army, and eventually in support of the 9th Army at Sedan.⁶⁵ On 14 May 1940, all Allied bombers available were tasked to stop or at least retard the progress of German armored units in Sedan. The 2nd Army would not be able to counter-attack until the day after.

The missions

On 14 May 1940, Gen d'Astier de la Vigerie could only count on thirty available French bombers to take part in the most important battle of the war so far. Only six LeO 451s and eight Breguet 693s were operational after the costly strikes that occurred on 10 May. Gen Vuillemin, acknowledging the urgency of the situation at Sedan as well as the weakness of French bombing, asked Gen d'Astier de la Vigerie to use the outdated night-bombing Amiot 143s. With Tétu's support, d'Astier de la Vigerie initially refused to use Amiot 143s but he was forced to do so after receiving a direct order from Vuillemin. Vuillemin insisted on throwing the Amiot 143s into the fight, even if it meant the sacrifice of bomber crews, for the FAF could do nothing less than to engage all its available means in order to prevent an enemy breakthrough.⁶⁶

⁶⁴ Lormier, *La Bataille de France Jour Après Jour: Mai-Juin 1940*, 106.

⁶⁵ Facon, *L'Armée de l'Air dans la Tourmente*, 185-186.

⁶⁶ Facon, *L'Armée de l'Air dans la Tourmente*, 188.

On 14 May at 0900, eight Breguet 693s attacked at low level the German bridgeheads between Sedan and Bazeilles. Despite the reaction of flak and Bf 109s, all aircraft returned safely to their home base. At 1100, eighteen Amiot 143s took off toward Sedan, but eight of them missed the rendezvous with their fighter escort and returned to their base.⁶⁷ Thus, at 1245, ten Amiot 143s of 9th and 10th Bomber Wings struck from 2,500 ft. – according to their order – the German bridgeheads at Sedan. Thirty Bloch 152s provided a fighter escort to the Amiot 143s but they were overwhelmed by their German counterparts, forcing the Amiot 143s to face first German flak and then German fighters. Even though these black-painted (for night-time mission) aircraft in the clear sky made perfect targets, the German flak and Bf 109/110s shot down only four Amiot 143s. At the same time, six unescorted LeO 451s of the 6th Bomber Wing attacked a column of German vehicles on the Sedan-Bazeilles road, and one of them was shot down.⁶⁸ As Facon argues, Sedan was not the so-called “massacre of French bombing” as some historians have depicted it.⁶⁹ On the other hand, for the RAF, Sedan was a disaster. On 14 May 1940, Barratt launched all his available Fairey Battles (71) in order to stop German forces for crossing the Meuse, and 31 of them were shot down. Soon after, the British light bomber Fairey Battle was relegated to only night attacks.⁷⁰

The Assessment

As Doughty states, Sedan was a turning point in the Battle of France. Concerning the FAF, its tactical system was unable to gather together a bomber force able to meet the challenge of the German push through the Ardennes. Yet, from 20 May to 25 June 1940, the reinforcements in terms of new aircraft produced by the aviation industry increased the capabilities of French bombing. These reinforcements came too late, and were missing at one of the most crucial moments of the war: Sedan.

The FAF tactical approach that consisted in performing low-level attacks with both medium bombers and assault aviation induced losses that in turn hampered any

⁶⁷ Raymond Brohon, “Le GB 10 d’après les Cahiers du Lcl Aribaud,” *ICARE* No 57, 88-90.

⁶⁸ René Genty, “Le GB II/12 Pendant La Campagne De Mai-Juin 1940,” *ICARE*, no 57, 111.

⁶⁹ Facon. *L’Armée de l’Air dans la Tourmente*, 187.

⁷⁰ Ibid.

attempts to apply principles of war such as economy of force and concentration of effort. Amiot 143s, LeO 451s, and Breguet 693s were tasked in small packages on different target locations that decreased their efficiency, which was already low considering the small number of available bombers. Furthermore, the concentration of bombers in terms of timing would also have helped French fighters to maximize the protection over Sedan of the Allied strikes that were spread over the entire day. Regarding the principle of economy of force, the FAF tactical system employed bombers at low altitude with munitions that were effective against infantry in the open but not against armored vehicles.⁷¹ German armored and infantry combat vehicles were heavily defended by flak, which disrupted the formations of bombers, and therefore altered their bombing efficiency. Besides the fact that low-level attacks increased neither the accuracy nor the lethality of French bombing, the FAF could not afford the losses induced by these low level attacks. For all these reasons, one can argue that *FAF tactical concepts were not consistent with operational capabilities* because its tactics were unsuited to combat realities.

Concerning ground leaders who led the French High Command, the bombing missions over Sedan revealed their outdated vision of airpower employment, and more precisely how, when, and for what purpose bombers should be used. As Facon argues, French army leaders saw aviation as a cavalry corps launched in the Sedan region for buying the time needed by the 2nd Army to reach Sedan, and then to repel German forces from the other side of the Meuse.⁷² Thirty bombers were thus supposed to compensate not only for the failure of French artillery and the Corps of Engineers for not destroying the bridges at Sedan, but also the lack of anti-tank guns as well as AAA in the French Army that let soldiers almost defenseless against the German combination of tanks and Stuka.⁷³ The FAF tactical system had to respond to a flow of strike requests that all asked in no uncertain terms to compensate for the holes in an overwhelmed land defense. Thus, its attention locked on the ground, French bombing was in a situation in which it could neither prevent the advance of German troops nor strike the enemy beyond the

⁷¹ SHD., Col Rignot, Enseignements à Tirer des Opérations de Mai-Juin 1940,” 12.

⁷² Facon, *L'Armée de l'Air dans la Tourmente*, 188.

⁷³ Ibid., 178.

front line. In that respect, one can argue that *the tactical system of French bombing was not properly used in terms of integration of all arms* during the Battle of France.

Evolution of French Bombing – Battle of the Somme – 5-6 June 1940

During the brief lull at the end of May 1940, Gen Weygand, Gamelin's successor as the head of French forces, hastily established a line of defense along the Somme River. With a total of 384 aircraft, though only 178 of them were available (including 130 daylight capable bombers), the situation of French bombing had significantly improved since the outset of the hostilities.

From the tactical perspective, the situation had also changed. Bomber crews learned the hard way how to adapt their tactics to the threat posed by both flak and pursuit fighters. Thus, LeO 451s only flew at dusk on pre-identified targets in order to avoid German fighters, and returned to their base protected by darkness.⁷⁴ Moreover, the GB II/12 developed new tactics that aimed at bombing German convoys. Rather than overflying a convoy for a long time in order to bomb vehicles heavily protected by AAA, as it was stipulated in the French bombing regulations, four sections of three LeO 451s attacked a road at almost a right angle.⁷⁵ Each section of LeO 451s bombed a half-mile section of the road that allowed them to overfly the AAA threat during the strict amount of time required. Even though the French Air High Command still requested low-level attack, LeO 451s flew at an altitude of 3,000 ft. That altitude proved the best compromise between lethality and survivability because 3,000 ft. was too high for small calibers as well as too low for heavy AAA.⁷⁶ Assault aviation also adopted the altitude of 3,000 ft. for the same reason. Moreover, Breguet 693's pilots also changed their tactics by abandoning as much as they could low level attacks, and by adopting semi-dive attacks that were initiated at medium-altitude to preserve a chance of escaping from Bf 109s.⁷⁷

On 5 and 6 June 1940, French bombing accomplished its maximal effort of the Battle of France: 126 sorties in daylight delivered 60 tons of bombs on the 5th, and 180

⁷⁴ Facon, *Batailles Dans le Ciel de France*, 172-173.

⁷⁵ SHD., Col Rignot, *Enseignements à Tirer des Opérations de Mai-Juin 1940*, 13.

⁷⁶ SHD., Série 3D, Carton 511, Cdt Ruth, "Enseignements tirés de la guerre," 27 Dec. 1940, 8.

⁷⁷ Seive, *L'Aviation d'Assaut Française dans la Campagne de 1940*, 173.

sorties were performed on the 6th.⁷⁸ At night, under the cover of darkness, Amiot 143s and LeO 451s bombed lines of communication that led to the front, and harassed German land reinforcements. As Facon explains, the strikes on 5-6 June were no longer disordered bombing missions but rather the application of a concerted plan, in support of the 7th Army, carried out with efficiency despite losses (26 aircraft shot down on the 5th, and 17 on the 6th).⁷⁹ Since the first engagements, French fighters had adopted new tactics that allowed them to counter effectively German Bf 109s and 110s. The tactical enhancements adopted by both French bombers and their escort combined with the will of FAF leaders to concentrate the effort in order to minimize losses led to significant results. Thus, the progress of three German armored divisions was dramatically hampered on 5-6 June due especially to the assault aviation that had overcome its disastrous first mission.⁸⁰

These results gave new hopes to Gen Weygand, who thought that the French High Command had eventually found a way to employ airpower properly. However, the attrition took its toll on French fighters, and after 6 June 1940, the Luftwaffe enjoyed the control of the air. Bombing missions became highly risky due to the presence of German fighters that did not hesitate to pursue French bombers to their home base. Bombing missions became also less and less efficient because German troops were no longer concentrated as they had been in May 1940 but rather dispersed in order to decrease their vulnerability. After being tasked for striking mobile targets detected hours before by reconnaissance aircraft, French bombers had to challenge Bf 109s for, when they found their targets, bombing a couple of vehicles. Thus, French crew felt that these targets were not worth taking such risk.⁸¹ Although the front collapsed on 12 June 1940, and the tactical situation on the ground became hopeless, French bombers continued to do their duty until the end of hostilities. Even M.S. 406s – the least capable French fighters in that context due to their lack of agility, power, and armament – were tasked for strafing

⁷⁸ Danel, “Le Bombardement dans la Bataille,” 64.

⁷⁹ Facon, *Batailles Dans le Ciel de France*, 170.

⁸⁰ Ibid., 172.

⁸¹ SHD., Col Lefort, “Enseignements à Tirer des Opérations de Mai-Juin 1940,” 22.

German tanks as a desperate effort to stop them. These missions did not change the tactical situation on the ground but rather significantly increased attrition.⁸²

The bombing missions of 5 and 6 June demonstrated the ability of the tactical system of French bombing to adapt to the situation. However, while bomber groups strove to heal the symptoms of the French bombing sickness, the causes of the latter were still present. The ratio of available bomber was still low due essentially to the fact that the new aircraft delivered by French aviation industry were fully equipped but not operational (weapons, engines, and flight controls had to be harmonized).⁸³ Furthermore, most of the bombing missions aimed at striking German troops, and the German control of the air was still unchallenged. New recruits regularly reinforced bomber groups but experienced crews became fewer due to attrition, and at the end of hostilities, just a few of the bomber crews were fully combat ready.⁸⁴ Whereas the bombing missions of 5 and 6 June marked an improvement in terms of tactical effectiveness, by answering to the question “*To what extent*” this improvement impacted operations, one could argue that it was not enough to be decisive.

⁸² Facon, *L'Armée de l'Air Dans La Tourmente*, 232.

⁸³ SHD., Cdt Malardel, “Enseignements à Tirer des Opérations de Mai-Juin 1940,” 6.

⁸⁴ SHD., Col Lefort, “Enseignements à Tirer des Opérations de Mai-Juin 1940,” 7.

CONCLUSION

This analysis has shown that the roots of the defeat in 1940 can be traced from France's grand strategy to her military strategy. More specifically, during the Battle of France, the tactical system of the FAF was not designed for achieving strategic objectives.

At the dawn of WWII, the political, social, and economic situation in France was very complicated. Even though France knew in 1919 that she would likely have to fight against Germany once again, the combination of the domestic political struggle between conservatives and leftists played out against the structural weakness of the Third Republic led to indecision. The social context (heavily influenced by the bad situation of the French economy) that pitted unions against employers also contributed to the exacerbation of tensions in France. While France's domestic politics was cautiously striving to find a path between fascism and communism, Hitler was preparing Germany for war.

The fact that the French grand strategy did not bring about any clear decision before 1938 concerning how to deal with the German threat permeated the French High Command. The French political stalemate became a strategic military stalemate. The French military leaders thus designed a strategy that aimed at containing German forces in the Low Countries with the bulk of the French armies, and on the Eastern Front with the Maginot Line. The goal was first and foremost to buy time. Since the Munich Agreement, French political and military leaders knew that France needed time to increase her military power, especially her airpower.

Among the FAF, during the interwar years, there were no airpower prophets such as Marshal of the Royal Air Force Hugh Trenchard or U.S. Army General William "Billy" Mitchell. Instead, there were either advocates of Douhet's theory or assault aviation such as General Maurice Armengaud. Even though the interwar years saw the initial development of a balanced air doctrine called *lutte aérienne*, the leaders of the FAF chose to deviate from these initial concepts by promoting Douhet's ideas in order to counter the influence of the French Army. Despite its formidable skills acquired during WWI and its independence gained in 1933, during a period marked by tremendous

technological improvements, the FAF lacked a vision that promoted a coherent development of French airpower rather than merely countering the grievances of the French ground commanders. The interservice rivalries that occurred in France during the interwar years were fierce, and this doctrinal fight about how to best employ airpower was eventually won by the French Army. The FAF doctrine became “reactive” in Cain’s terms because French airpower was dispersed among the several different armies, and was focused on the ground maneuver. The attention of the FAF was locked on the ground while it should have looked at the sky, beyond the front line. Therefore, the defeat of the FAF in 1940 rested on its inability to state clearly how airpower should be employed for the sake of joint operations.

In addition to this doctrinal failure, one of the most important mistakes of the FAF leaders was “to capitulate,” at the end of the Phony War, to the ground commanders by accepting a re-organization that achieved the hierarchical dominance of the army over the air force. Even if the FAF leaders had realized that they were applying a flawed doctrine, their ability to innovate was subordinated to the will of the ground commanders. The FAF gave the keys of French airpower to the French Army leaders whose intellectual biases, nurtured by ideas developed during WWI and the following interservice rivalry, prevented them from envisioning a sound employment of airpower. The rivalries of the interwar years had significantly created a gap between services that even the war did not successfully fill.

The combination of these strategic, doctrinal, and organizational failures led to an operational situation in which one of the most important capabilities of the FAF was missing: the ability to gain and maintain air superiority. Even though the significance of air superiority was acknowledged in its doctrine since the *lutte aérienne*, the FAF failed to develop a tactical system that combined a warning system, a centralized C2, and the fighter squadrons into a coherent whole. Since 1938, the FAF had promoted the production of fighters vs. bombers, but in May 1940, French airpower had neither a credible bombing component nor the ability to gain and maintain air superiority.

The elements mentioned above help to understand how the FAF designed its tactical system. The flaws in terms of training, organization, and equipment diminished the overall tactical effectiveness of the FAF. Moreover, the FAF entered WWII with

tactical beliefs about the right way to fight in the air that proved wrong. Furthermore, the FAF leaders did not design an air force that was able to support its operational units as well as to train its crews in war time. Therefore, the overstated inferiority of the FAF at the outset of the hostilities alone did not explain the superiority of the Luftwaffe. In that respect, one can argue that the FAF was partly responsible of the defeat in 1940.

The study of the French fighter tactical system reveals that *its organization was not consistent with support capabilities* due mainly to the combination of the lack of ferry pilots and the flaws of the FAF supply chain. Concerning the latter, the FAF supply chain was not designed for supporting a sustained combat period. Moreover, in terms of pursuit aircraft acquisition, *the FAF did not emphasize the strengths of the French aviation industry but rather its weaknesses*. FAF and civilian leaders decided to equip the FAF with French-built fighter aircraft, while the aviation industry was unable to mass produce competitive fighters. Furthermore, the cumbersome organization of the French fighter tactical system *prevented the French air C2 from exploiting opportunities and to surprise the German forces*. Finally, considering the training of FAF fighter pilots, one can argue that the French fighter tactical system *was unable to train a sufficient amount of new recruits* in order to sustain the pace imposed by combat attrition during the Battle of France.

By acquiring a light bomber that was less effective, and therefore more vulnerable, while performing low-level attack, *the tactical system of French bombing did not match its strengths to its adversary's weaknesses*. By overestimating the ability of its assault aviation “to always get through” at low altitude, while underestimating the performance of German flak, the FAF’s acquisition in terms of attack bombers proved catastrophic. Moreover, while the pre-war training of the crews was focused on medium or high altitude bombing in daylight, the wartime tactical employment of French bombing imposed a low-level flight profile for which French crews were not prepared. Therefore, *the tactical approach of French bombing to training was not consistent with its tactical system*. In the same vein, *the French tactical system of bombing was not consistent with its support capabilities*. Because of the inability of the FAF supply chain to provide the parts for repairing non-operational aircraft, French bombing was unable to fulfil the requirements imposed by its tactical system. The situation of the FAF supply

chain worsened when the front line collapsed at Sedan, which forced bomber wings to move from one airfield to another.

The obstacles confronting the poorly thought out and misused FAF tactical system were great and a rout seemed inevitable. Nevertheless, the Luftwaffe never succeeded in blowing out the flame of the French airpower candle. Despite strategic failure, operational mistakes, and tactical flaws, the FAF tactical system was exhausted but still coherent at the end of hostilities. This situation stemmed essentially from the commitment of the men and women who fought on the ground and in the air by demonstrating a pure courage, self-sacrifice, and fighting spirit.

This latter assertion leads us to examine potential implications regarding the present study. The men and women who served in the FAF during the Battle of France deserved better leaders who ought to have thought and implemented a sound tactical system. When during the interwar years, not only the lack of funds but also the limitations of the French aviation industry hampered the modernization of the FAF, the sole treasure of the FAF was its airmen, and the success or the failure to come stemmed from the ability of the FAF to educate them. In that respect, as the French historian Marc Bloch put it: “In two different campaigns, separated by more than twenty years, I heard officers state about the military education they had received: “The Ecole de Guerre [*French Joint Staff College*] deceived us.”¹ Military education is the key. One can argue that, though inferior in terms of quality and quantity of equipment, a well-designed and properly-driven tactical system would have performed better than the FAF’s in 1940.

¹ Bloch, *L'Étrange Défaite*, 175.

APPENDIX A: TIMELINE²

1939

- 1 September: Germany invaded Poland. Italy declared itself neutral.
- 3 September: France and Britain declared war on Germany.
- 26 September: Polish capitulation.
- 9 October: Hitler gave his first directive concerning the Yellow Plan.
- 30 November 1939 – 12 March 1940: War between Finland and the Soviet Union.
- 1 December 1939: The French Parliament voted full powers to Édouard Daladier's government.

1940

- 9 January: Hitler planned to ignite the Yellow Plan on January 16.
- 10 January: A German aircraft crashed in Belgium revealing the Yellow Plan to the Allies. Hitler had to change his initial planning.
- 15 March: Finalization of the new Yellow Plan.
- 20 March: Resignation of the President Édouard Daladier.
- 21 March: Installation of Paul Reynaud's government.
- 21 March – 16 June: Paul Reynaud's government was in charge.
- 28 March: A new agreement between France and Britain was signed that excluded any separated peace or armistice.
- 8-9 April: Germany invaded Denmark and Norway.
- 10 May: Germany invaded the Low-Lands. Winston Churchill nominated British Prime Minister. German airborne operation launched against The Netherlands. German paratroopers took the Eben Emael Fort on the Albert Canal. Germany took Maastricht. Gamelin ignited the Dyle maneuver.
- 11 May: German troops progressed west of the Albert Canal.
- 13 May: Rommel crossed the Meuse north of Dinant. Guderian crossed the Meuse at Sedan.

² The source of the present timeline is: Facon, *L'Armée de l'Air dans la Tourmente*, 286-287.

15 May: The 9th French Army was defeated on 14 May, and began its retreat. The Germans started to exploit the breakthrough at Sedan. The Netherlands capitulated. The Allied armies in the Low-Lands started their retreat toward the Channel.

18 May: Pétain became the Vice-President of the French government.

19 May: Gen Weygand replaced Gen Gamelin at the head of French armed forces.

20 May: Germany took Arras, Amiens, and Abbeville. Panzer Corps reached the Channel encircling Allied armies in the Flanders. The rest of the French Army established a defensive line along the Somme river.

24 May: By stopping German divisions toward the North Sea, Hitler offered a break to Allied armies.

25 May: Lord Gort decided that British troops would re-embark in Dunkirk toward Britain.

26 May: Hitler decided to pursue the progression of German troops but the Allies had reinforced their lines.

28 May: Capitulation of Belgium.

28 May – 4 June: Battle of Dunkirk. About a million of French, British, Belgian, and Dutch soldiers were captured by German troops. Eighteen Franco-British divisions were destroyed.

5 June: German offensive on the Somme. Nomination of Charles De Gaulle as Deputy Secretary of Defense.

6 June: German troops broke through French defenses.

10 June: Declaration of war on Italy.

14 June: German troops entered in Paris. Germans attacked the Maginot Line.

16 June: Paul Reynaud resigned. Marshal Pétain constituted a new government.

17 June: Pétain requested an armistice to Germany.

18 June: General de Gaulle's speech, broadcasted from London to France by the British Broadcasting Corporation that appealed to refuse defeat and continue the fight the enemy.

20 June: Italian offensive in the Alps.

22 June: Signature of the armistice between France and Germany.

24 June: Signature of the armistice between France and Italy.

25 June: Entry into force of the armistices.

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