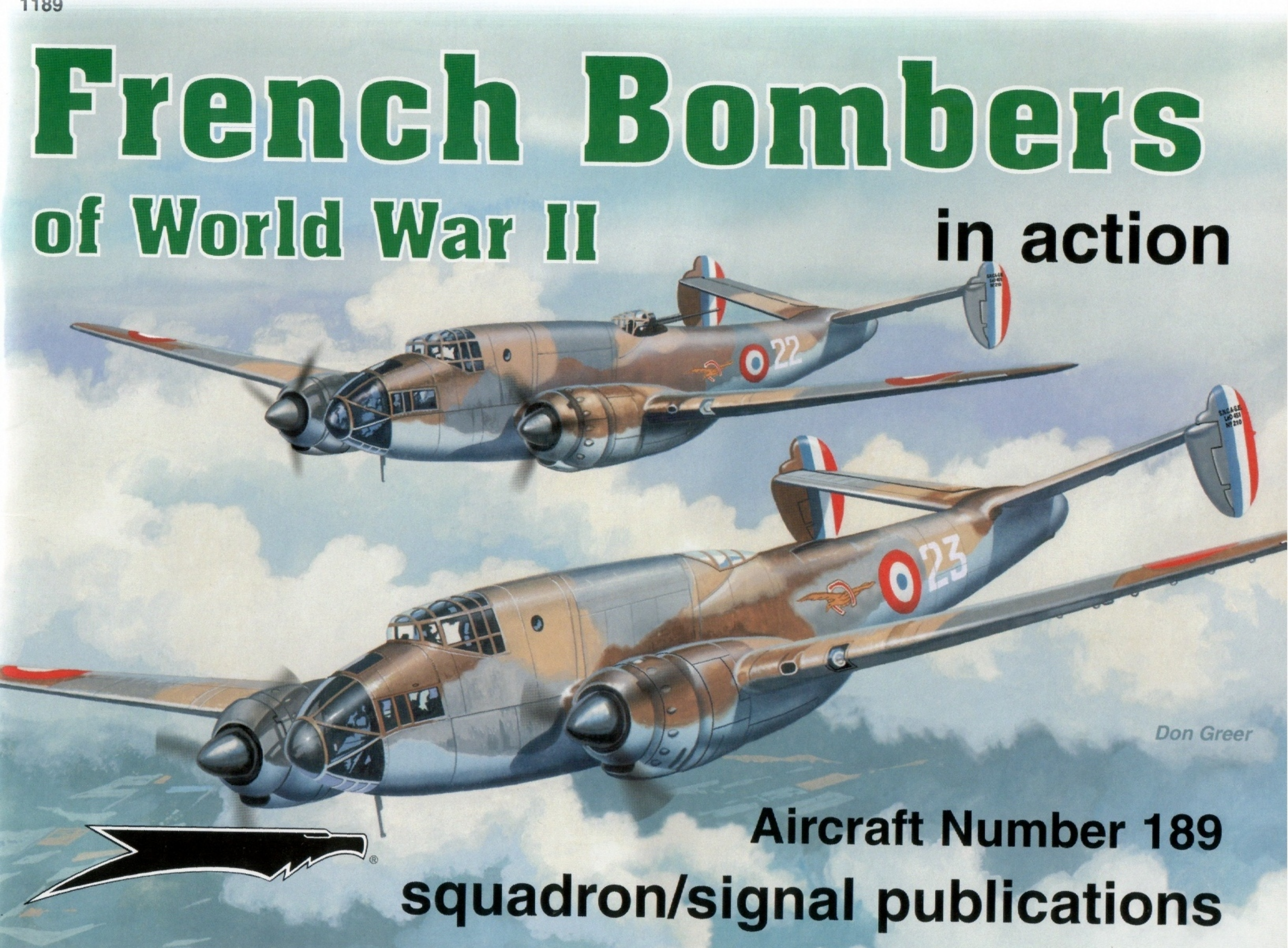
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French Bombers of World War II in action



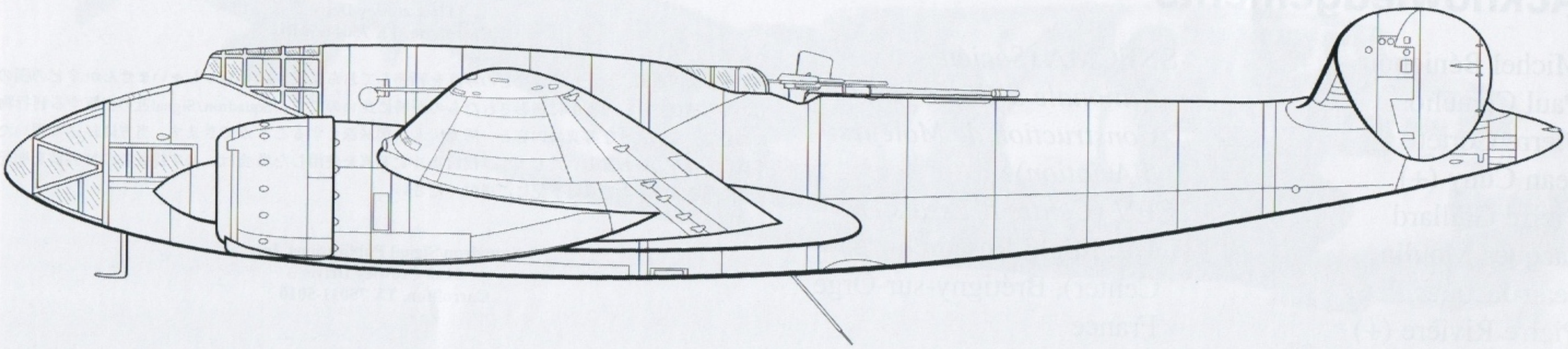
Don Greer

Aircraft Number 189

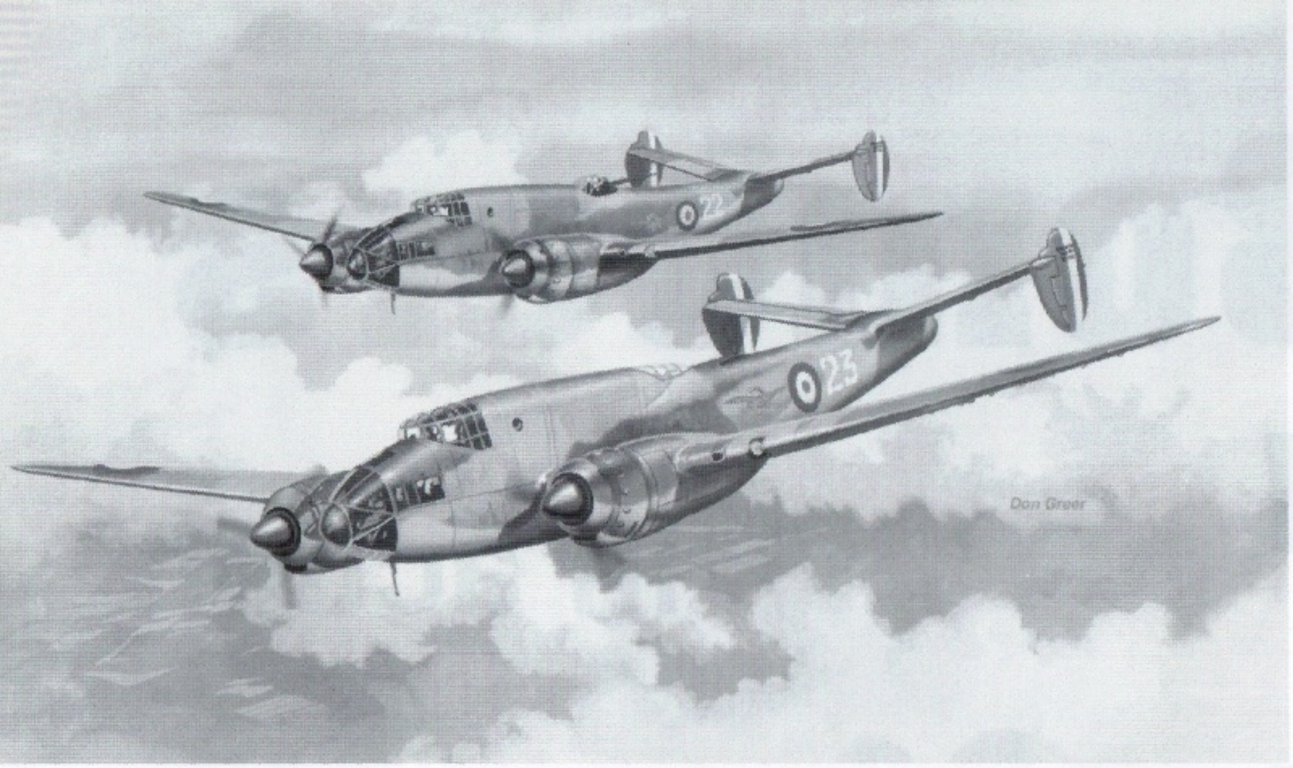
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French Bombers of World War II in action

By Alain Pelletier
Color by Don Greer and Darren Glenn
Illustrated by Dave Gebhardt



Aircraft Number 189
squadron/signal publications



Two Lioré & Olivier LeO 451 bombers fly to attack German armor formations advancing through central Belgium in May of 1940. The aircraft were assigned to the 1st *Escadrille* (Squadron) of *Groupe de Bombardement* (Bomber Group) I/31 (31st *Escadre*/Wing). This *Escadrille* was the first operational LeO 451 unit and was based at Connantre, France when German forces invaded Western Europe on 10 May 1940.

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Three Lioré & Olivier LeO 451 bombers assigned to the 2nd *Escadrille* (Squadron) of *Groupe de Bombardement* (GB; Bomber Group) I/25 (25th *Escadre*; Wing) fly in formation in late 1940. This was a unit of the *Armée de l'Air de l'Armistice* (Armistice Air Force) of Vichy France, as identified by the White aft fuselage stripe. GB I/25 was stationed at El Aouina, Tunisia after the fall of France in June of 1940. This *Escadre* had White numerals in the 21 to 40 range painted on the aft fuselage of 2nd *Escadrille*'s aircraft. Aircraft assigned to GB I/25's 1st *Escadrille* had numerals in the 11 to 20 range. The LeO 451 was the standard French medium bomber when the Germans attacked France on 10 May 1940.



Introduction

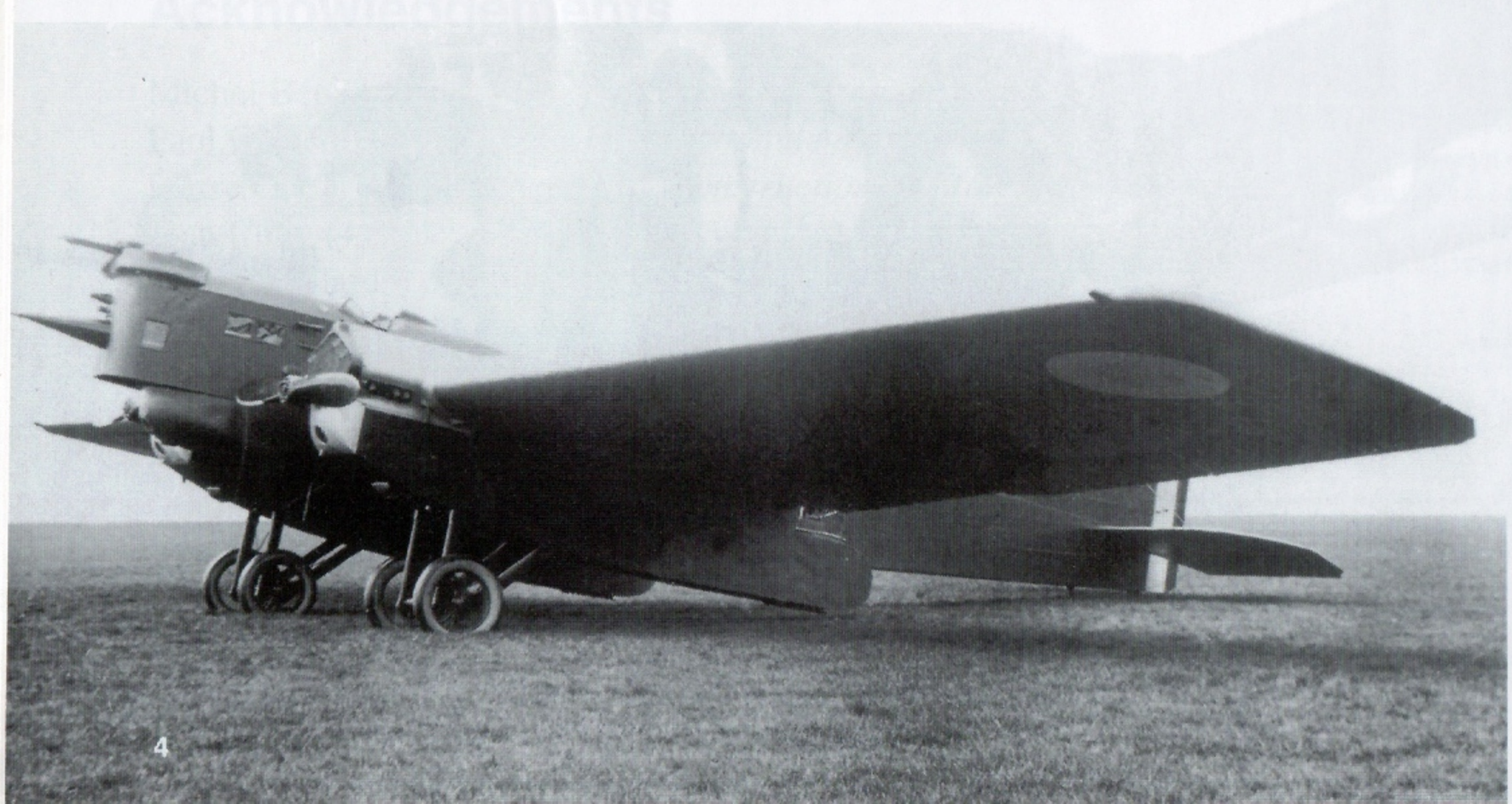
On 1 April 1933, the French Army's *Aéronautique Militaire* (Military Aeronautics) was renamed the *Armée de l'Air* (Army of the Air; French Air Force). (This service became independent of the Army on 2 July 1934.) New French Air Minister Pierre Cot asked *Armée de l'Air* Chief of Staff *Général* Victor Denain to prepare a five-year aircraft procurement plan in May of 1933. *Plan d'Equipement I* (Equipment Plan One) was intended to replace all aircraft in the *Armée de l'Air* inventory and had several technical objectives. These included the widespread use of radio equipment and the introduction of high rate of fire automatically fed machine guns. Financial difficulties due to the Great Depression caused the *Ministère de l'Air* (Air Ministry) to postpone *Plan I* for the moment.

Germany withdrew from both the Disarmament Conference and the *Société des Nations* (League of Nations) at Geneva, Switzerland on 14 October 1933. *Reichskanzler* (Reich Chancellor) Adolf Hitler's Nazi regime was now totally free to rearm, in defiance of the 1919 Treaty of Versailles. (Germany and the Allies signed this treaty – whose provisions strictly curtailed Germany's armed forces – to formally end World War One on 28 June 1919.) The Air Ministry soon adopted *Plan I,* but the French Parliament did not allocate the necessary funding for its total fulfillment. Despite this setback, the Air Ministry placed several orders for bomber aircraft in late 1933 and early 1934, including 40 Amiot 140s, 50 Breguet 413/414s, and 32 Bloch 200s.

Violent right wing demonstrations occurred in Paris in February of 1934. This led to the formation of a new French government, with Gaston Doumergue as Premier and *Général* Denain as Air Minister. The financial situation was worse than ever and the *Armée de l'Air* budget was further reduced while the Nazi threat grew daily. On 17 April 1934, France withdrew from the Disarmament Conference and new defense budgets were adopted the following July. These budgets called for the procurement of 170 new aircraft by the end of 1934 and 450 more in 1935. Consequently, the *Ministère de l'Air* ordered 84 new bombers between August of 1934 and January of 1935.

On 16 March 1935, Germany officially revealed the Luftwaffe, which has been secretly formed months before. The French government reacted to this development by allocating additional funds for procuring 309 aircraft. *Général* Denain signed intent letters for 520 additional aircraft a few weeks later. These called for the delivery of 452 aircraft before the year's end. Meanwhile, the *Etat-major de l'Armée de l'Air* (EMAA; French Air Force High Command) revised their aircraft requirements. They called for 1508 new aircraft (528 fighters, 620 bombers, and 360 reconnaissance aircraft). The Air Ministry presented a modified *Plan I* (*Plan des 1500*) to the Parliament, but it was not adopted due to budgetary constraints. This Ministry studied a new procurement plan calling for 1173 aircraft, but increasing financial difficulties reduced this to 1023 aircraft before it was adopted on 16 July 1935. Due to the Luftwaffe's rapid expansion, *Plan I* was modified to authorize procurement of 1151 aircraft on 9 December.

German troops reoccupied the Rhineland – demilitarized German territory west of the Rhine River and facing France – on 7 March 1936. This act was in defiance of both the Versailles Treaty and the 1925 Locarno Pact, which brought Germany into Western Europe's mutual security network. Although French forces were stronger than Germany's at this time, the French did nothing to stop Hitler's move. The *Ministère de l'Air* subsequently awarded the last production contracts under *Plan I.* New Premier Léon Blum appointed Pierre Cot as Air Minister on 6 June. Cot helped develop a new procurement program (*Plan II*), which the Air Ministry adopted on 26 October 1936. This plan called for a considerable increase in *Armée de l'Air* strength by



This Blériot 127M was one of 34 examples built which entered *Aéronautique Militaire* service from April of 1929. These aircraft were assigned to the *Escadrilles de Protection* (Defense Squadrons) of the 11th *Escadre de Bombardement* (Bomber Wing) at Metz. Numerous fatal accidents plagued the Blériot 127M's service life and led to the introduction of several modifications. These modifications proved ineffective and the French grounded the massive Blériots in 1933. *Cocardes* (roundels) were painted only on the wings of French military aircraft prior to 1940. The center disc was Roundel Blue (FS25090), with a White (FS27780) inner ring and a Roundel Red (FS21105) outer ring. Rudders were striped (from front) Roundel Blue, White, and Roundel Red.

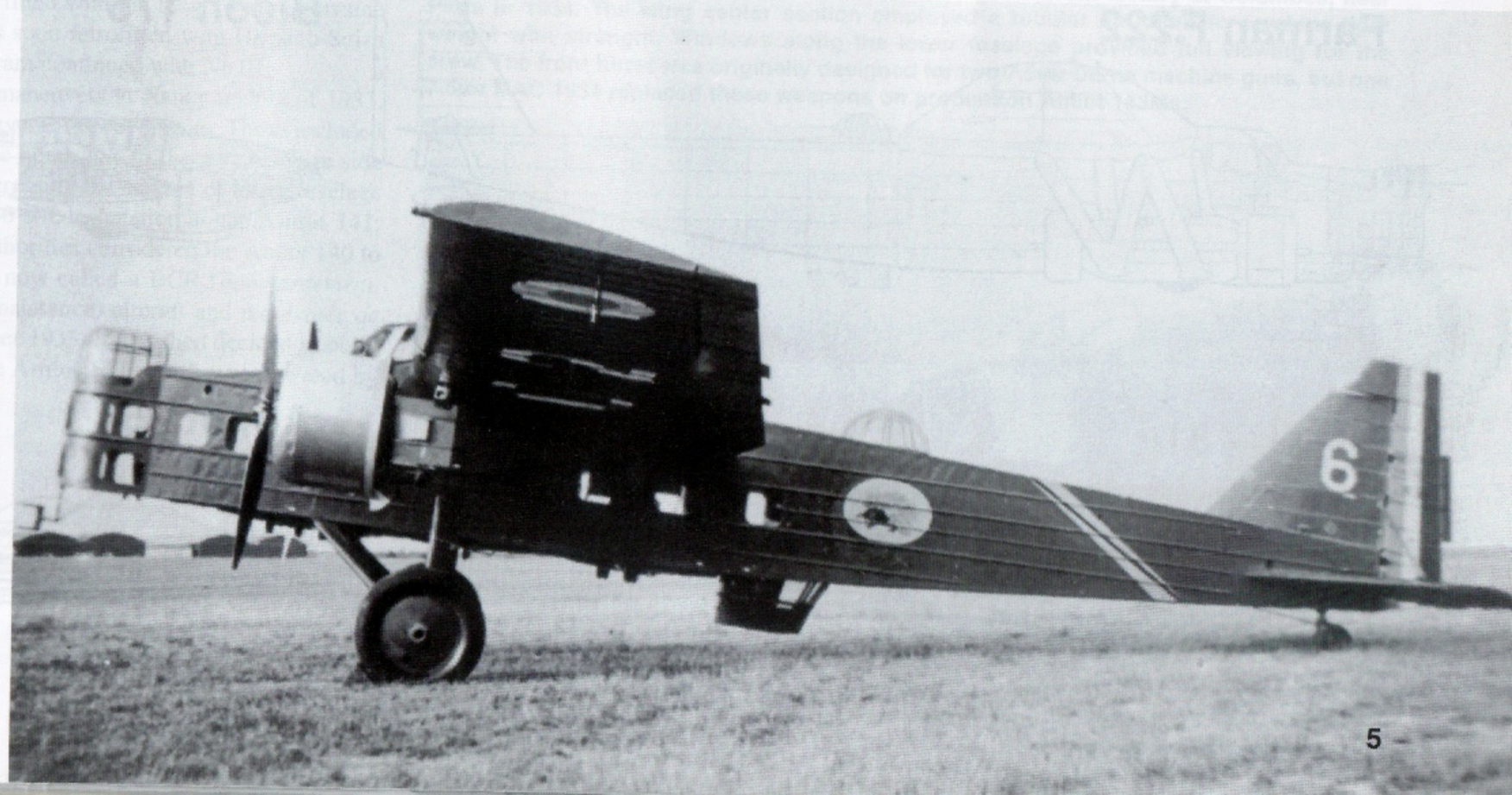
the end of 1939. Among the requested assets were 1099 bombers, which were divided into 984 medium bombers and 115 heavy bombers. French aircraft firms were due to deliver 250 bombers against *Plan II* during 1938, including 24 **Farman F.222**s, 115 **Bloch 210**s, and 111 **Bloch 131**s. The industry was unable to meet these needs, partly due to both political instability and the consequences of aircraft industry nationalization on 11 August 1936. Various firms were consolidated into regional *Sociétés Nationale de Constructions Aéronautiques* (SNCAs; National Aircraft Construction Companies). The intended production efficiency increase did not occur after nationalization.

By January of 1938, the most advanced of the 757 bombers on strength were 119 **Amiot 143M**s and 144 Bloch 210s, which were obviously outdated. The growing German threat led to a reevaluation of French defense policy and led to a new aircraft equipment program (*Plan V*), which the Air Ministry hastily approved on 15 March 1938. Its objective was to increase the number of first line aircraft in the inventory to 2617, including 876 bombers, with a reserve of 2122 aircraft, including 614 bombers. This plan was scheduled for completion within three years. Edouard Daladier – appointed Premier in April of 1938 – gave top priority to aircraft production and *Plan V*'s quantities were constantly modified during the following months. Unfortunately, French aircraft industry output remained slow. On 1 June 1939, only 885 aircraft had been produced against the scheduled 1305! The daily worsening of the European situation prompted the making of new aircraft procurement decisions on 13 June 1939. A modified *Plan V* (*Plan V renforcé*; Reinforced Plan V) was adopted, which called for 3575 aircraft to be delivered by 1 January 1940 and 3938 additional aircraft to be delivered the following year. These unrealistic production programs were never fulfilled. First-line *Armée de l'Air* units were equipped with only 322 bombers when German forces launched their assault on France and Western Europe on 10 May 1940. These aircraft included 90 Bloch 210s, 50 Amiot 143s, 21 **Farman 221/222**s, 94 **LeO 45**s, 54 **Breguet 691/693**s, and 13 **Amiot 354**s.



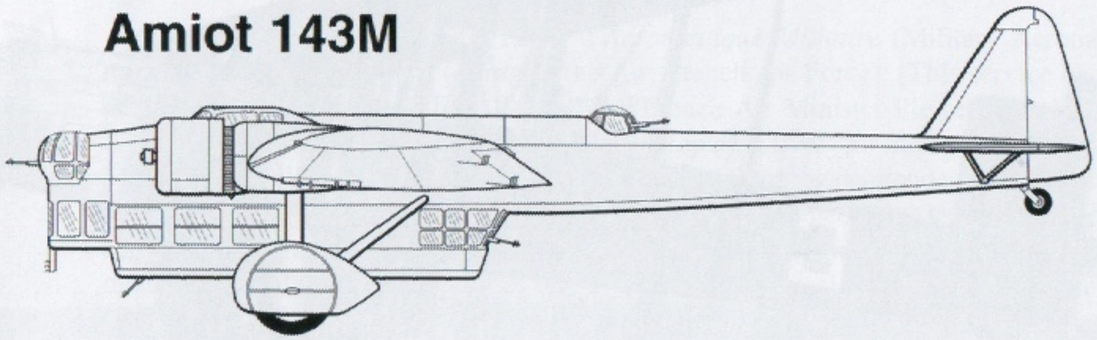
A few Lioré & Olivier LeO 20 bombers replaced aging Farman F.60 Goliaths from May of 1928. LeO 20s equipped three bomber wings: the 12th (Rheims), 21st (Nancy), and 22nd (Chartres) *Escadres de Bombardement*. Each *Escadre* consisted of two *Groupes*, while each *Groupe* was formed of two *Escadrilles*. Bloch 200s and Amiot 143Ms replaced the LeO 20s from 1935; however, several LeO 20s were still in the *Armée de l'Air* inventory at the outbreak of World War Two in September of 1939. This LeO 20 BN3 was painted overall Chocolate Brown (FS20117).

Bloch 200 No 193, White 6 (E-202), was assigned to the 32nd *Escadre de Bombardement* at Tours. It was a sturdy and reliable aircraft with reasonable performance when it entered *Armée de l'Air* service in 1934. Its two 760 HP Gnôme & Rhône 14Kdrs radial engines powered it to a maximum speed of 215 KMH (134 MPH). The Bloch 200 carried a 1500 KG (3307 pound) bomb load and was armed with three 7.5MM Darne machine guns located in single mounts in the nose, dorsal, and ventral positions. Bloch built 208 Bloch 200s, with 92 of them still in service at the outbreak of World War Two. This bomber was painted overall Dark Green (FS24058), with natural metal cowlings. The *matricule militare* (military registration number) was painted in White across the wing undersurface. This practice was discontinued on French aircraft built after 13 January 1940. (M. Bénichou)

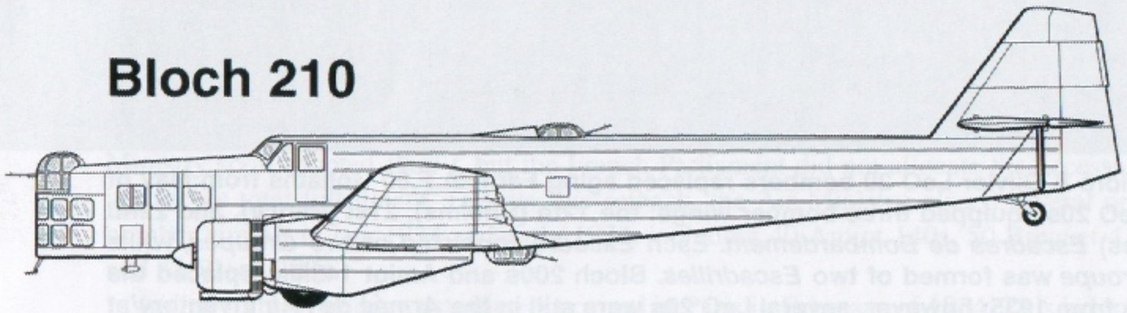


Development

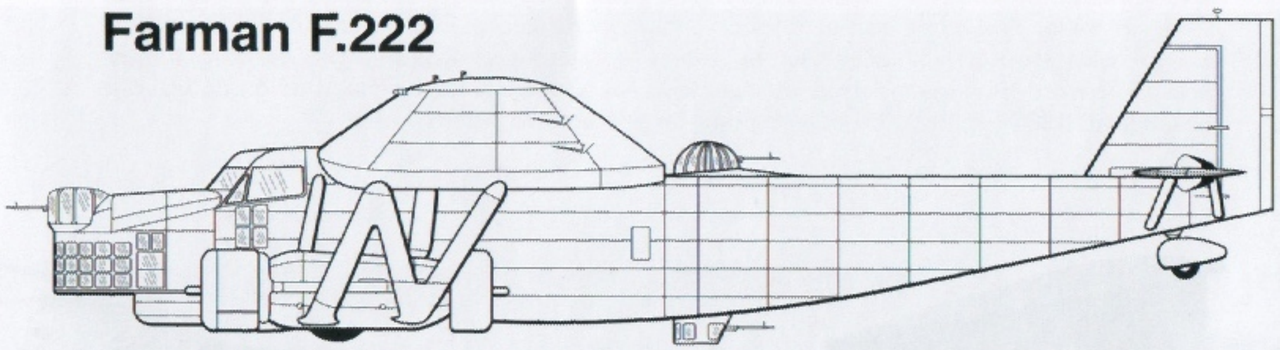
Amiot 143M



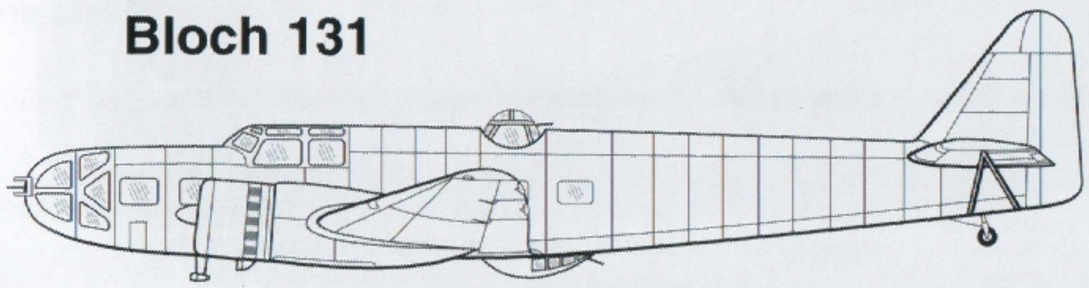
Bloch 210



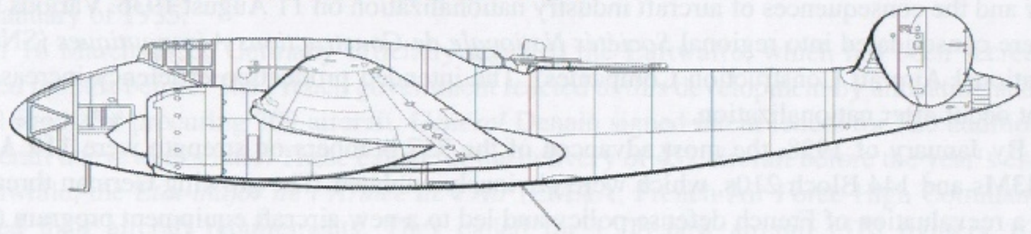
Farman F.222



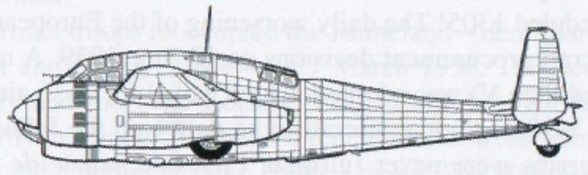
Bloch 131



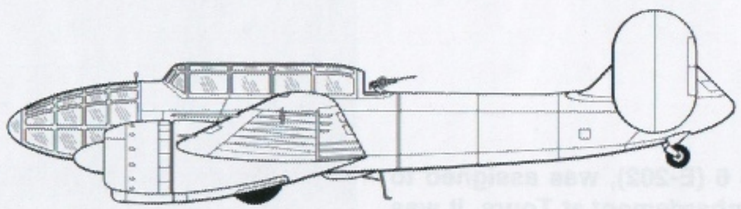
Lioré & Olivier LeO 451



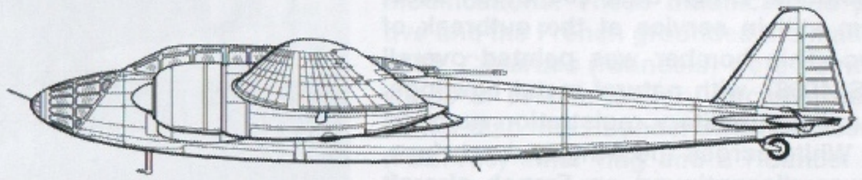
Breguet 693



Bloch 175



Amiot 354



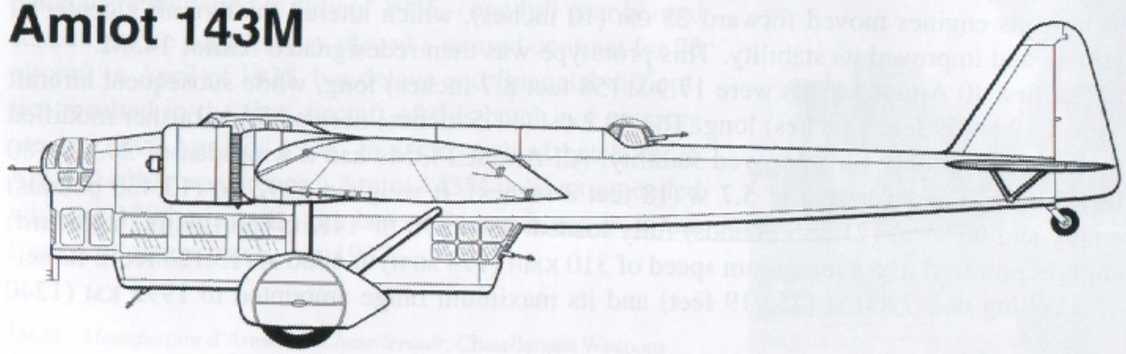
Amiot 143M

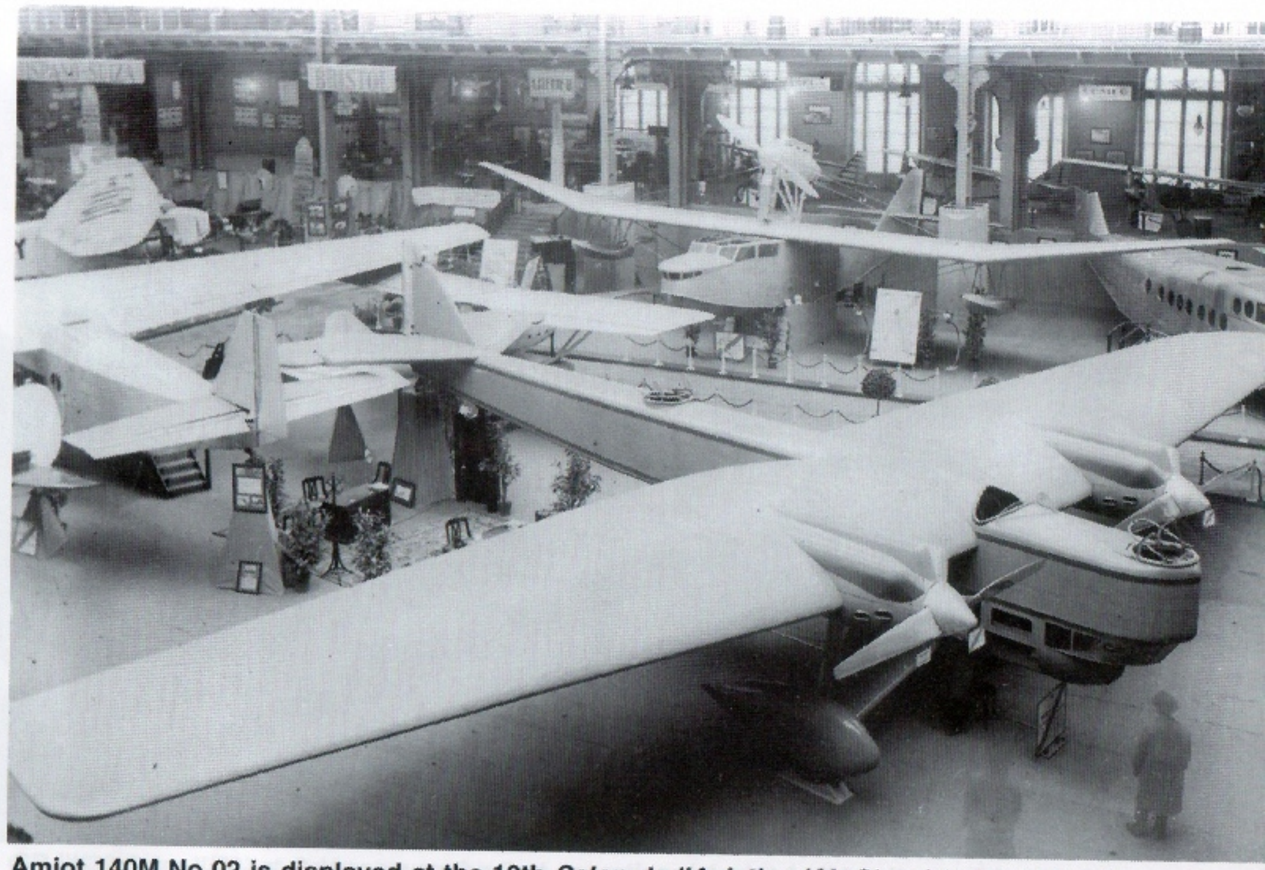
The French Air Ministry's *Service Technique Aéronautique* (STAé; Aeronautical Technical Service) issued a specification for a twin-engined, four-seat, all-metal multipurpose monoplane aircraft in 1928. Several manufacturers submitted proposals and the Ministry awarded contracts for four prototypes: the **Blériot 137M** (*Multiplace*; Multi-Seat), the **Breguet 411M**, the **SPCA 30**, and the **SECM (Amiot) 140M**. Félix Amiot led the *Société d'Emboutissage et de Construction Mécanique* (SECM; Stamping and Mechanical Construction Corporation), whose design bureau was headed by André Dutartre. The Amiot 140M introduced the stressed skin principle, which provided a lightened airframe and consequently better performance without needing additional horsepower. Among the Amiot 140M's many distinctive features was a 100 M^2 (1076 square foot) wing, which allowed a relatively low landing speed of 85 KMH (53 MPH), and a rectangular cross-section fuselage fitted with a deep glazed gondola. Four machine gun stations were installed and the typical bomb load consisted of sixteen 50 KG (110 pound) bombs. It was planned to install two 700 HP Lorraine 18Gad Orion 18-cylinder, liquid-cooled, inline engines, but this powerplant was not ready in time for the first flight. The Amiot 140 was subsequently equipped with two 650 HP Hispano-Suiza 12Nbr 12-cylinder, liquid-cooled, inline engines.

The first prototype (Amiot 140 No 01) made its maiden flight at Etampes on 12 April 1931. After a few flights, three-blade Ratier propellers replaced the two-blade Levasseur propellers in order to reduce vibrations. During the following June, the prototype was sent to the *Centre d'Essais du Matériel Aérien* (CEMA; Air Material Research Center) at Villacoublay for official tests. The second Amiot 140 was displayed at the 12th *Salon de l'Aviation* (Air Show) in Paris, during November and December of 1931. It was due to receive all the modifications found necessary while testing No 01 prototype and was fitted with the long awaited Lorraine 18Gad Orion engines in November of 1932. No 02 was soon retrofitted with Hispano-Suiza 12Nbrs, but never flew. Meanwhile, the flying test program continued with No 01.

After CEMA trials, the aircraft participated in night maneuvers at Nancy in July of 1933. These flights prompted the *Armée de l'Air* to request several improvements. These included installing a cupola over the nose gun station, moving the bomb bay to the port fuselage side and creating a crew access cat walk to starboard, and increasing the surface of lower fuselage windows. These modifications resulted in the Amiot 140's redesignation as the **Amiot 141**; however, this variant never came to fruition. Military authorities considered the Amiot 140 to have fulfilled most of their requirements for what they now called a BCR (*Bombardement, Chasse et Reconnaissance*; Bomber, Fighter and Reconnaissance) aircraft and the *Armée de l'Air* ordered a first batch of 40 machines on 23 November 1933. It was then decided to build two prototypes as soon as possible. The first one was the **Amiot 142**, which was powered by

Amiot 143M

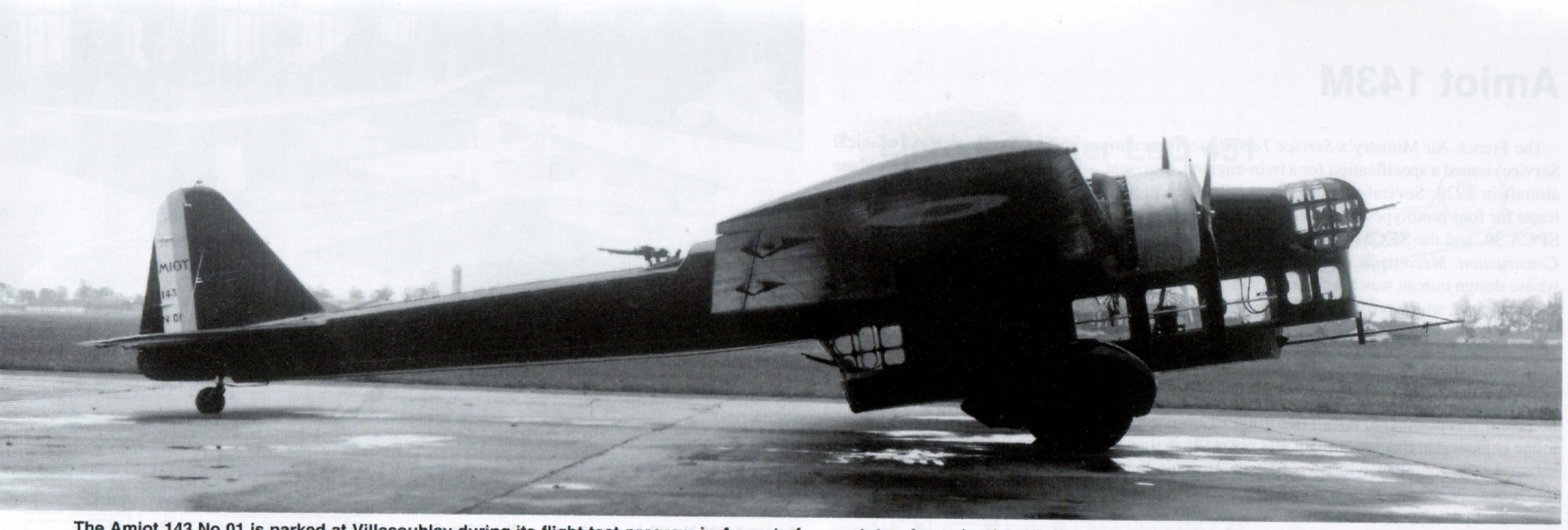




Amiot 140M No 02 is displayed at the 12th *Salon de l'Aviation* (Air Show) in Paris in late 1931. The empty engine nacelles were designed for 700 HP Lorraine 18Gad Orion, 18 cylinder inline engines. Amiot designed the airframe for the simplest possible construction. Large riveted panels covered the rectangular fuselage frames. (*L'Aeronautique*)

The fuselage of Amiot 143M No 01 is rolled out of the SECM factory at Colombes, near Paris in 1934. The wing center section employed a tubular structure to combine light weight with strength. Windows along the lower fuselage provided full viewing for the crew. The front turret was originally designed for two 7.5MM Darne machine guns, but one 7.5MM MAC 1934 replaced these weapons on production Amiot 143Ms.





The Amiot 143 No 01 is parked at Villacoublay during its flight test program in August of 1934. Armament was installed in the three gunner stations: nose, dorsal, and ventral. An enclosed turret on production Amiot 143Ms replaced the prototype's open dorsal position. Engine cowlings were located immediately forward of the wing leading edge. The prototype's engine installation near the wing leading edge was moved 25 CM (10 inches) forward on the Amiot 143M. This aircraft's color scheme is believed to be overall Dark Green (FS24058), with natural metal cowlings. The nose mounted test data probe was not mounted on production aircraft.



This Amiot 143M No 7, White 5 (E-166), was assigned to *Groupe de Bombardement* (GB; Bomber Group) II/22 at Chartres. A stylized blue bird is painted on the vertical stabilizer, while a White diagonal band is painted on the fuselage. This aircraft is believed to be painted in the standard overall Chocolate Brown (FS20117) scheme for Amiot 143Ms. (Tranchant Collection)

two 860 HP Hispano-Suiza 12Ybr engines. The second prototype was designated Amiot 143 and fitted with two 800 HP Gnôme & Rhône 14K Mistral Major 14-cylinder, air-cooled radials. Delivery of the Amiot 142 was scheduled for 23 July 1934, but numerous delays resulted in its first flight not occurring until January of 1935 – five months after the Amiot 143's maiden flight in August of 1934. Little test flight information exists on the Amiot 142 prototype, which the *Armée de l'Air* soon cancelled to divert all liquid cooled engines to fighters.

The **Amiot 143** prototype was originally powered by 700 HP Gnôme & Rhône 14Kars (port)/Kbrs (starboard) radials, which were soon replaced by the specified 800 HP 14Kdrs/Kgrs, and replaced in turn by 850 HP 14Kirs/Kjrs. Gnôme & Rhône 14 series engines were handed, so the port engine turned clockwise and the starboard engine turned counterclockwise. This inward motion countered engine torque and reduced aircraft yawing in the event of one engine shutting down during flight. Flight tests with CEMA at Villacoublay began during October of 1934. The prototype demonstrated a maximum speed of 293 KMH (182 MPH) at 4000 M (13,123 feet) during these trials. The Amiot 143 prototype was returned to Amiot after CEMA testing to have its engines moved forward 25 CM (10 inches), which altered the aircraft's center of gravity and improved its stability. This prototype was then redesignated **Amiot 143M**.

The first 40 Amiot 143Ms were 17.9 M (58 feet 8.7 inches) long, while subsequent aircraft were 18.2 M (59 feet 9 inches) long. The 29.2 CM (11.5 inches) nose addition further modified the center of gravity for improved stability. All Amiot 143Ms had a wingspan of 24.5 M (80 feet 5 inches) and a height of 5.7 M (18 feet 8 inches). It weighed 6092 KG (13,430 pounds) empty and 9687 KG (21,356 pounds) fully loaded. Two 850 HP 14Kirs (port)/Kjrs (starboard) engines powered it to a maximum speed of 310 KMH (193 MPH) at 4000 M (13,123 feet). Its service ceiling was 7900 M (25,919 feet) and its maximum range amounted to 1995 KM (1240



White 2 was Amiot 143M No 81 (E-304), which flew with the *Section de Pilotage Sans Visibilité* (SPSV; Blind Flight Training Unit) at Cazaux. This Amiot 143M was later transferred to GB II/34 at Poix and survived the Battle of France in May and June of 1940. The *Groupe*'s red and white insignia is painted on the aft fuselage.



GB III/22 (later II/22) at Orléans was the first operational Amiot 143M unit, receiving its first aircraft in September of 1935. This *Groupe* was redesignated GB II/22 the following 1 December, while an existing GB II/22 was renamed GB I/15. The 22nd *Escadre*'s other *Groupe*, GB I/22, transitioned to the Amiot 143M in January of 1936. Four Amiot 143Ms of GB II/22 are parked on or beside the concrete dispersal at Chartres, while Potez 540 bombers are parked aft of the Amiot aircraft. (G. Grod Collection)

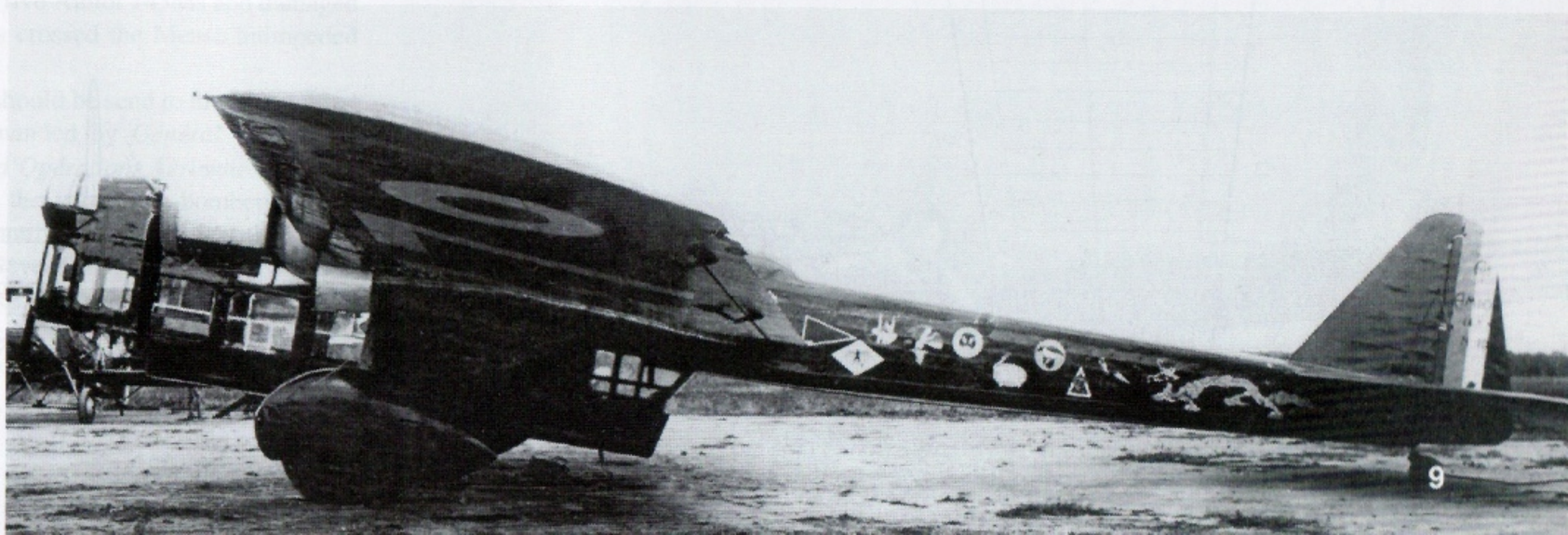
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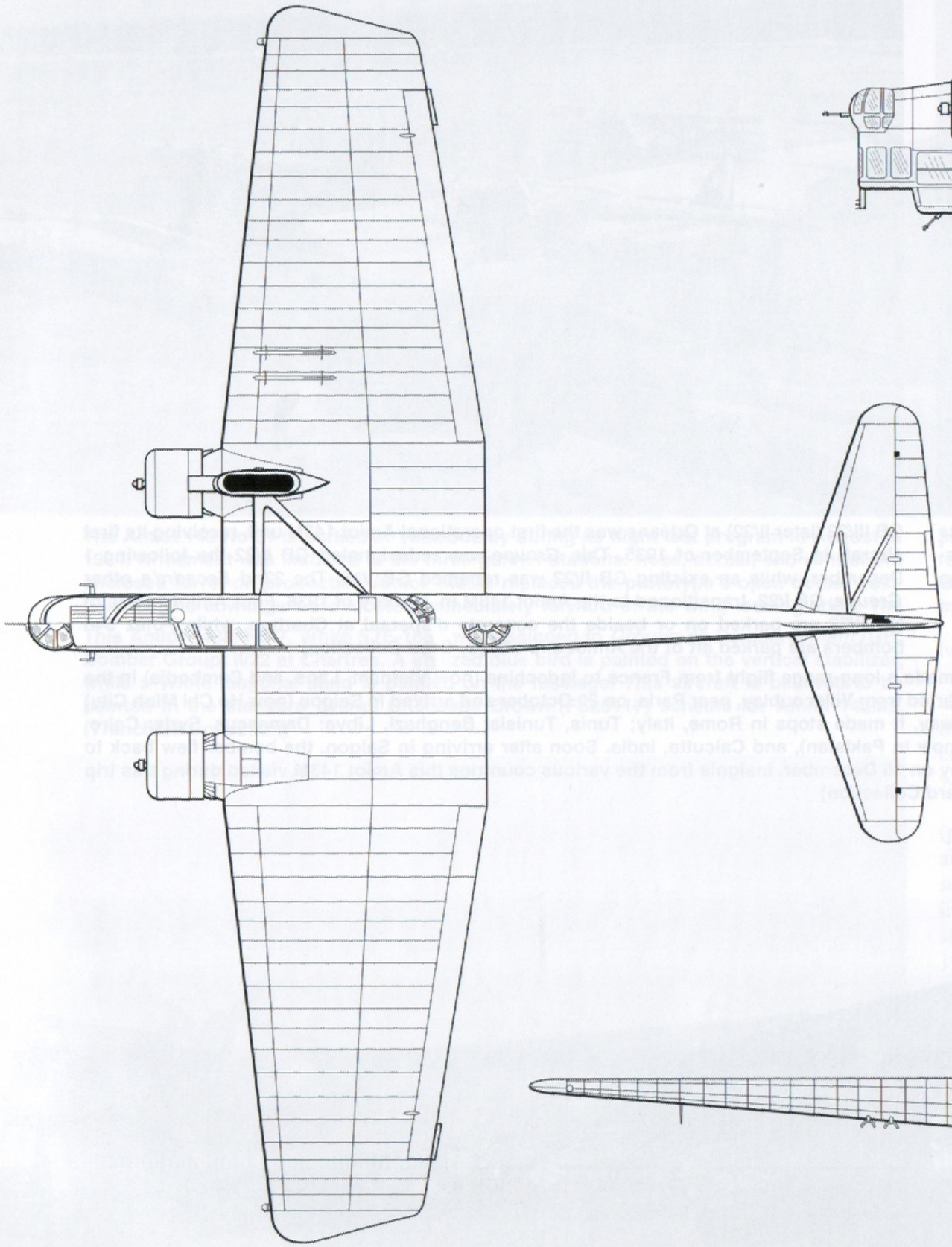
This aircraft was armed with four 7.5MM MAC[1] 1934 machine guns. One each was mounted in the nose turret, the dorsal turret, through the forward fuselage floor hatch, and on the ventral step. Outboard wing racks held four 100 KG (220 pound) or two 200 KG (441 pound) bombs, while the bomb bay held a maximum of 880 KG (1940 pounds) of bombs. This bay held a combination of one 500 KG (1102 pound), four 100 KG, four 220 KG (485 pound), sixteen 50 KG (110 pound), or sixty-four 10 KG (22 pound) weapons. A five-man crew – pilot, co-pilot/navigator, nose gunner, radio operator/ventral gunner, and dorsal gunner – operated this bomber.

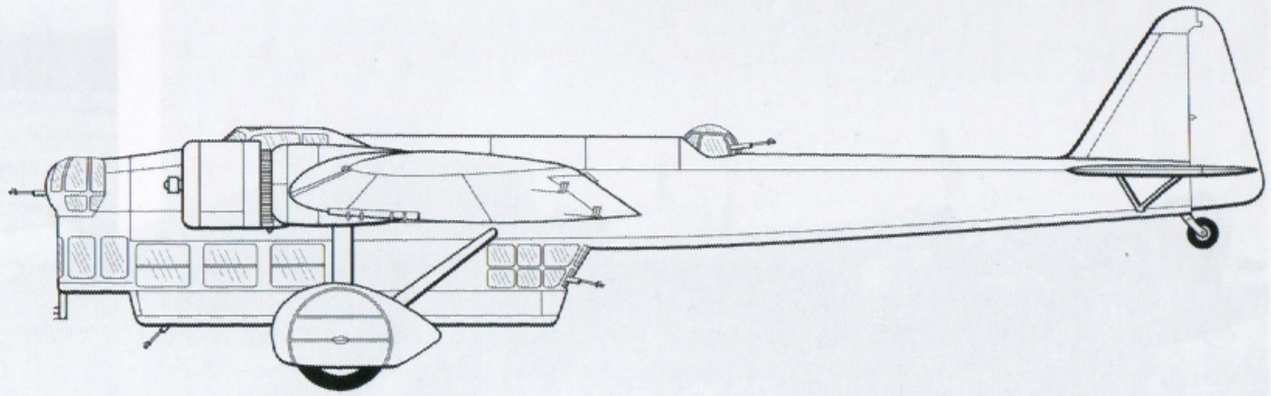
The first four Amiot 143Ms of the initial production batch were delivered in July of 1935 – one full year behind schedule. The Air Ministry placed a second contract for 73 aircraft in April of 1935, but delays and financial difficulties resulted in the first aircraft of this batch not entering service until April of 1936. In 1936, a third batch of 25 Amiot 143Ms was ordered. Amiot 143M production ended with the 178th aircraft – the last of 76 machines from the final production batch – in 1937.

[1]MAC: *Manufacture d'Armes de Chatellerault*; Chatellerault Weapons Manufacturing Company.

Amiot 143M No 100 (E-327) made a long-range flight from France to Indochina (now Vietnam, Laos, and Cambodia) in the fall of 1936. This aircraft departed from Villacoublay, near Paris, on 20 October and arrived in Saigon (now Ho Chi Minh City) on 1 November. Along the way, it made stops in Rome, Italy; Tunis, Tunisia; Benghazi, Libya; Damascus, Syria; Cairo, Egypt; Jask, Iran; Karachi (now in Pakistan), and Calcutta, India. Soon after arriving in Saigon, the bomber flew back to France, reaching Villacoublay on 15 December. Insignia from the various countries this Amiot 143M visited during this trip adorn the fuselage. (P. Gaillard Collection)



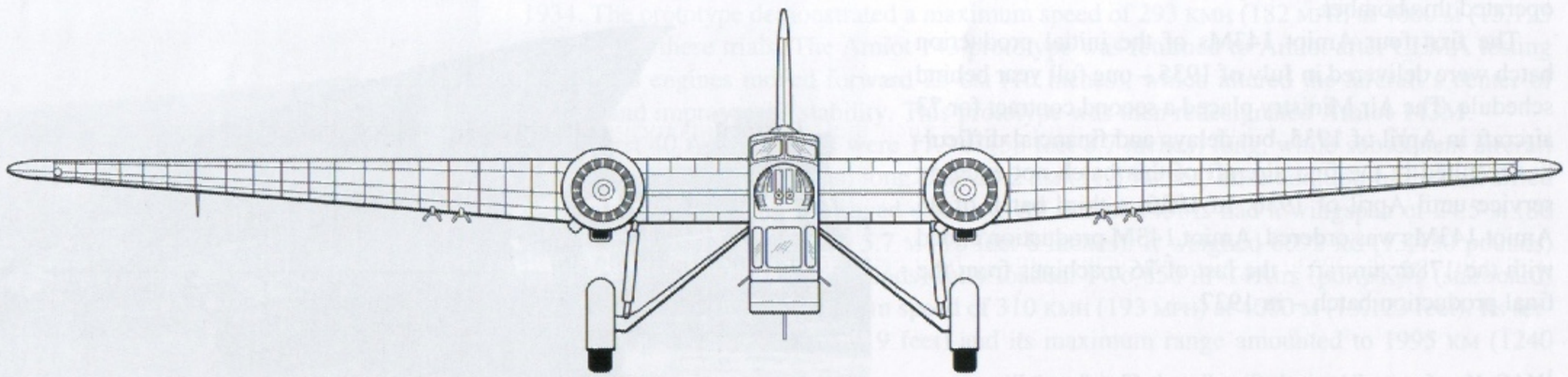




Amiot 143M Specifications

Wingspan:.....24.5 M (80 feet 5 inches)
Length:.....18.2 M (59 feet 9 inches)
Height:.....5.7 M (18 feet 8 inches)
Wing Area:.....100 M^2 (1076 square feet)
Empty Weight:.....6092 KG (13,430 pounds)
Maximum Weight:....9687 KG (21,356 pounds)
Powerplant:.....Two 850 HP Gnôme & Rhône 14Kirs (port)/Kjrs (starboard), 14-cylinder, air-cooled, radial engines.
Armament:.....One 7.5MM MAC 1934 machine gun with 800 rounds in nose turret, one 7.5MM MAC 1934 machine gun with 1200 rounds in dorsal turret, one 7.5MM MAC 1934 machine gun with 600 rounds on flexible mount firing through hatch in floor of forward fuselage, and one 7.5MM MAC 1934 machine gun with 1200 rounds on flexible mount in ventral step. Maximum bomb load of 400 KG (882 pounds) on outboard wing racks and 880 KG (1940 pounds) inside bomb bay.

Performance:
Maximum Speed:..310 KMH (193 MPH) at 4000 M (13,123 feet)
Service ceiling:.....7900 M (25,919 feet)
Maximum Range:..1995 KM (1240 miles)
Crew:.....Five



Amiot 143M in Service and Combat

The first Amiot 143Ms were delivered to *Groupe de Bombardement* (GB; Bomber Group) GB III/22 (22nd *Escadre*; Wing) at Orléans in September of 1935. This unit was soon redesignated GB II/22 and began transitioning to the new type in January of 1936. On 15 December 1936, 72 Amiots equipped front line units while 12 more were held in reserve. The inventory increased to 122 aircraft in January of 1938. Amiot 143Ms equipped GB I/22, GB II/22, GB I/34, GB II/34, GB I/35, GB II/35, and the 14th *Groupe Autonome* (Autonomous Group). The obsolescent Amiot 143M constituted the backbone of the French bomber force when France declared war on Germany on 3 September 1939. They equipped GB I/34 at Abbeville, GB II/34 at Poix, GB II/35 at Pontarlier, GB I/38, GB II/38, and GB II/63 at Sétif, Tunisia. The first war mission was undertaken on 15 September, when two GB II/34 Amiots flew a reconnaissance mission along the German border. These aircraft dropped thousands of propaganda leaflets during this mission, while the crews were strictly ordered not to fire on German aircraft unless fired upon. On 9 October, GB I/38 deployed from Tunisia to Troyes-Barberet, followed a few days later by GB II/38, which went to Auxerre.

Only 67 Amiot 143Ms were still in *Armée de l'Air* service on 10 May 1940, when German forces attacked the Netherlands, Belgium, and Luxembourg. This total included 50 aircraft equipping four bomber groups: GB I/34 at Montdidier, GB II/34 at Roye-Amy, GB I/38 at Troyes-Barberet, and GB II/28 at Chaumont-Semoutiers. The remaining 17 machines were stationed in French North Africa. Luftwaffe bombers attacked Metz airfield just before sunrise on 10 May and destroyed the hangar that sheltered GB II/34's Amiot 143Ms. The following night, the slow Amiots flew their first bombing mission over Germany.

German forces coming through the Ardennes Forest reached Sedan, France on 13 May. They launched pontoon bridges across the River Meuse and began moving southwards with hundreds of tanks and armored vehicles. *Armée de l'Air* chief *Général* Joseph Vuillemin ordered all available aircraft to attack the German crossing. Nineteen slow and highly vulnerable Amiots – nine from GB I/34 and II/34, and ten from GB I/38 and II/38 – and nine Lioré & Olivier LeO 45s were assigned to this desperate mission. The bombers were armed with 50 KG and 100 KG bombs and were to rendezvous with their escorting Morane-Saulnier MS406 fighters at 1230 hours. GB I/38's aircraft were unable to make their rendezvous and flew back to their base. This left only nine Amiots and the LeO 45s to fly under fighter escort to the target. When the Amiots reached the Sedan area, the Germans were waiting for them and several Messerschmitts dived towards them. The Germans shot down five Amiot 143Ms and damaged the other four bombers, some beyond repair. German troops crossed the Meuse unimpeded after repelling the air attacks.

On 16 May, the French Army requested that Amiot 143Ms should be send to the Montcornet area of northeastern France to support French tanks commanded by *Général* Charles de Gaulle.[1] *Général* d'Astier de la Vigerie, commander of *Zone d'Opérations Aériennes du Nord* (ZOAN; North Aerial Operations Zone), refused to commit the vulnerable bombers during daylight. Amiot 143Ms flew only night bombing missions until the end of May, then were committed to special missions during the first days of June. Several aircraft flew low altitude flights dropping food and munitions to French ground forces encircled by the *Wehrmacht* (German Armed Forces). Advancing enemy forces forced the French bomber units to retreat. The 34th *Escadre de Bombardement* (Bomber Wing) crossed the Mediterranean with a few

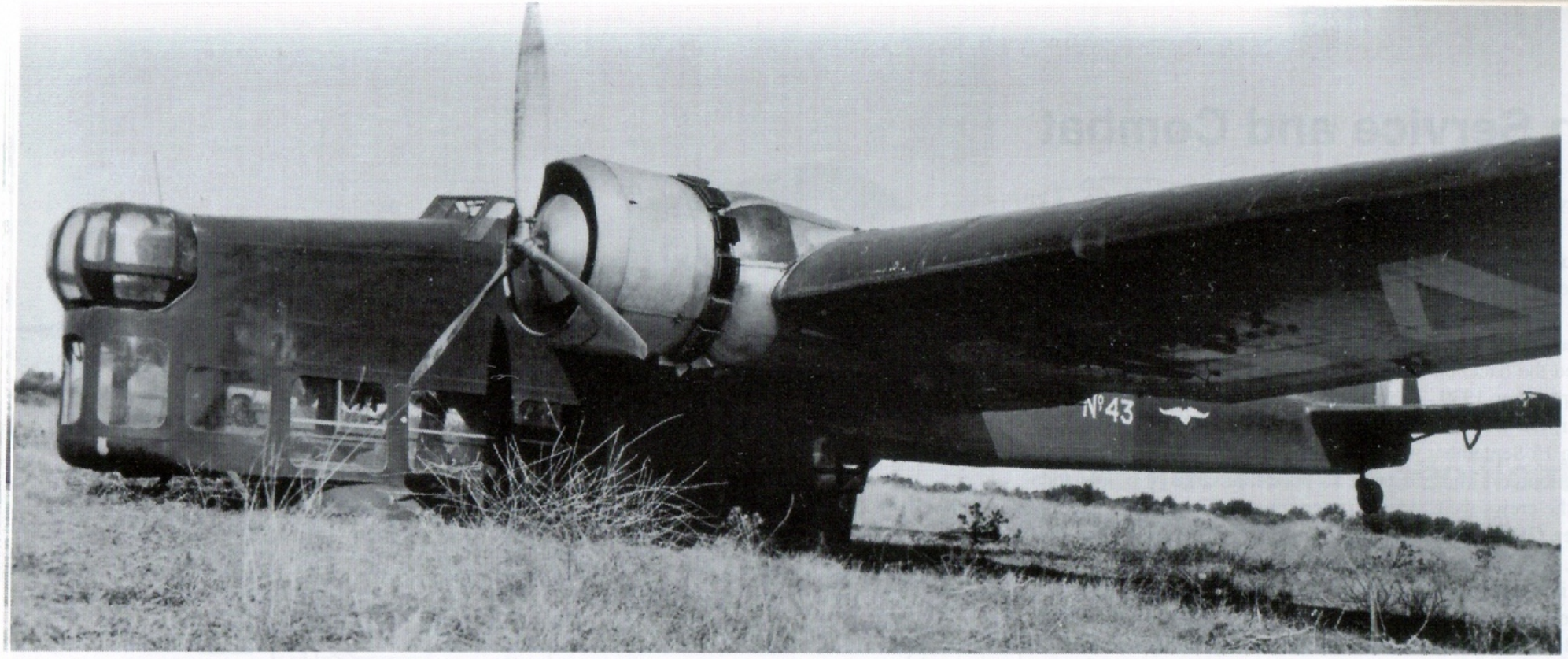
[1]De Gaulle became leader of the Free French forces after France's surrender to the Germans in June of 1940.



Amiot 143M No 45, White 5 (E-266), flies on a training mission in the late 1930s, with two 100 KG (220 pound) bombs mounted on the starboard wing rack. The port and starboard wing racks carried up to 400 KG (882 pounds) of bombs, supplementing the 880 KG (1940 pound) internal bomb load. This aircraft was assigned to the 2nd *Escadrille* of *Groupe de Reconnaissance* (GR) I/51 at Tours. (P. Gaillard Collection)

Amiot 143M No 58 (E-280) was assigned to the 3rd *Escadrille* of GB II/35 at Lyon-Bron in 1938. Its nose turret happens to be turned to port while this aircraft is parked. This unit later moved to Pontarlier, where it was stationed at the outbreak of World War Two. GB II/35's Amiot 143Ms began flying night reconnaissance missions over Germany on 10 September 1939.





This Amiot 143M, No 43 (E-264) made a hard landing, which sheared off its fixed main landing gear. The aircraft's sturdy construction limited damage, which increased the likelihood of it being repaired and returned to service. The extent of any crew injuries was unknown. This Amiot is believed to be assigned to the *Centre d'Instruction au Bombardement* (CIB; Bomber Training Center) at Marrakech, French Morocco. Defensive armament was deleted from this instructional aircraft. (G. Grod Collection)



(Below) Amiot 143M No 12, White 11 (E-171), lands at a French airfield. This bomber was assigned to the 22nd *Escadre de Bombardement*. Despite its obsolescence, the Amiot 143M was involved in numerous daylight and night missions against German communications and armored columns. This machine had the original short nose typical of the first 40 production Amiot 143Ms. The nose made these early aircraft 29.2 CM (11.5 inches) shorter than the standard Amiot 143M length of 18.2 M (59 feet 9 inches). (P. Gaillard Collection)

Amiot 143s and some factory fresh Amiot 354s on 20 June. Between 12 April and 17 June, Amiot 143Ms from 34th *Escadre* flew 247 missions and dropped 153 MT (169 tons) of bombs. During the same period, the 38th *Escadre* conducted 197 missions and dropped 119 MT (131 tons) of bombs.

When the Franco-German Armistice was signed at Rethondes[2], France on 22 June 1940, 52 Amiot 143Ms remained in France's Unoccupied Zone[3] and 25 were in North Africa. The *Armée de l'Air de l'Armistice* (Armistice, or Vichy Air Force) used them in the transport role. When the Germans invaded France's Unoccupied Zone on 13 November 1942, they found 11 Amiot 143Ms, of which only three were airworthy.

[2]The Franco-German Armistice was signed aboard a railroad car in the Forest of Compiegne, where the Armistice ending World War One was signed on 11 November 1918.

[3]This Unoccupied Zone became the French State, or Vichy France, after the zone's capital of Vichy.



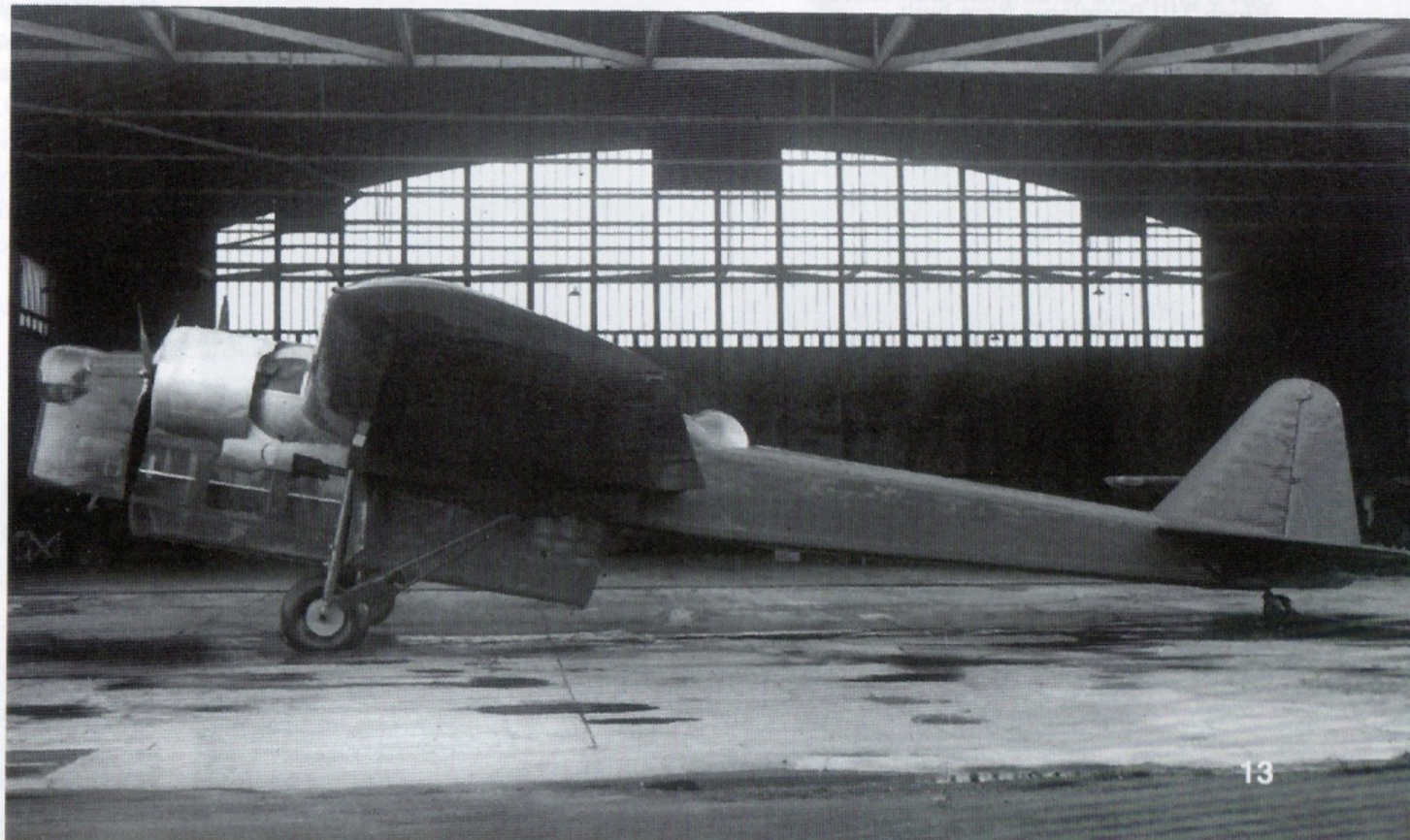
Amiot 143Ms are parked at Le Bourget airfield near Paris during French maneuvers prior to World War Two. Most of these bombers lack unit insignia, although the second aircraft from right on the far row has the GB II/34 insignia on its aft fuselage. *Armée de l'Air* officers gathered on the hardstand wear Louise Blue service uniforms with white cap covers during the summer months.



An Amiot 143M, No 52, Red 9, flies over North Africa on 23 January 1941. This aircraft was assigned to *Groupe de Bombardement* I/38, which received their Amiots from GB I/22 during the fall of 1938. Wheel fairings were discarded to reduce weight and ease maintenance. This aircraft is painted in the French three-tone camouflage of Khaki Green (FS24087), Chocolate Brown (FS20117), and Dark Blue Gray (FS36176). (M. Bénichou Collection)

Amiot 143 Variants and Derivatives

In October 1933, Amiot began designing an improved Amiot 143M variant. The resulting **Amiot 144** featured a retractable landing gear, a reduced wing area, and an increased aspect ratio (wingspan divided by chord or width of wing). Wing flaps were installed and the nose turret was discarded. The prototype first flew on 18 January 1936 and the Air Ministry ordered 25 production aircraft in due course, but the Amiot 144's performance proved highly disappointing. This order was subsequently transferred to Amiot 143M production and the Amiot 144 program was cancelled at the end of 1936. A few Amiot 144 variants with different powerplants were also considered. The **Amiot 145** was to be fitted with two 1100 HP Hispano-Suiza 14Har inline engines. The **Amiot 146** was due to receive 1100 HP Gnôme & Rhône 18Lars radials, while the **Amiot 147** was to be powered by 880 HP Hispano-Suiza 12Ydr inline engines. None of these three aircraft were built.



The Amiot 144 was an improved derivative of the standard Amiot 143M. Its main feature was the installation of a retracting landing gear. This prototype was originally built with a nose turret, which was later deleted and faired over. The French Air Ministry ordered 25 Amiot 144s in September of 1936; however, this was cancelled due to the aircraft's poor performance during trials. (M. Bénichou Collection)

Bloch 210 BN5

In 1932, the *Aéronautique Navale* (*Aéronavale*; French Naval Air Arm) issued specifications for a new torpedo-bomber intended to replace the obsolete Farman F.60 Goliath floatplanes. Quite coincidentally, this requirement was similar to the *Aéronautique Militaire*'s specification for a new heavy night bomber to replace the ancient Lioré & Olivier LeO 20 *Bombardement de Nuit – Cinq-Place* (BN5; Five-Seat Night Bomber). *Avions* Marcel Bloch engineers took advantage of their experience gained with the Bloch 200 high-wing, two-engine day bomber in designing the new aircraft, designated the **Bloch 210**. This was a sturdy, but crude all-metal monoplane featuring an angular fuselage and a thick trapezoidal one-piece low-mounted wing. The type was proposed both as a floatplane and as a fixed undercarriage landplane. Armament comprised three 7.5MM MAC 1934 machine-guns in three manually-operated turrets and up to 1600 KG (3527 pounds) could be carried in the bomb bay.

Construction of two prototypes began in 1933. The first machine (Bloch 210 No 01) was fitted with two 800 HP Gnôme & Rhône 14Kdrs(port)/Kgrs (starboard) Mistral Major, 14 cylinder, air-cooled, radial engines and featured a fixed undercarriage. On 27 July 1934, this aircraft was transported by truck from Courbevoie to Villacoublay from where it flew for the first time on 24 November. Numerous modifications were found necessary, including a redesigned tail assembly and a repositioned dorsal turret. Flight tests resumed on 15 January 1935, but additional modifications were soon required. The sweepback angle of the outer wing panels was increased and a retractable ventral turret was fitted. The prototype was then flown to the *Centre d'Essais du Matériel Aérien* (CEMA) at Villacoublay, where official flight tests were initiated on 14 February. These were successful enough for the prototype to receive its full armament and be sent to Cazaux to undergo armament trials a month later. The French Navy's need for a floatplane resulted in the Bloch 210 No 01 being flown to Marseille-Marignane, where it was fitted with two large pontoons. It flew from Berre Lake during January of 1936, but no further Bloch 210 floatplanes were built.

The second Bloch 210 prototype was fitted with two 860 HP Hispano-Suiza 12Ybrs engines and became the Bloch 211 BN4 No 1. Front-mounted radiators were installed for the liquid-cooled powerplants. The Bloch 211 was re-engined with Hispano-Suiza radial engines and became the Bloch 212 No 01 in 1936, but its development was soon abandoned.



Bearing the designation **Bloch 211**, the second prototype was powered by two 860 HP Hispano-Suiza 12Ybrs, 12-cylinder, liquid-cooled, inline engines. It was eventually sent to Villacoublay for flight testing, but it did not fly before 16 April 1935. The prototype performed well during these tests and reached a maximum level speed of 316 KMH (196 MPH), but its performance was not significantly different from that of the Bloch 210. The Bloch 211 was not produced; however, it was eventually equipped with Hispano-Suiza 14Aa01/02 engines and redesignated **Bloch 212**, which also did not enter production.

Accordingly to *Plan I*, the *Armée de l'Air* placed orders for 130 Bloch 210s in April and May of 1935. The first production aircraft was flown by André Curvale on 10 December 1935 and reached the speed of 335 KMH (208 MPH) at 4000 M (13,123 feet). This differed from the prototype by employing 870 HP Gnôme & Rhône 14Kirs/Kjrs radial engines turning three-bladed variable-pitch Ratier propellers. It also featured a rearward partially retracting undercarriage. The second production aircraft, which was delivered during April of 1936, differed slightly from its predecessor in having an increased dihedral in the outer wing panels. This modification was eventually introduced on all production aircraft. The wing area measured 72 M^2 (775 square feet).

The production Bloch 210 BN5 had a wingspan of 22.8 M (74 feet 10 inches), a length of 18.9 M (62 feet), and a height of 6.7 M (22 feet). It weighed 5990 KG (13,206 pounds) empty and 10,200 KG (22,487 pounds) fully loaded. It was powered by two 910 HP Gnôme & Rhône 14N 10 (port)/11 (starboard) 14-cylinder, air-cooled, radial engines. The Bloch 210 had a maximum speed of 322 KMH (200 MPH) at 3500 M (11,483 feet). It had a service ceiling of 9900 M (32,480 feet) and a maximum range of 1700 KM (1056 miles).

It was armed with three 7.5MM MAC 1934 machine guns in nose, dorsal, and ventral turrets. Each weapon was provided with 800 rounds of ammunition. Its 1600 KG (3527 pound) maximum bomb load came in combinations of eight 200 KG (441 pound), thirty-two 50 KG (110 pound), two 500 KG (1102 pound), or one hundred twenty-eight 10 KG (22 pound) bombs. The Bloch 210 was crewed by five men: pilot, co-pilot/navigator, nose gunner, radio operator/ventral gunner, and dorsal gunner.

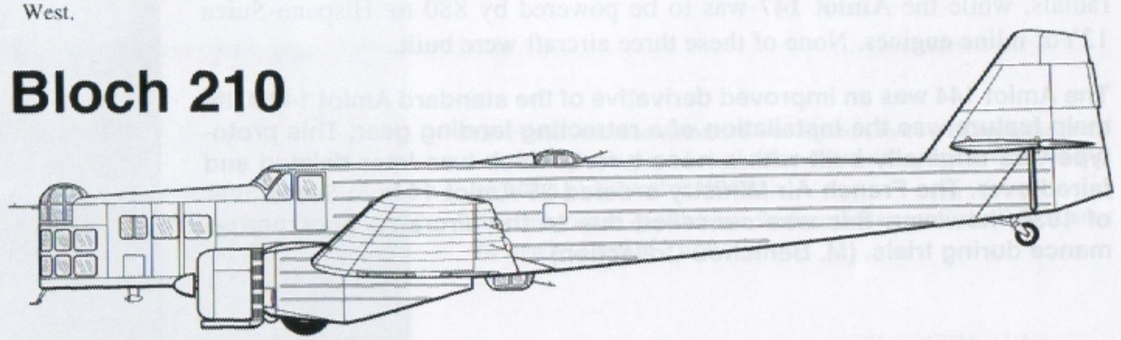
Deliveries of production aircraft were much slower than expected, mainly due to a shortage of variable-pitch propellers. Subsequently, Bloch delivered only 23 Bloch 210s to the *Armée de l'Air* in 1936. Meanwhile, additional batches totaling 36 aircraft were ordered. At the same time, Rumania ordered 24 Bloch 210s (later reduced to ten aircraft), which were powered by Gnôme & Rhône 14N 10/11 engines. SNCASO[1], SNCAC[2], and SNCAO[3] were contracted to built 67 additional aircraft at the end of 1936. All these aircraft were intended to be Bloch 210 BN5s. Production concluded with the 253rd aircraft in early 1939.

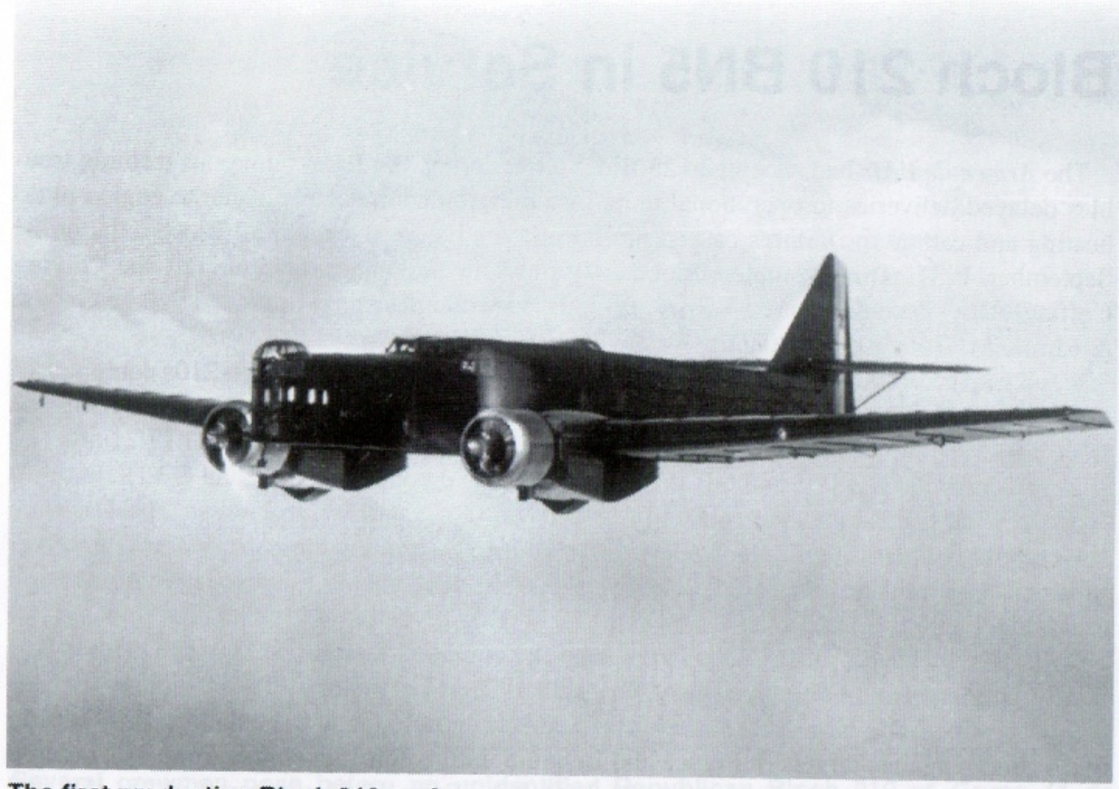
[1]SNCASO: *Société National de Construction Aéronautiques du Sud-Ouest*; National Aircraft Construction Company of the Southwest.

[2]SNCAC: *Société National de Construction Aéronautiques du Centre*; National Aircraft Construction Company of the Center

[3]SNCAO: *Société National de Construction Aéronautiques de l'Ouest*; National Aircraft Construction Company of the West.

Bloch 210





The first production Bloch 210 performs a test flight in 1936. An unknown number of early production aircraft were 6.9 M (22 feet 8 inches) tall, due to taller vertical tail surfaces. This height was approximately 0.2 M (8 inches) taller than the majority of Bloch 210s. Its service ceiling was 9900 M (32,480 feet).

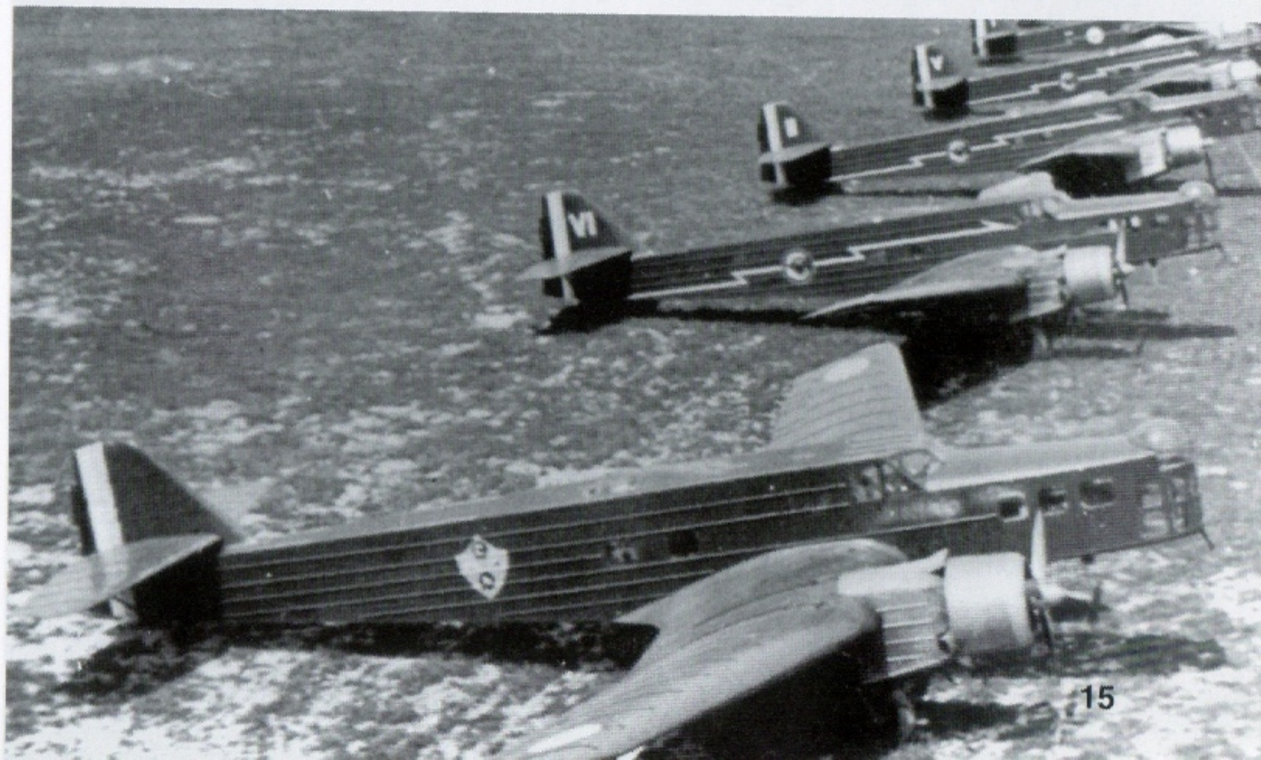


External reinforcement ribs were fitted to the Bloch 210's wings and fuselage. This was a feature carried over from the earlier Bloch 200 bomber. The first production Bloch 210 and all subsequent machines were painted overall Dark Green (FS24058), with bare metal engine cowlings and front engine nacelles.

Bloch 210 No 1 (E-341) was named VERDUN, after the famous French victory in World War One. This name was painted on the forward fuselage, aft of the nose. An air data probe is mounted on the nose to collect test data. It was not fitted on Bloch 210s in operational service. This medium bomber had a 1600 KG (3527 pound) bomb carrying capacity.



Six Bloch 210s assigned to the 19th *Escadre de Bombardement* are lined up at a French airfield. The commander's aircraft at front has the combined insignia of the Wing's two *Groupes* painted on the aft fuselage. The remaining aircraft belonged to GB I/19 and display the Group insignia. White lightning bolts are painted along the fuselage sides of GB I/19's Bloch 210s, which have white Roman numerals on the tail. (P. Gaillard Collection)





Bloch 210 No 258 (L-210) warms up its engines at Toulouse-Blagnac in 1938. It was assigned to the 4th *Escadrille* of GB II/23 and is identified both by a White B on the fuselage and by a White 14 on the vertical stabilizer. The barely discernable *Groupe* insignia on the fuselage depicted a white rabbit on a red disc. (P. Cortet Collection)

Bloch 210 No 33, White 4 (E-375), of the 2nd *Escadrille* of GB II/21 is parked at its home of Bordeaux-Mérignac in 1939. The *Groupe* insignia represents an owl on a crescent moon; both are white on a black background. A Roundel Blue (front) and Roundel Red diagonal band is painted across the aft fuselage. (Saboureau via J.J. Petit)



Bloch 210 BN5 in Service

The *Armée de l'Air* had accepted 125 Bloch 210s during 1937, but numerous teething troubles delayed deliveries to operational units. A number of fatal accidents due to engine overheating and carburetor failures caused the French Air Force to ground all Bloch 210s on 24 September 1937. This prompted Bloch 210 crews to nickname their aircraft the "Flying Coffin." All Gnôme & Rhône 14Kirs/Kjrs engines were replaced by improved 910 HP Gnôme & Rhône 14N10/11s or 4N20/21s.

When France declared war on Germany on 3 September 1939, 238 Bloch 210s equipped 12 bomber groups. These included ten groups stationed in metropolitan France (GB I/11, GB II/11, GB I/23, and GB II/23 at Toulouse; GB I/12 and GB II/12 at Rheims; GB I/21 and GB II/21 at Bordeaux; GB I/51 and GB II/51 at Tours). Two groups (GB I/19 and GB II/19 usually stationed at Bordeaux) were conducting maneuvers at Kalaa-Djerda, Tunisia. The *Armée de l'Air* considered the Bloch 210 obsolete at the time and withdrew these groups from first line service. These units and their aircraft were redeployed to southern France for swift conversion to modern bombers.

On 10 May 1940, only GB I/23 at Istres was fully equipped with Bloch 210s. This group was part of *Groupement de Bombardement* No 7. GB II/23 at Le Vallon was transitioning on LeO 451. Aircraft of GB I/23 successively based at Pont-sur-Yonne and Chaumont flew several night attacks against targets in France and Belgium until 1 June, when the group was ordered to retreat to Orange for re-equipment with LeO 451s. From 18 May, aircraft of GB I/21 and GB II/21 conducted several sorties from La Ferté-Gaucher airfield against advancing German ground forces. These two groups lost ten Bloch 210s on these missions. GB II/11 flew a mix of six Blochs and fifteen LeO 451s on several missions against Italy after the latter's declaration of war on France on 10 June.

When the Armistice was signed on 22 June, 99 Bloch 210s were inventoried in the Unoccupied Zone of France and 20 more aircraft were still based in French North Africa. These aircraft were quickly withdrawn from use, stored, or scrapped. The Vichy Air Force refurbished six Bloch 210s for navigator training duties in 1942.

Bloch 210 in Foreign Service

Right-wing army officers led a revolt against the Spanish Republic on 18 July 1936. This action led to civil war in Spain and both the insurgent Nationalists and the Republicans sought combat aircraft from various countries. France's Popular Front government initially supported the Republic and Bloch 210s were among the aircraft acquired by Republican forces.

French test pilot Lionel de Marmier ferried a Bloch 210 (believed to be the first production aircraft) to Spain in late July or early August of 1936. This bomber initially flew with the *España* (Spain) Squadron before its reassignment to *Grupo* (Group) 72. Two additional aircraft (identities unknown) were flown from Bloch's Marignane factory to Republican-held territory the following September. The Republican Air Force had 15 Bloch 210s in service by May of 1937. Their vulnerability to fighters led to their restriction to night missions later in 1937. Remaining Bloch 210s were assigned to *Grupo 11 de Bombardeo Nocturno* (11th Night Bomber Group) by 1938; however, further information on their Spanish service is unknown.

Rumania's ten Bloch 210s were assigned to *Escadrila 82 bombardament* (82nd Bomber Squadron) at Craiova. These aircraft flew day and night bombing missions against Soviet targets when Rumania joined Germany's invasion of the Soviet Union on 22 June 1941. Five Bloch 210s were lost in combat and accidents during this campaign. The remaining Bloch 210s were replaced by March of 1942

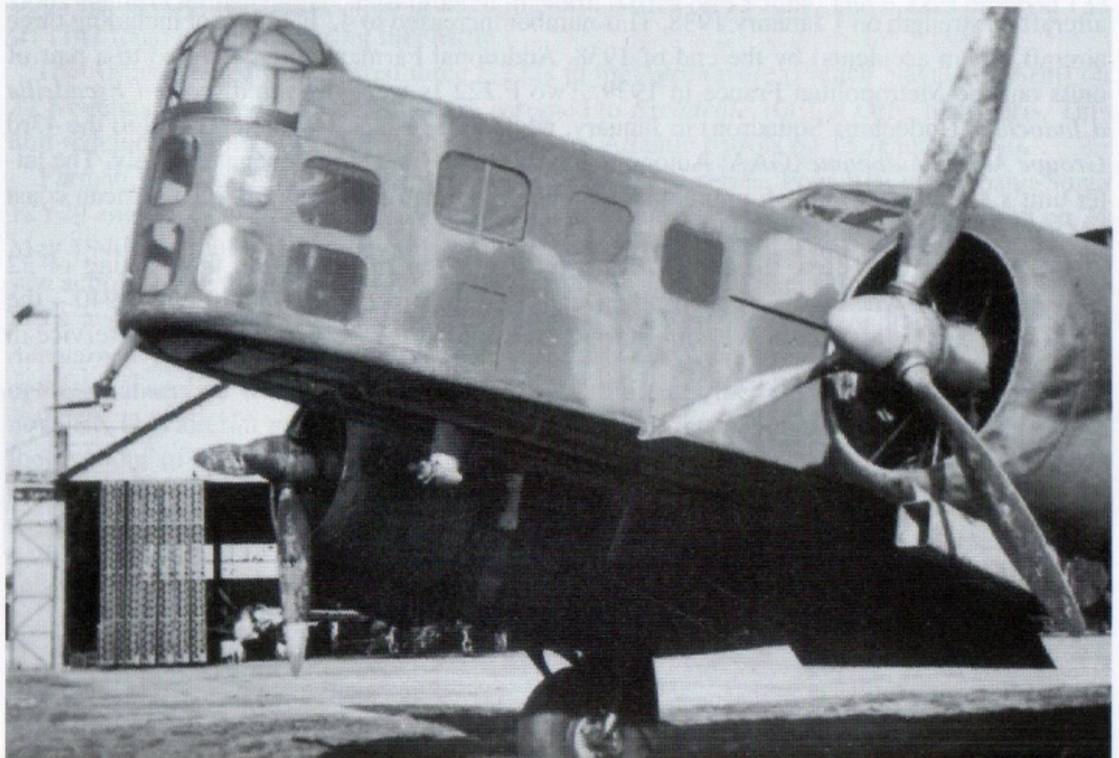


Several crewmen pose before an unidentified Republican Bloch 210 of *Grupo 11 de Bombardeo Nocturno* (11th Night Bomber Group) at Lérida, Spain in 1938. The crew access ladder is extended from the hatch, while engine openings are covered for protection from the cold. The undersurfaces are painted a light color; however, the upper surface scheme is unknown. Spanish Bloch 210s were seldom photographed. (Juan Arraez Cerda Collection)

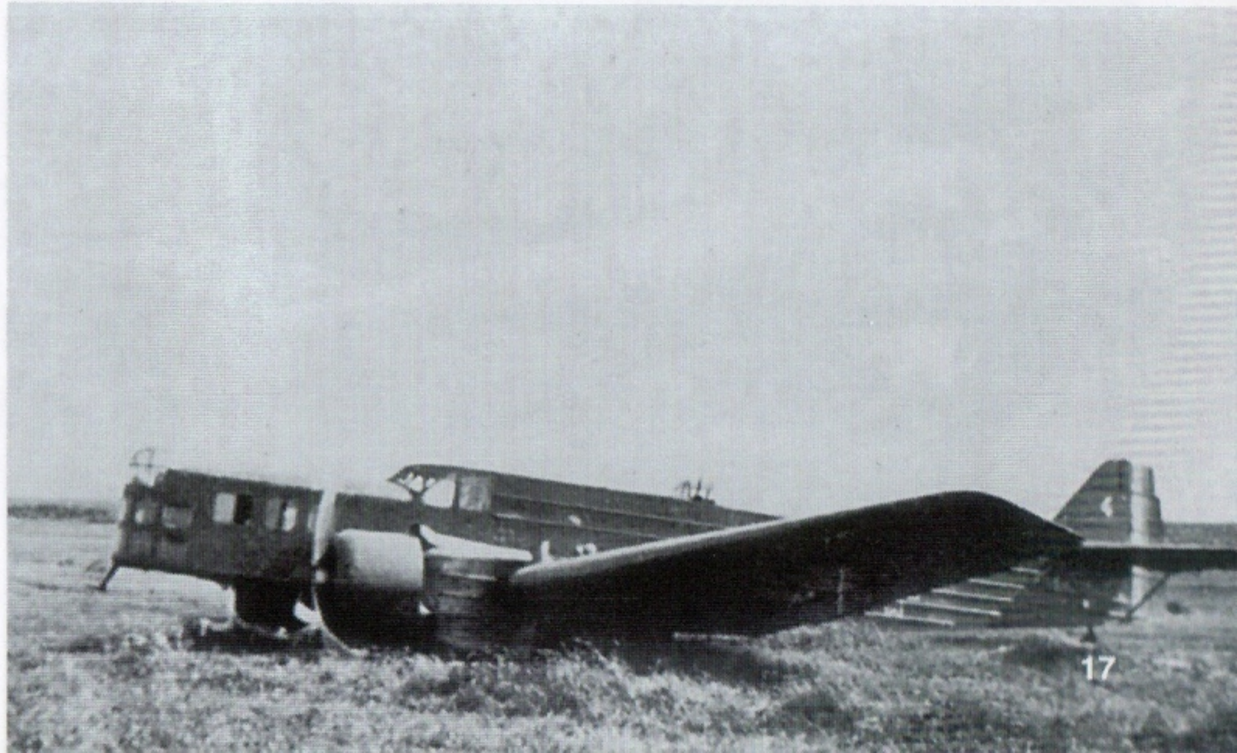


This unknown machine was one of only a few Bloch 210s painted in a camouflage scheme. Upper surfaces were painted Khaki Green (FS24087), Chocolate Brown (FS20117), and Dark Blue Gray (FS36176), while undersurfaces were Light Blue Gray (FS25189). A large *cocarde* was painted on the fuselage side from 13 January 1940. (P. Gaillard Collection)

German forces captured this Bloch 210 after the French surrender in June of 1940. The 7.5mm MAC 1934 machine gun has been removed from the nose turret. A three-tone camouflage was painted on this bomber. Some black paint has peeled off the propeller blades and there are dents in the cowling lip. (P. Gaillard Collection)



One of Rumania's Bloch 210s (White 4) made a wheels up landing in either 1941 or 1942. This aircraft was one of ten aircraft flown by *Escadrila 82 bombardament* (82nd Bomber Squadron) from 1937 until 1942. Rumanian Bloch 210s flew day and night bombing missions against Soviet targets during the opening months of the war on the Russian Front.



Farman F.220 BN5 Series

The STAé (Aeronautical Technical Service) issued a specification for a *Bombardement de Nuit – Quadriplace* (BN4; Four-Seat Night Bomber) in 1929. The *Ministère de l'Air* (Air Ministry) awarded Farman a contract to design and develop two BN4 prototypes on 31 January 1930. The first of these aircraft was the Farman **F.220**, which made its maiden flight on 26 May 1932. This bomber was powered by four 600 HP Hispano-Suiza 12Lbr, 12-cylinder, liquid-cooled, inline engines, which were mounted in tandem pairs (tractor in front, pusher in rear) under the high-mounted wing. The second prototype was the Farman F.221, which was powered by four 730 HP Gnôme & Rhône 14Kbrs Mistral Major, 14-cylinder, air-cooled, radial engines. It also differed from the earlier F.220 in having a redesigned vertical tail section and three manually operated gun turrets: nose, dorsal, and ventral. The F.221 first flew in November of 1933 and its strong performance in STAé tests led to armament trials at Cazaux. Supercharged 800 HP Gnôme & Rhône 14Kdrs engines replaced the 14Kbrs powerplants in March of 1934. The F.221 resumed flight tests in June and attained a top speed of 290 KMH (180 MPH) at 4000 M (13,123 feet). The *Ministère de l'Air* ordered ten **F.221 BN5** (*Bombardement de Nuit – Cinqplace*; Five-Seat Night Bomber) aircraft by the end of 1934. The fifth crew member was added to help man the defensive armament.

The Air Ministry returned F.221 No. 01 to Farman for installation of a retracting landing gear in August of 1935. This was the only modification to this aircraft, but it was enough to warrant a designation change to F.222-01, which first flew in late 1935. Farman began to build 11 production **F.222.1** BN5s in April of 1936. These aircraft differed from the F.222-01 in having 870 HP Gnôme & Rhône 14Kirs (port)/Kjrs (starboard) radial engines and four additional fuel tanks, which increased total fuel capacity from 4340 L (1147 gallons) to 5860 L (1548 gallons). F.222-1 flight tests resulted in several airframe changes to the second production batch, which the Air Ministry ordered on 16 October 1936. These changes included added dihedral to the wing outer panels, eliminating the step under the bombardier's station, and lengthening the forward fuselage by 90 CM (35 inches). Four 870 HP Gnôme & Rhône 14N11(port)/15 (starboard) engines replaced the 14Kirs/Kjrs on the second batch aircraft, which were designated **F.222.2**s. The *Ministère de l'Air* ordered 16 F.222.2s on 15 December 1936 and the first aircraft began official flight tests at CEMA (Air Material Research Center) at Villacoublay in November of 1937. The last of approximately 50 production aircraft made its maiden flight on 20 May 1938.

The Farman F.221 01 first flew in November of 1933, one year after the F.220 01's maiden flight. The newer bomber retained the fixed undercarriage, but incorporated several improvements. These included 730 HP Gnôme & Rhône 14Kbrs engines, a redesigned vertical tail, and three enclosed gun turrets. The F.221 prototype is painted overall Dark Green (FS24058), with bare metal engine nacelles and cowlings.



The Farman F.222.2 was an all-metal, high-winged monoplane with fabric-covered control surfaces. It had a wingspan of 36 M (118 feet 1 inch), a length of 21.5 M (70 feet 6 inches), and a height of 5.2 M (17 feet 1 inch). The aircraft's wing area was 186 M^2 (2002 square feet), its empty weight was 10,474 KG (23,091 pounds), and its maximum weight amounted to 18,675 KG (41,171 pounds). Its four 950 HP Gnôme & Rhône 14N11/15 14-cylinder, air-cooled, radial engines were mounted in tandem nacelles under the wing.

This bomber had a maximum bomb load of 4185 KG (9226 pounds) in its fuselage bay. Payload combinations included twenty 200 KG (441 pound) or forty 100 KG (220 pound), or combinations of 200 KG, 100 KG, or 50 KG (110 pound) bombs. The aircraft was armed with three 7.5MM MAC 1934 machine guns in single mounts in the nose turret, dorsal turret, and ventral gondola.

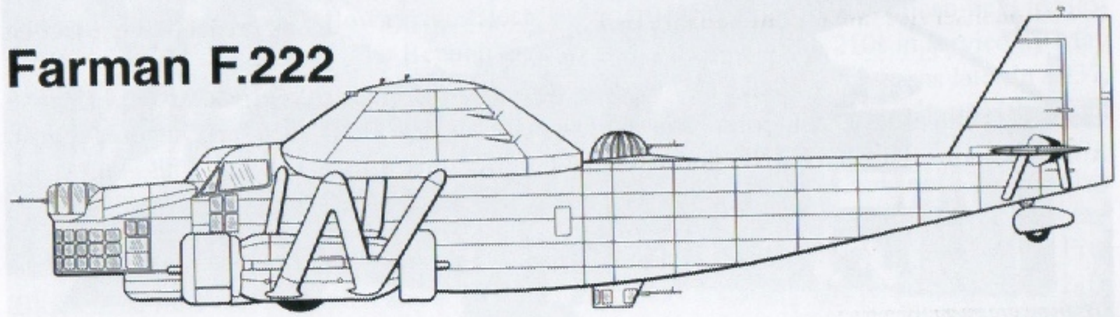
The Farman F.222.2 had a maximum speed of 320 KMH (199 MPH) at 4000 M (13,123 feet). Its service ceiling was 8000 M (26,247 feet) and its maximum range was 1995 KM (1240 miles). This bomber was crewed by five men: pilot, co-pilot, nose gunner/navigator/bombardier, ventral gunner, and dorsal gunner.

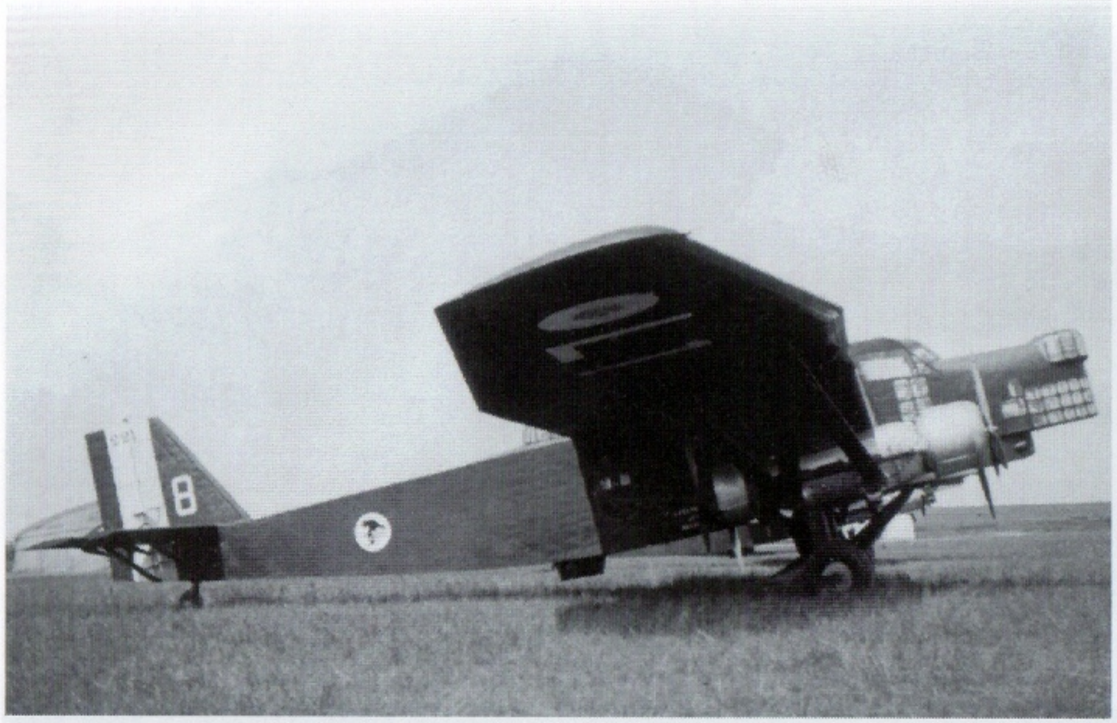
F.222 in Service

The *Armée de l'Air* assigned the Farman F.222s to both Groups of the 15th *Escadre de Bombardement* (Bomber Wing) at Avord. GB I/15 accepted its first F.222.1s in April of 1937, followed by the F.222.2s entering GB II/15 service the following December. The Wing had 18 aircraft on strength on 1 January 1938. This number increased to 42 F.222s (not including three aircraft lost in accidents) by the end of 1938. Additional Farman were delivered to a pair of units outside Metropolitan France in 1939. Two F.222.1s were delivered to the *l'Escadrille d'Indochine* (Indochina Squadron) in January, while three F.222.2s were assigned to the 43rd *Groupe Aérien Autonome* (GAA; Autonomous Air Group) at Thiès, Sénégal that July. The latter unit's aircraft flew anti-shipping and anti-submarine patrols along the West African coast in October and November of 1939.

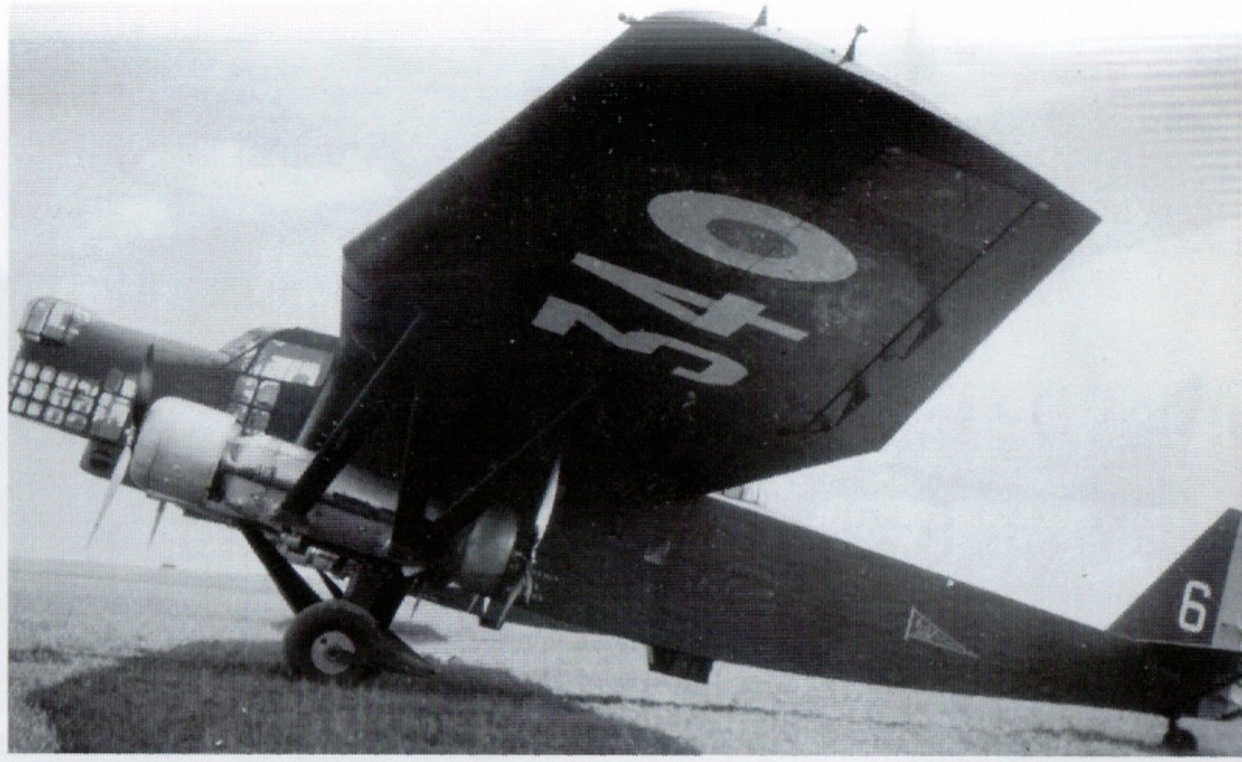
GB I/15's aircraft flew the first F.222 combat mission in Europe on the evening of 22 December 1939, when they dropped propaganda leaflets on Munich. On 10 May 1940 – the date of Germany's assault on Western Europe – the *Armée de l'Air* had 28 F.222s in service in

Farman F.222





Farman F.221 No 8 (L-136) was assigned to the 2nd *Escadrille* of GB 1/15 at Avord. This aircraft flew its first combat mission during the evening of 17-18 May 1940, when it attacked German armored columns in the Charleville-Hirson area. It was hit by anti-aircraft fire while attacking Friedrichshafen airfield, but was able to return to Saint Yan. The Farman was repaired before it was flown to Lézignan on 18 June. It crossed the Mediterranean three days later. Strafing Australian P-40s at Kousseri, Cameroon destroyed F.221 No 8 on 29 June 1941.



The 4th *Escadrille* of GB II/15 flew this F.221, No 6 (L-134), from Avord in 1936. This Farman was painted overall Chocolate Brown (FS20117), while engine cowlings and nacelles were natural metal. The *Groupe* insignia on the fuselage consists of a yellow snake on a green flag. BR132, a Breguet 14 bomber squadron during World War One, previously used this emblem. (Saboureau via J.J. Petit)

Metropolitan France: 11 with GB I/15, ten with GB II/15, and seven with other units. Low serviceability meant that the 15th *Escadre de Bombardement*'s aircraft flew only 67 sorties during the Battle of France. This campaign began when six aircraft flew a night bombing mission against the outskirts of Sedan on 14-15 May. The Wing flew additional night bombing missions against German targets until ordered to North Africa on 15 June. The F.222s dropped 133 MT (147 tons) of bombs during this battle.

The *Armée de l'Air* transferred three F.222s to the *Aéronavale* (French Naval Air Arm) on 22 November 1939. These aircraft were assigned to *Escadrille* 10E[1] at Orly, near Paris. This unit redeployed from Orly to French Morocco for Atlantic patrols on 15 January 1940.

Farman developed the F.222 further into the **NC.223**[2] series. Four 910 HP Hispano-Suiza 12Y29 engines powered the **NC.223.3** BN5. Two examples were delivered to GB II/15 on 24 May 1940 and four were accepted by GB II/15 in early June; however, none of these aircraft saw action during the Battle of France. Three civil **NC.223.4**s – featuring twin vertical tail surfaces and powered by 1050 HP Hispano-Suiza 12Y37 engines – were impressed into the *Aéronavale* and assigned to *Escadrille* B5[3] at Paris-Orly. Only one of these NC.223.4s saw operational service, an aircraft named JULES VERNE after the famous French science fiction novelist. This aircraft made history when it became the first Allied aircraft to bomb Berlin on the evening of 7-8 June 1940. The Farman flew from Bordeaux-Mérignac up the English Channel, skirted the Dutch coast, crossed Denmark and the Baltic Sea, and attacked Berlin from the north. JULES VERNE safely returned to Mérignac after a 13.5 hour mission.

[1]E: *Exploration*; Long-Range Maritime Reconnaissance.

[2]Farman came under SNCAC during the 1936 French aviation industry nationalization and their later aircraft had the F prefix replaced by NC.

[3]B: *Bombardement*; Bombing.

White 8 was one of only 12 Farman F.222.1 BN5s built, which were assigned to GB I/15. On 10 May 1940, this unit had 11 Farman F.222s on strength, including three F.222.1s (Nos 01, 7, and 10) and eight F.222.2s. GB II/15 flew F.222.1 Nos. 6 and 11 at the same time. GB I/15 was redesignated *Groupe de Transport* (GT; Transport Group) I/15 – a Vichy Air Force unit – on 10 October 1940.



A Farman F.222.2 BN5, White 1, is parked at an airfield between missions with GB II/15. F.222.2s were factory numbered 13 to 36, with military registrations L-155 to L-162 and L-216 to L-231. Farman F.222s were the largest bombers in *Armée de l'Air* service during the 1930s and early 1940s. This aircraft had a wingspan of 36 M (118 feet 1 inch) and a length of 21.5 M (70 feet 6 inches). The F.222.2 had a maximum speed of 320 KMH (199 MPH) and a maximum range of 1995 KM (1240 miles). (M. Bénichou Collection)

A nose gunner/navigator/bombardier works in his station aboard an F.222. He is pulling a lever that is believed to either operate the bomb bay doors or for bomb release. This crewman was provided with a bomb sight, a table for navigational duties, and a nose-mounted 7.5MM machine gun. French aircraft interior surfaces were usually painted Apple Green (FS14108), with cockpits in Night Blue (FS35045).

This overall Chocolate Brown F.222.2 No 5, White 8 (L-159), was assigned to GB II/15. A White diagonal band is painted on the fuselage. F.222.2s were armed with three 7.5MM MAC 1934 machine guns: one each in the nose and dorsal turrets and in ventral gondola. The aircraft carried a maximum bomb load of 4185 KG (9226 pounds).





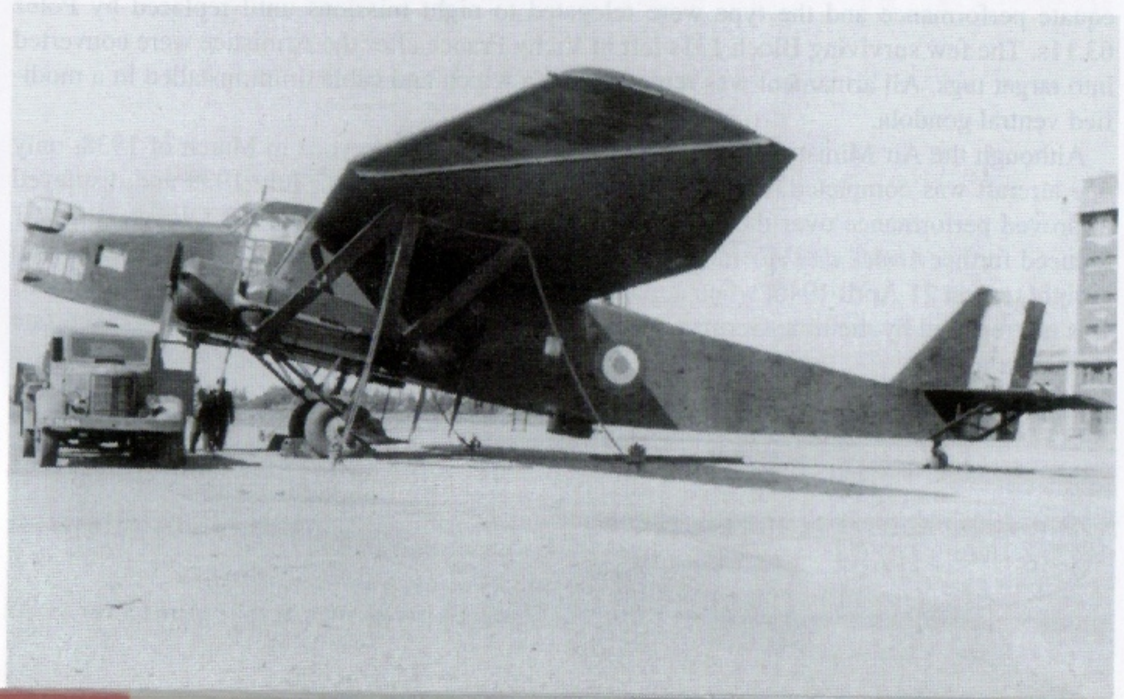
This F.222.1 was one of a few examples camouflaged at the outbreak of World War Two. Khaki Green (FS24087) and Dark Blue Gray (FS36176) patches were painted over the Chocolate Brown (FS20117) upper surfaces. Undersurfaces were Flat Black (FS37038) in keeping with their night bomber role. Several airmen gather near the F.222, while a Curtiss Hawk H.75A-2 (export P-36) fighter is parked nearby. (M. Bénichou Collection)



The *Armée de l'Air* transferred F.222.1 No 1 and F.222.2 Nos 16 and 33 to the *Aéronavale* (French Naval Aviation) in November of 1939. These bombers were used to form *Escadrille* 10E at Orly, near Paris. F.222.1 No 1 was allocated the *Aéronavale* code 10E.3 when it was based at Orly in November. This Squadron deployed from Orly to French Morocco on 15 January 1940, when it began flying patrols over the Atlantic (P. Cortet Collection)

The second NC.223.4 for Air France, F-ARIN JULES VERNE, was impressed into the *Aéronavale* when war broke out. This aircraft was originally tasked for long-range reconnaissance, but was soon reassigned to night bombing missions. JULES VERNE was the first Allied bomber to attack Berlin on the evening of 7-8 June 1940. The twin-tail NC.223.4 was powered by four 1050 HP Hispano-Suiza 12Y37 engines and had a 5000 KM (3107 mile) range. (P. Ropolo Collection)

An unknown F.222.2 is parked at a airfield in Vichy French-held North Africa in late 1941 or early 1942. *Armée de l'Air de l'Armistice* aircraft had diagonal wing bands painted (from inboard) Roundel Blue, White, and Roundel Red from December of 1941. A truck assigned to the base's ground crew is parked under the F.222.2's nose. (M. Bénichou Collection)





Bloch 131 RB4

In October of 1933, the *Etat-major de l'Armée de l'Air* (EMAA; French Air Force High Command) issued a specification for a twin-engine BCR (*Bombardement, Combat, Renseignement*; Bomber, Combat, Intelligence[1]) aircraft. This machine was required to carry 500 KG (1102 pounds) to 1000 KG (2205 pounds) of bombs, have a top speed of at least 350 KMH (217 MPH) at 4000 M (13,123 feet), and a range of 1300 KM (808 miles). Eight aircraft were entered in this competition: **Amiot 144**, **Bloch 130**, **Breguet 460**, **Couzinet 190**, **Dewoitine 420**, **Farman 420**, **Potez 541**, and **SAB 80**.

The Bloch 130 retained the basic layout of a low-wing, all-metal monoplane to the earlier Bloch 210. The prototype first flew in July of 1934, but *Avions* Marcel Bloch halted Bloch 130 development in favor of a more capable aircraft. The first developed two basic variants of this RB4 (*Reconnaissance Bombardement – Quadriplace*; Four-Seat Reconnaissance-Bomber) aircraft: the **Bloch 131** with Gnôme & Rhône 14Kirs (port)/Kjrs (starboard) radial engines, and the **Bloch 132** with the Hispano-Suiza 14Aa inline engines. Both all-metal machines featured a streamlined semi-monocoque fuselage and a highly tapered low cantilever wing. The Air Ministry placed two contracts with Bloch on 1 April and 24 April 1936. These called for eight production Bloch 131s, one Bloch 132 prototype, 12 production Bloch 132s, and one prototype of the twin-finned **Bloch 133**.

The Bloch 131 prototype first flew from Courbevoie on 12 August 1936. The second Bloch 131 was displayed in a five-seat configuration at the 15th *Salon de l'Aviation* (Air Show) in Paris the following November. Aircraft No 2 had several improvements over its predecessor, including the deletion of horizontal stabilizer bracing struts, a reduced chord vertical stabilizer, and a repositioned dorsal gun turret. This aircraft first flew on 5 May 1937 and was joined by the Bloch 132-01 prototype three days later.

The Bloch 133-01 first flew on 1 October 1937, but flight testing revealed difficulties with the retractable under fuselage turret. When this turret was lowered at high speed, buffeting caused high frequency vibrations in the twin tail unit. Bloch engineers decided to install a fixed streamlined gondola, whose drag reduced the maximum speed from 400 KMH (249 MPH) to 360 KMH (224 MPH). The *Ministère de l'Air* cancelled the Bloch 133, but ordered 44 Bloch 132s and 24 Bloch 131s in September of 1936, followed by 30 more aircraft the following July.

All contracts for Bloch 131s and 132s were modified after the Air Ministry adopted *Plan d'Equipement V* in March of 1938. These aircraft were to be completed as **Bloch 131 RB4**s, except for three **Bloch 134 B4** bomber prototypes. The first production Bloch 131 was completed and flown from Châteauroux-Déols in May of 1938. This and the following 13 aircraft completed were **Bloch 131 R4**s solely for reconnaissance missions. Bloch then produced five training aircraft with dual controls, with Bloch 131 No 21 and the 100 aircraft that followed built in the full RB4 configuration.

The Bloch 131 RB4 had a wingspan of 20.1 M (65 feet 11 inches), a wing area of 52.1 M^2 (561 square feet), a length of 17.9 M (58 feet 9 inches), and a height of 4.1 M (13 feet 5 inches). It weighed 6050 KG (13,338 pounds) empty and 8526 KG (18,796 pounds) fully loaded. The powerplant consisted of two 950 HP Gnôme & Rhône 14N10/11s, 14-cylinder, air-cooled, radial engines. The Bloch 131 RB4 had a maximum speed of 385 KMH (239 MPH) at 4000 M (13,123 feet), a service ceiling of 7250 M (23,786 feet), and a range of 890 KM (553 miles) with a 400 KG (882 pound) bomb load.

Its bomb bay held up to 800 KG (1764 pounds) of bombs on Alkan bomb racks. These were in combinations of four 200 KG (441 pound), six 100 KG (220 pound), eight 50 KG (110 pound), or sixty-four 10 KG (22 pound) weapons. Defensive armament consisted of three 7.5MM MAC 1934 machine guns in single mounts in the nose, dorsal turret, and ventral gondola. The nose gun was supplied with 500 rounds of ammunition, while the other two weapons each had 1500 rounds. A crew of four men – pilot, bombardier/nose gunner, dorsal gunner, and radio operator/ventral gunner – flew the Bloch 131 RB4.

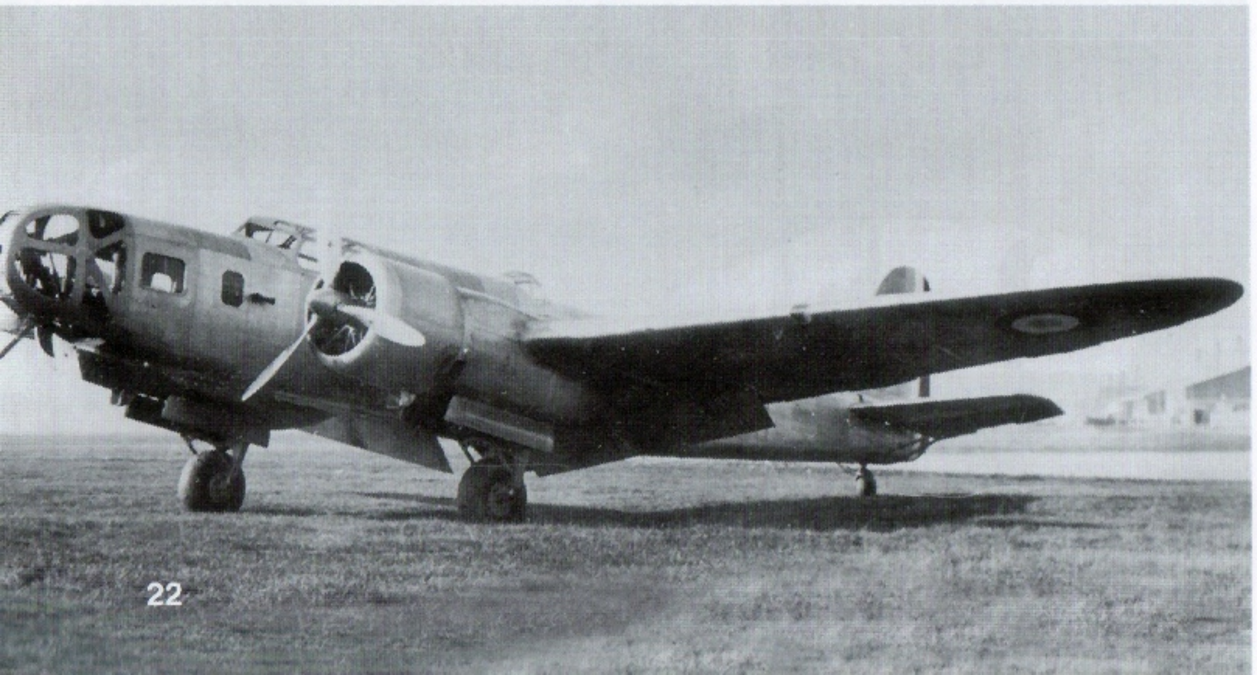
The first Bloch 131 was delivered to the *Armée de l'Air* in June of 1938, with the 22nd *Escadre* at Chartres beginning conversion to this type the following September. By September 1939, Bloch 131s equipped five *Groupes de Renseignement* (GR; Intelligence Groups) and an Autonomous Air Group in Metropolitan France and another Reconnaissance Group in North Africa. Bloch completed and delivered 138 Bloch 131s through September of 1939.

Early daylight reconnaissance missions over German territory revealed the Bloch 131's inadequate performance and the type were relegated to night missions until replaced by Potez 63.11s. The few surviving Bloch 131s left in Vichy France after the Armistice were converted into target tugs. All armament was removed and a winch and cable drum installed in a modified ventral gondola.

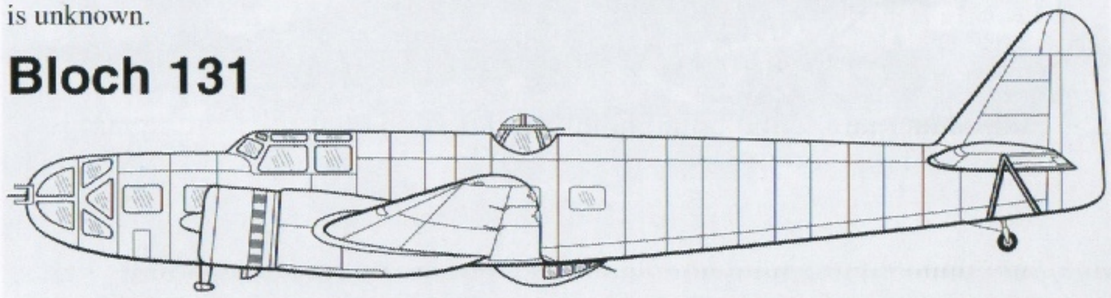
Although the Air Ministry ordered three **Bloch 134** B4 prototypes in March of 1938, only one aircraft was completed. It first flew from Orléans-Bricy on 22 July 1939 and displayed improved performance over the Bloch 131, but availability of the Liore & Olivier LeO 451 reduced further *Armée de l'Air* interest in the Bloch aircraft. The Bloch 134 was damaged on a flight test on 21 April 1940, when a main landing gear leg collapsed on landing. The aircraft was not repaired by the time German forces overran Orléans; the Bloch 134's subsequent fate is unknown.

[1] *Renseignement* (Intelligence) referred to strategic reconnaissance.

The Bloch 131 R4 No 01 prototype rests at Villacoublay during CEMA tests in the early summer of 1938. This natural metal aircraft has a nose test probe, which was not installed on production Bloch 131 RB4s. The EMAA (French Air Force High Command) intended the Bloch 131 to fly both reconnaissance and bombing missions.



Bloch 131





Bloch 131 No 124 (L-379) was assigned to *Groupe de Reconnaissance* (GR; Reconnaissance Group) I/55 at Orange-Plan de Dieu in the spring of 1940. The upper surfaces are painted Dark Green (FS24058), while the undersurfaces are Light Blue Gray (FS25189). Bloch 131s sustained high losses during the 'Phony War' (1939-40), which led the *Armée de l'Air* to rapidly phase this type from front-line service. (CAC)

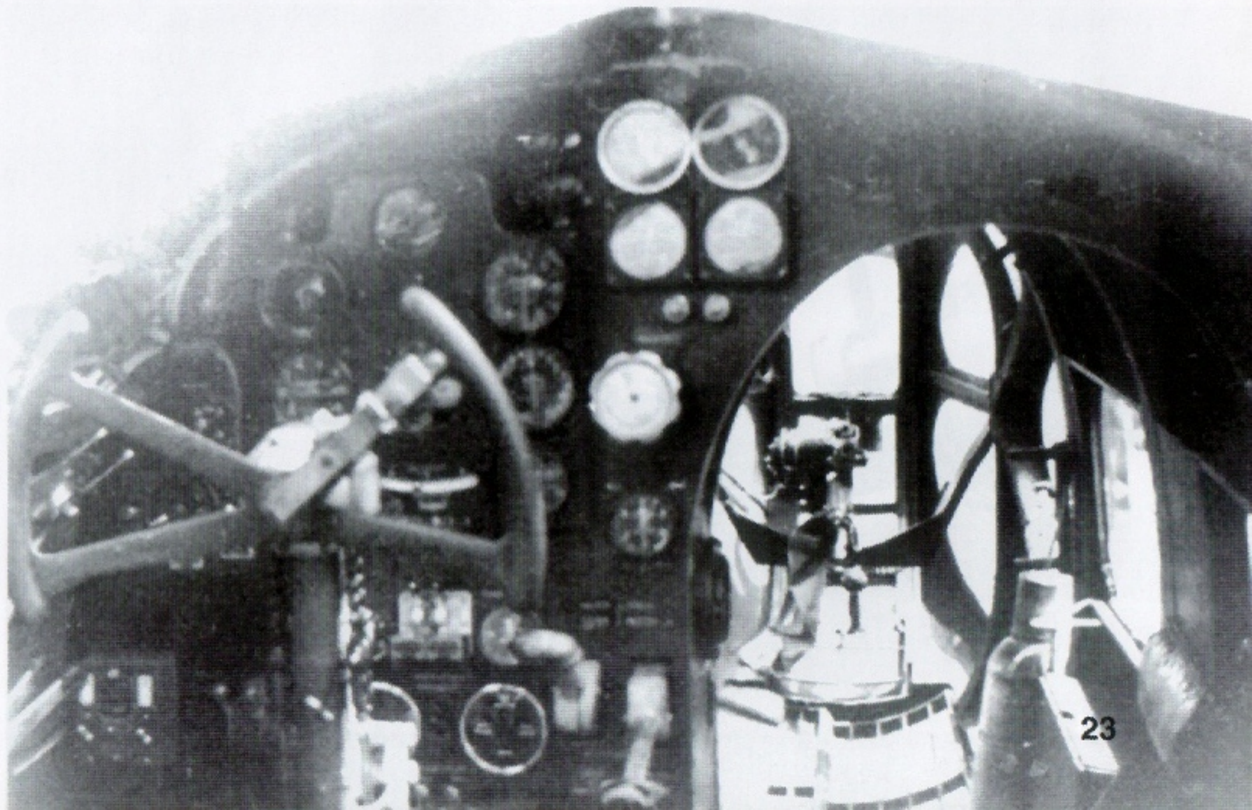


Bloch 131 No 12 (E-232) sits after a hard landing at Castres in July of 1940. Its upper surfaces were painted in an unusual camouflage pattern, which consisted of irregular patches of Khaki Green (FS24087), Chocolate Brown (FS20117), and Dark Blue Gray (FS36176). Small *cocardes* were painted on the wing upper surfaces and fuselage sides. Bloch 131s carried up to 800 KG (1764 pounds) of bombs. (P. Cortet Collection)

Bloch 131 No 43 (E-298) flies a target towing mission from Cazeaux in 1940. All armament was removed and a target winch installed under the fuselage. Three White (FS27780) and two Roundel Red (FS21105) bands are painted on the aft fuselage to increase the towing aircraft's visibility. Similarly configured Bloch 131s also flew from Toulouse and Orange. (M. Bénichou Collection)



The Bloch 131's pilot sat to port in the cockpit, with his control wheel mounted immediately forward of the seat. Flight, engine, and fuel instruments were grouped on the Night Blue panel. The large opening to starboard provided access to the bombardier/nose gunner's position in the glazed nose. A 7.5MM MAC 1934 machine gun is mounted in the nose.



Lioré & Olivier LeO 451 B4

On 17 November 1934, the *Service Technique Aéronautique* (STAé; Aeronautical Technical Service) issued specifications for a new bomber to replace obsolete bombers in the *Armée de l'Air* inventory. This called for a *Bombardement – Cinqplace* (B5; Five-Seat Bomber) capable of flying at 400 KMH (249 MPH) at 4000 M (13,123 feet). Its defensive armament would consist of fixed forward firing machine guns and rearward firing weapons in the dorsal and ventral positions. The bomb load of 1000 KG (2205 pounds) or possibly 1500 KG (3307 pounds) would be internally carried. Five B5 proposals were submitted to the STAé in late 1935: the **Amiot 341**, **Bloch 134**, **Latécoère 570**, **Lioré & Olivier 45**, and **Romano 120**. During the evaluation, the STAé decided to reduce the crew from five to four and to use a 20MM Hispano-Suiza HS 404 cannon in the dorsal gun position. The modified *Bombardement – Quadriplace* (B4; Four-Seat Bomber) specification considered available 1000 HP engines in calling for a maximum speed of 470 KMH (292 MPH).

The Lioré & Olivier LeO 45 prototype was built at Argenteuil and the main sub-assemblies were trucked to Villacoublay for final assembly. This aircraft was equipped with two 1080 HP Hispano-Suiza 14AA06 (port)/07 (starboard) 14-cylinder, air-cooled, radial engines. The powerplant was enclosed within NACA cowlings and turned three-bladed Hispano-Suiza two-position metal propellers. The LeO 45 prototype was designed to allow installation of 1200 HP Gnôme & Rhône 14P radials in place of the Hispano-Suiza engines.

The prototype (LeO 45 No 01) made its first flight from Villacoublay on 16 January 1937. This aircraft featured small triangular vertical fins and early test flights revealed instability during take off and climb. New, larger fins with aerodynamically balanced rudders were installed as a result of the flight tests. These modified tail surfaces largely overcame this concern. An even greater problem for Lioré & Olivier engineers was engine overheating, which required changing the Gnôme & Rhône 14AA06/07 engines after a few flight hours. Despite this concern, the LeO 45 prototype achieved a maximum level speed of 480 KMH (298 MPH) at 4000 M and reached 624 KMH (388 MPH) in a dive.

The Lioré & Olivier LeO 45 No 01 was modified into the LeO 451 No 01 prototype in 1938. Modifications included the installation of 1030 HP Gnôme & Rhône 14N20/21 radial engines under streamlined Mercier cowlings. Conical spinners were installed over the propeller hubs. Larger vertical tail assemblies replaced those originally installed on the aircraft. The first production LeO 451s were virtually similar to this aircraft.



Lioré & Olivier delivered LeO 45 No 01 to the *Centre d'Essais du Matériel Aérien* (CEMA; Air Material Research Center) at Villacoublay for official trials in September of 1937. Early the next year, the prototype was returned to the manufacturer for new engine cowlings designed by Louis Mercier. In July of 1938, the LeO 45 reached a maximum speed of 500 KMH (311 MPH). Teething problems with the Hispano-Suiza engines continued and Lioré & Olivier decided to replace them with 1030 HP Gnôme & Rhône 14N20/21 radial engines. This engine change resulted in the prototype's redesignation as **LeO 451**. The flight test program resumed on 21 October 1938 and lasted until February of 1939.

In the meantime, the STAé ordered two pre-production aircraft in May of 1937. One was the **LeO 450**, which was powered by two 1080 HP Hispano-Suiza 14A06/07 engines, while the other was the **LeO 452**, which had 1100 HP Hispano-Suiza 14AA12/13 engines.

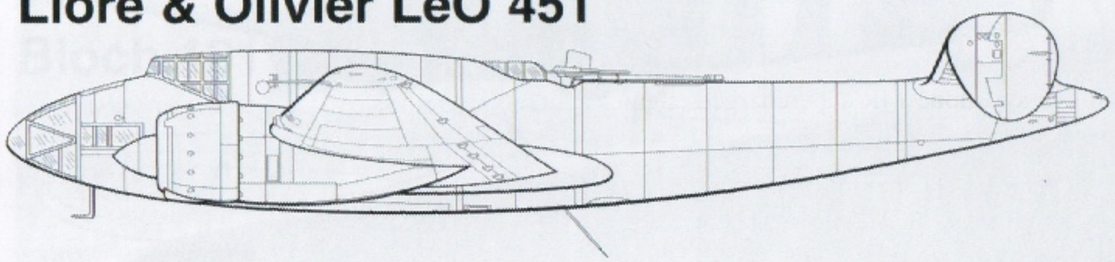
The *Ministère de l'Air* granted the first LeO 451 production contract on 29 November 1937, after the Ministry adopted Plan V. The agreement called for the delivery of 20 aircraft by May of 1938. This initial contract was followed by a second order for 100 more LeO 451s on 15 June 1938.

Production LeO 451s were capable of using either 950 HP Gnôme & Rhône 14N38/39 or 1140 HP 14N48/49 engines. This was a sound technical decision, but engine delivery delays set back the LeO 451 No 1's initial flight until 24 March 1939. Production was also hindered by the lack of specified Gnôme & Rhône three-bladed propellers, which were replaced by less efficient Ratier propellers. This reduced the aircraft's maximum level speed from 500 KMH (311 MPH) to 480 KMH (298 MPH).

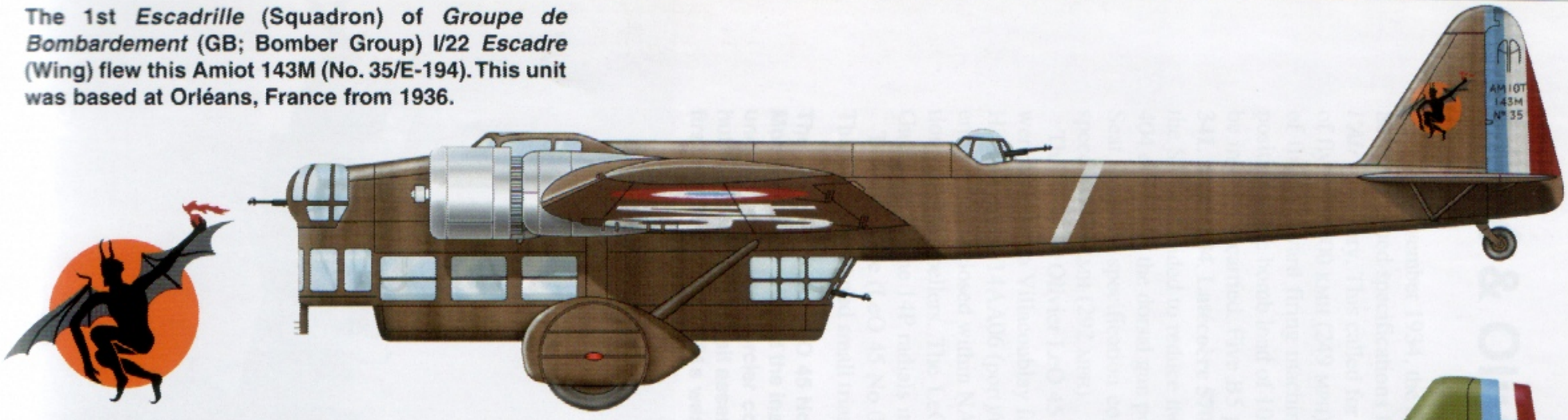
The LeO 451 was an all-metal monoplane, with fabric covered control surfaces (rudders, elevators, and ailerons). It had a wingspan of 22.5 M (73 feet 10 inches), a length of 17.2 M (56 feet 5 inches), and a height of 5.2 M (17 feet 1 inch). The aircraft had an empty weight of 7530 KG (16,601 pounds) and a maximum weight of 11,398 KG (25,128 pounds). The 14N48/49 - powered LeO 451 achieved a maximum speed of 480 KMH at 4800 M (15,748 feet). Its service ceiling was 9000 M (29,528 feet) and its maximum range was 2900 KM (1802 miles).

The main bomb bay in the fuselage held up to 1000 KG of bombs, including either two 500 KG (1102 pound) or five 200 KG (441 pound) weapons. Two smaller bomb bays located in the wing roots each held either one 200 KG or one 100 KG (220 pound) bomb. The LeO 451's defensive armament included one 7.5MM MAC 1934 machine gun with 300 rounds fixed in the nose to fire forward. A 20MM Hispano-Suiza HS 404 cannon with 120 rounds was mounted in the retractable dorsal turret, while another 7.5MM machine gun with 500 rounds was fitted in a retractable ventral turret. The bomber's crew consisted of four men: pilot, bombardier/navigator, dorsal gunner, and radio operator/ventral gunner.

Lioré & Olivier LeO 451



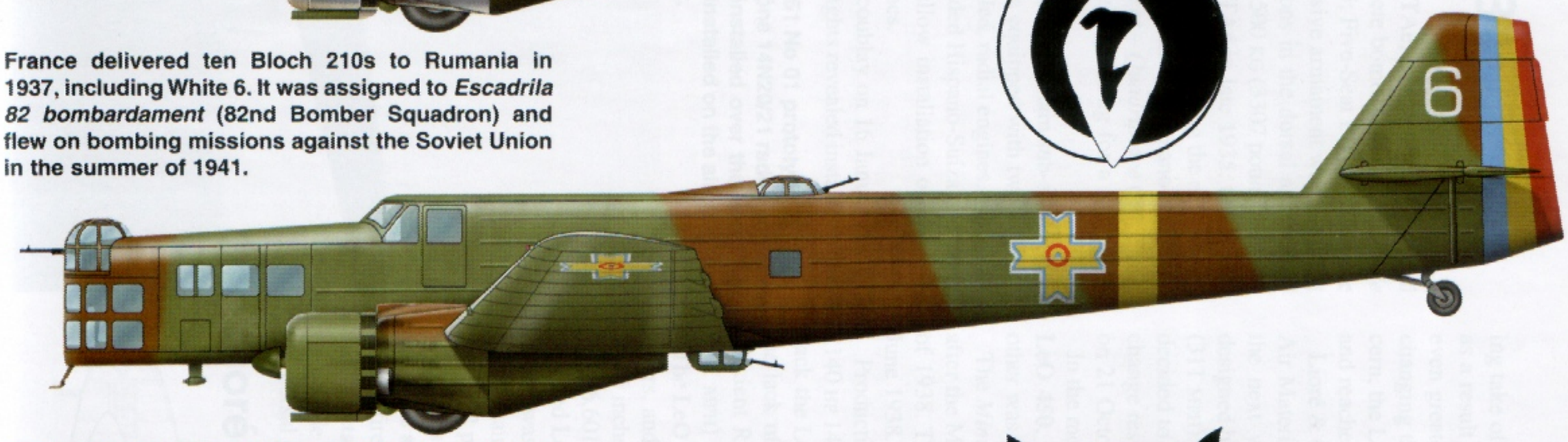
The 1st *Escadrille* (Squadron) of *Groupe de Bombardement* (GB; Bomber Group) I/22 *Escadre* (Wing) flew this Amiot 143M (No. 35/E-194). This unit was based at Orléans, France from 1936.



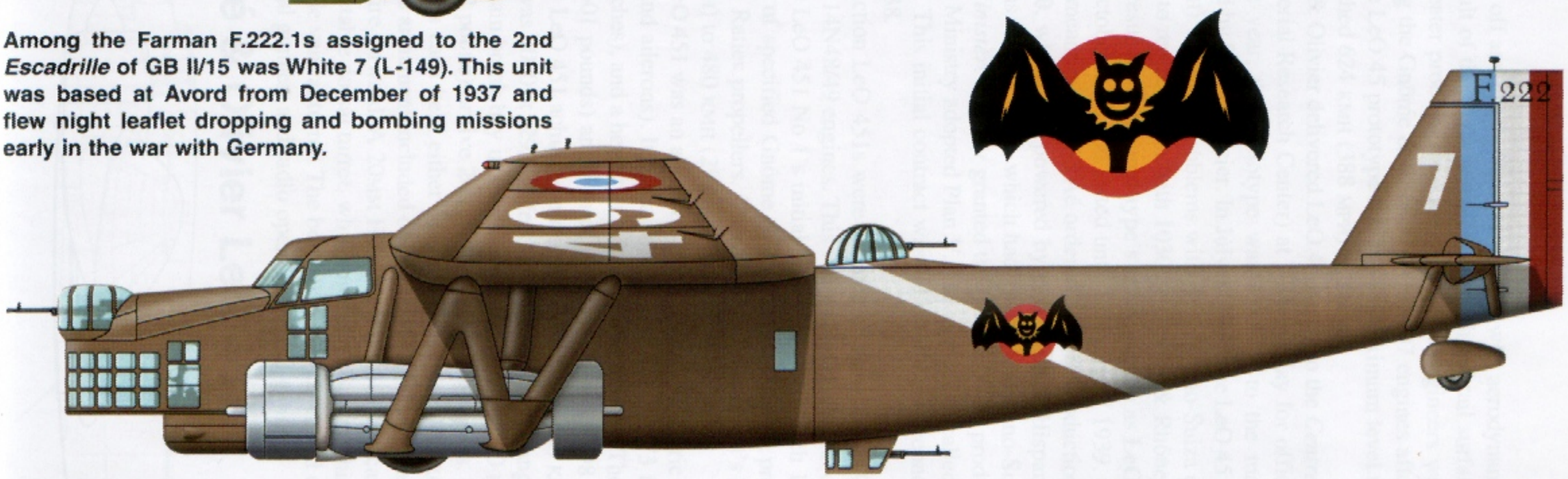
Bloch 210 No. 45 (White 1/E-018) was assigned to the 2nd *Escadrille* of GB II/21 at Bordeaux-Mérignac in 1939. This aircraft flew night reconnaissance missions early in World War Two.



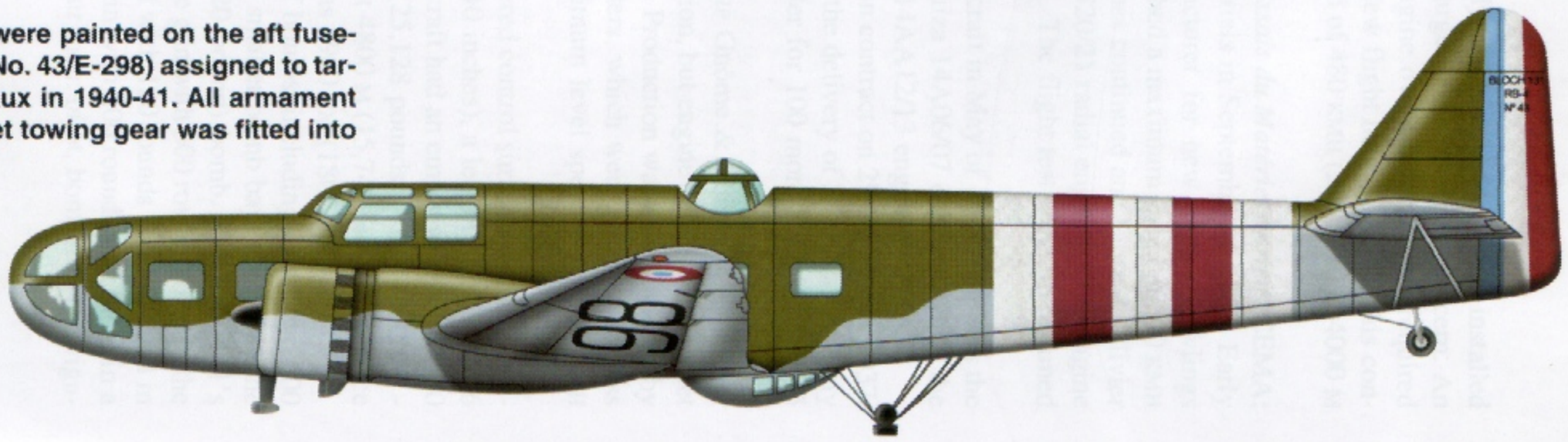
France delivered ten Bloch 210s to Rumania in 1937, including White 6. It was assigned to *Escadrila 82 bombardament* (82nd Bomber Squadron) and flew on bombing missions against the Soviet Union in the summer of 1941.



Among the Farman F.222.1s assigned to the 2nd *Escadrille* of GB II/15 was White 7 (L-149). This unit was based at Avord from December of 1937 and flew night leaflet dropping and bombing missions early in the war with Germany.



Red and white stripes were painted on the aft fuselage of this Bloch 131 (No. 43/E-298) assigned to target tug duties at Cazeaux in 1940-41. All armament was deleted and a target towing gear was fitted into the lower fuselage.



This Lioré & Olivier LeO 451 (No. 426) was assigned to the 1st *Escadrille* of GB I/11 in 1941. It was a Vichy French unit based at Oran, Algeria. The white fuselage stripe identifying Vichy aircraft was sometimes made in the form of an arrow.



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US forces captured this LeO 451 (DK+ZD) from the Germans while advancing into Sicily in 1943. The Luftwaffe commandeered this bomber for training and transport uses. The Americans later used it as a squadron 'hack.'



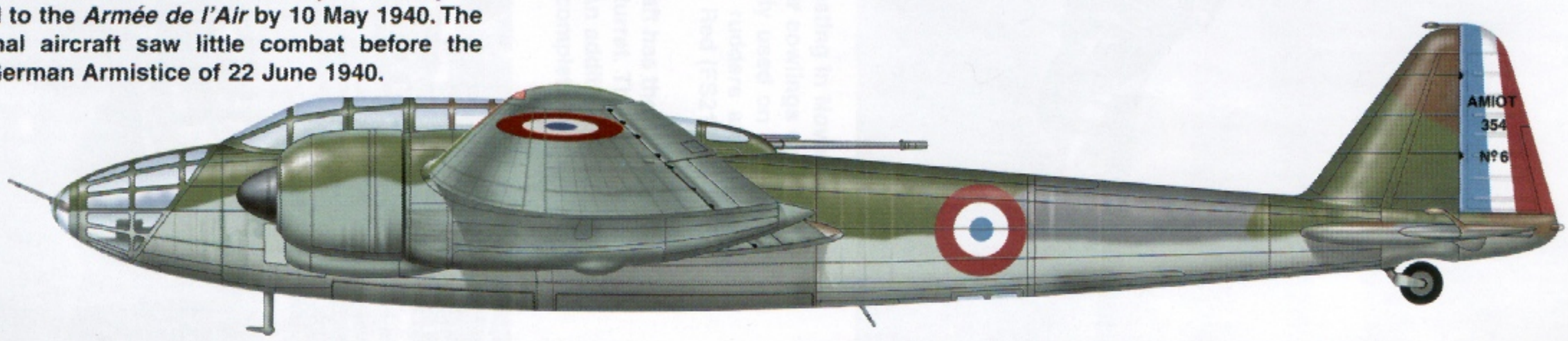
The commander of the 1st *Escadrille* of *Groupe de Bombardement d'Assaut* (GBA; Assault Bomber Group) I/51 flew this Breguet 693 (No. 74), White 1. This Squadron attacked German armored formations during the Battle of France in May and June of 1940.



The 3rd *Escadrille* of *Groupe de Reconnaissance* (GR; Reconnaissance Group) II/52 flew this Bloch 175 (No. 111) in 1940-41. This Vichy Air Force unit was based at Oran-La Sénia, Algeria.



The sixth Amiot 354 was one of only 25 examples delivered to the *Armée de l'Air* by 10 May 1940. The operational aircraft saw little combat before the French-German Armistice of 22 June 1940.





The LeO 45 No 01 was powered by 1080 HP Hispano-Suiza 14AA06/07 radials during its flight test program at Villacoublay in early 1937. Extended air intakes to the oil coolers were not installed at the time. This LeO 45 prototype was converted into the LeO 451 prototype in 1938. The aircraft remained with SNCASE until the end of 1942; however, its final fate is unknown.

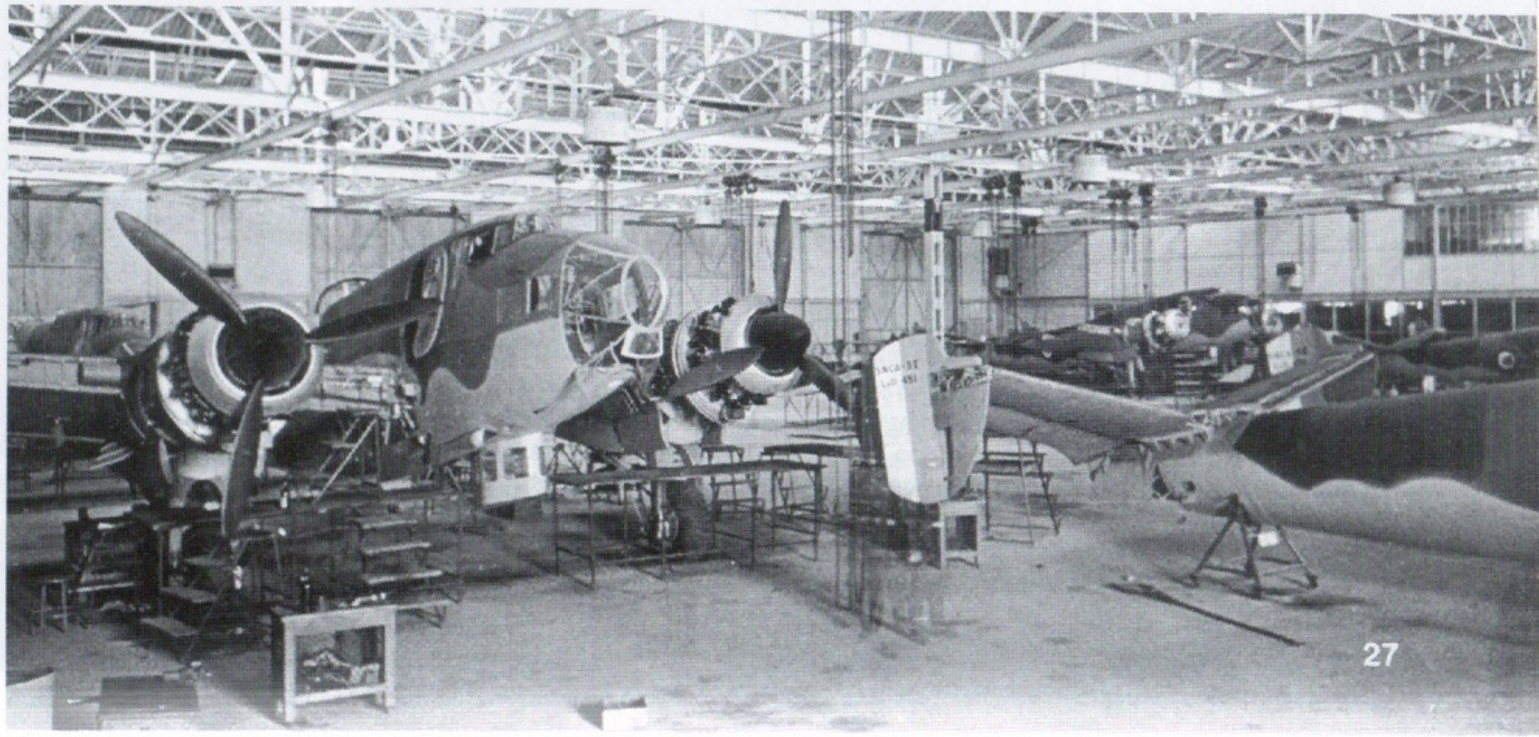


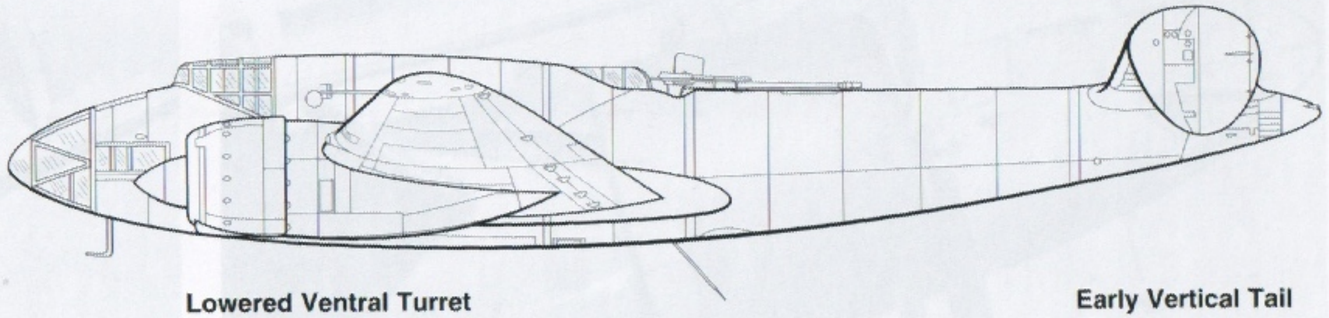
LeO 451 No 01 banks away from the camera aircraft during flight testing in November of 1938. This publicity photograph is a montage, for it depicts Mercier cowlings on an aircraft powered by Hispano-Suiza engines. These cowlings were only used on Gnôme & Rhône-powered production aircraft. This natural metal LeO 451's rudders are painted (from front) Roundel Blue (FS25090), White (FS27780), and Roundel Red (FS21105).

The Air Ministry ordered 100 additional LeO 451s on 20 February 1939, followed by 480 additional machines on 18 April. Production lagged far behind and the *Armée de l'Air* had accepted only two aircraft by the end of July. An *Escadrille d'Expérimentation* (Evaluation Flight) was established at Rheims in early August of 1939. This Flight was assigned five LeO 451s with crews coming from GB (*Groupe de Bombardement*) I/31 to hasten training on the new bomber. Only ten LeO 451s were in the *Armée de l'Air* inventory – against 749 aircraft on order – when France declared war on Germany on 3 September 1939. Production orders also included five **LeO 457** high-altitude bombers and ten **LeO 458**s powered by 1600 HP Wright GR-2600-A5B 14-cylinder, air-cooled, radial engines.

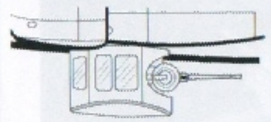
The *Ministère de l'Air* placed additional orders for 800 LeO 45 series aircraft during the *Drôle de guerre* (Phony War) period (3 September 1939 to 10 May 1940), which raised total LeO 451 and derivatives ordered from 749 to 1549. This total included 68 aircraft for the *Aéronavale* (*Aéronautique Navale*; French Naval Air Arm) for delivery between June and November of 1940. Also among the 1549 machines requested were 400 **LeO 455**s powered by with 1375 HP Gnôme & Rhône 14R supercharged engines and 200 LeO 458s.

LeO 451s undergo final assembly at a SNCASE factory in 1939 or early 1940. The near aircraft has the early small vertical stabilizer configuration, while the machine on the left has lowered its ventral gun turret. The French Air Ministry placed orders with SNCASE for 749 LeO 45 series aircraft by 3 September 1939. An additional 800 LeO 45s were ordered by 10 May 1940, for a total of 1549 aircraft. Only 452 LeO 451s were completed before the Franco-German armistice of 22 June 1940.

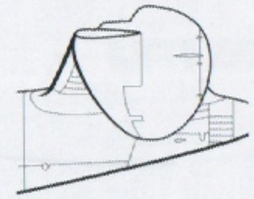


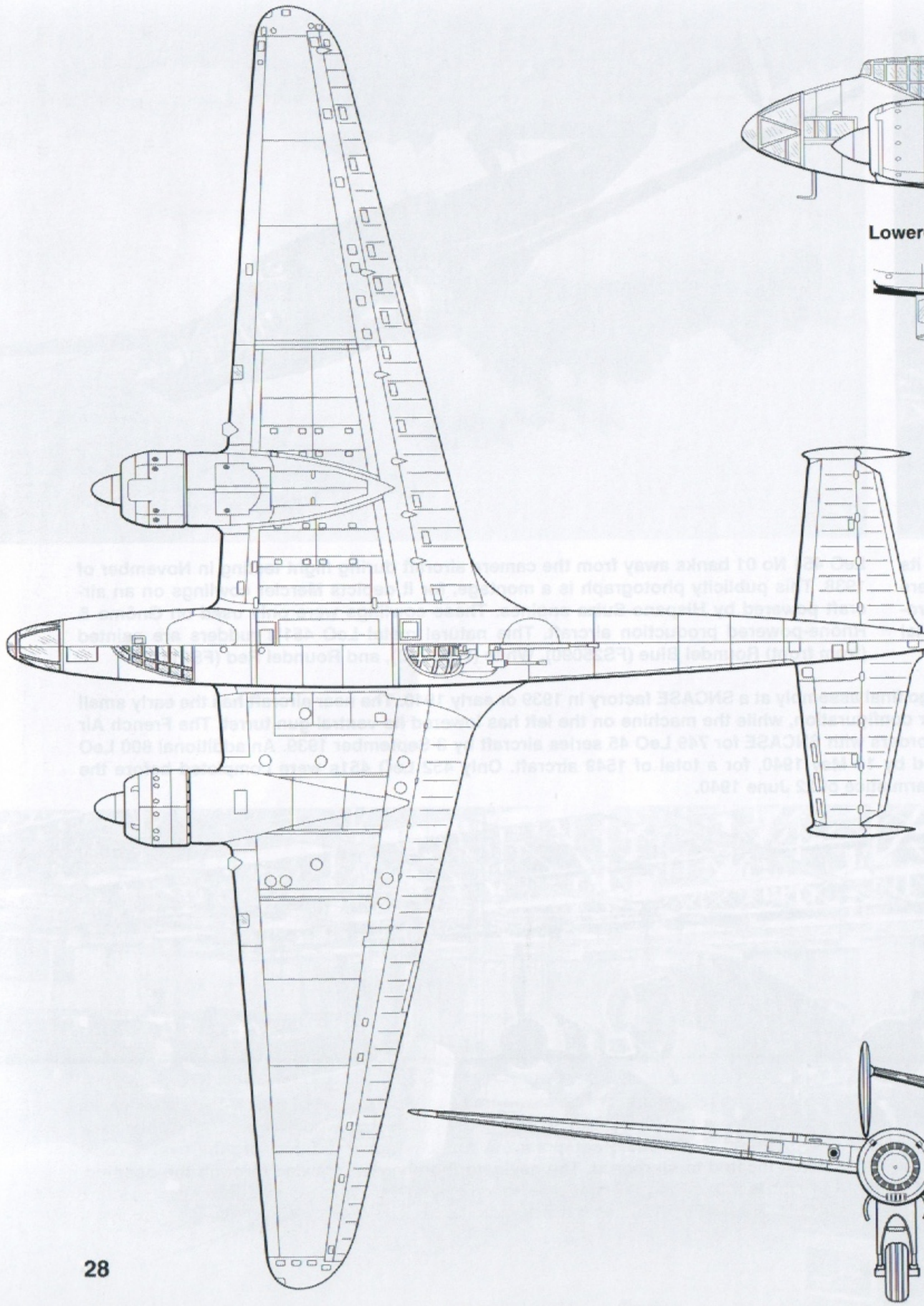


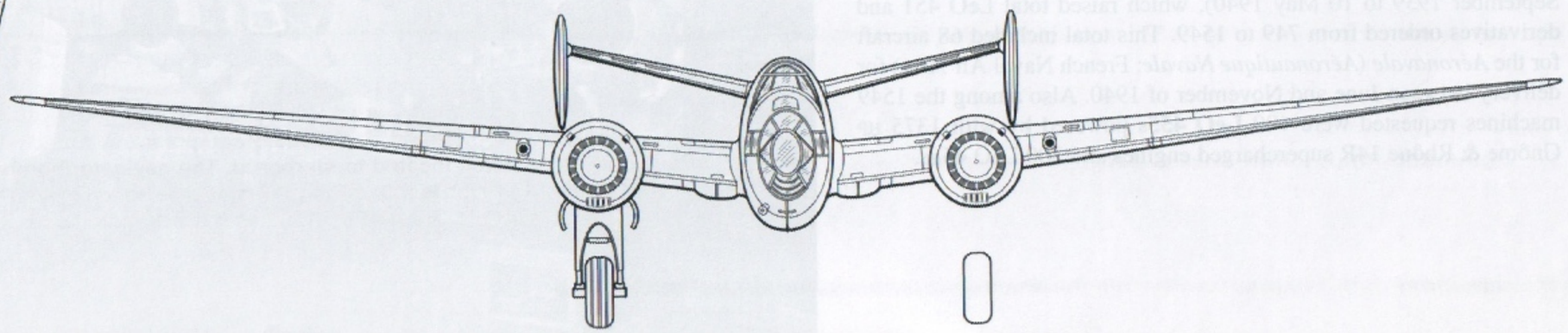
Lowered Ventral Turret



Early Vertical Tail







Lioré & Olivier LeO 451 B4 Specifications

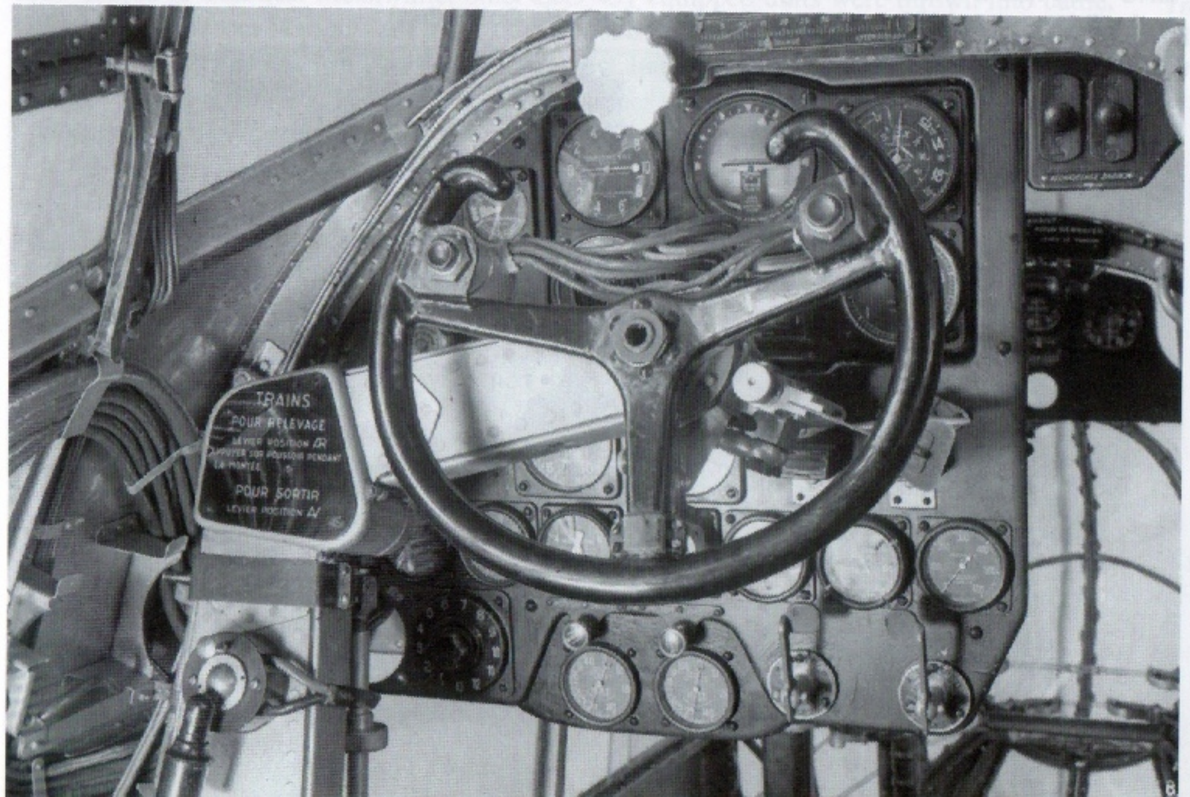
Wingspan:.....22.5 M (73 feet 10 inches)
Length:.....17.2 M (56 feet 5 inches)
Height:.....5.2 M (17 feet 1 inch)
Wing Area:.....66 M^2 (710 square feet)
Empty Weight:.....7530 KG (16,601 pounds)
Maximum Weight:...11,398 KG (25,128 pounds)
Powerplant:.....Two 1140 HP Gnôme & Rhône 14N48 (port)/49 (starboard), 14-cylinder, air-cooled, radial engines.
Armament:.....One fixed 7.5MM MAC 1934 machine gun with 300 rounds, one 20MM Hispano-Suiza HS 404 cannon with 120 rounds in retractable dorsal turret, and one 7.5MM MAC 1934 machine gun with 500 rounds in retractable ventral turret. Maximum bomb load of 1000 KG (2205 pounds) in fuselage bomb bay and 200 KG (441 pounds) in each of two wing-root bomb bays.

Performance:
Maximum Speed:...480 KMH (298 MPH) at 4800 M (15,748 feet)
Service Ceiling:.....9000 M (29,528 feet)
Maximum Range:...2900 KM (1802 miles)
Crew:.....Four



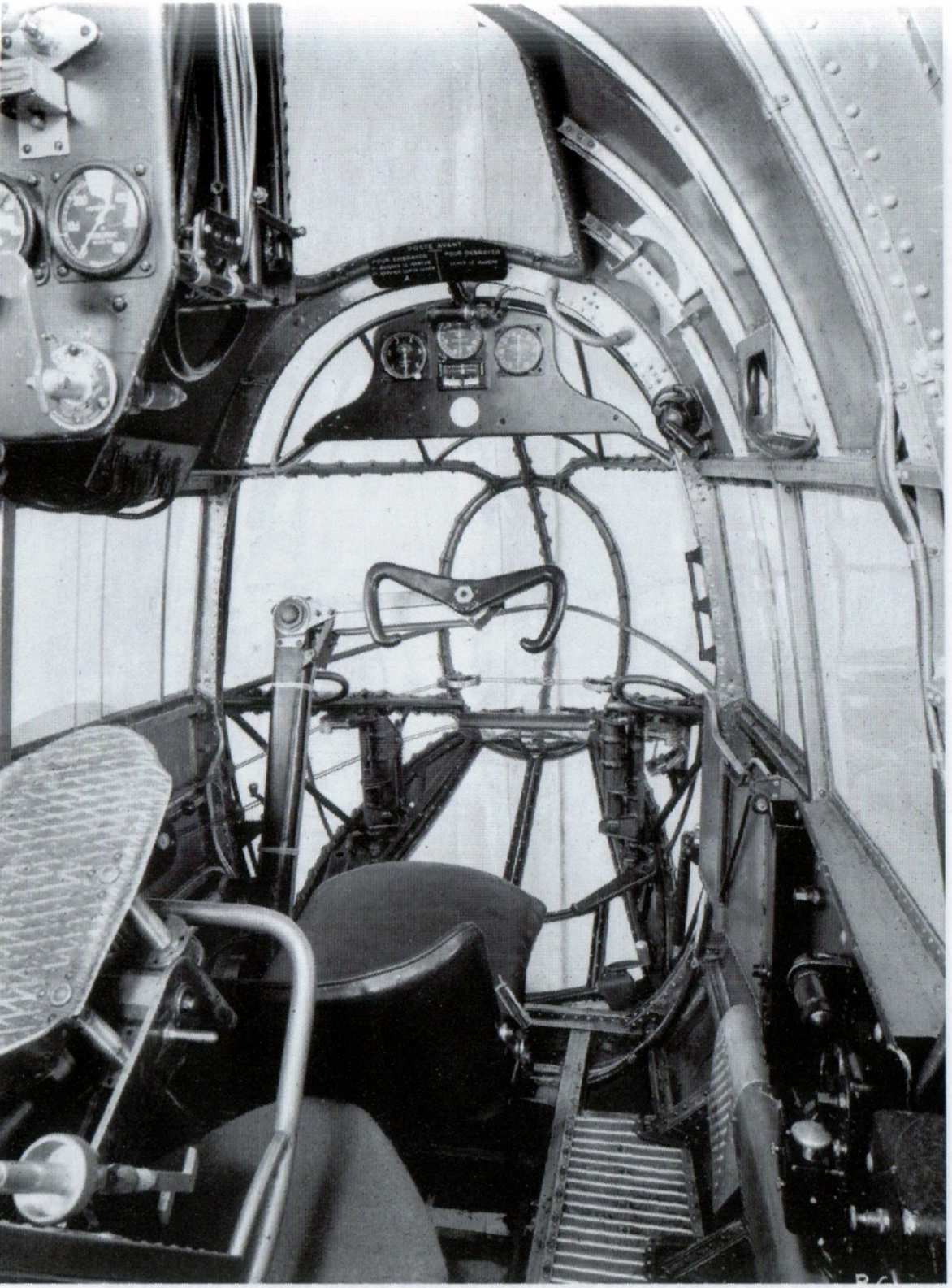
A French crew boards a LeO 451 somewhere in North Africa in 1943. This aircraft was believed to be assigned to GB I/25. A ladder extended from the wing trailing edge for crew access and egress. It was retracted into the wing before flight. The rope mounted inside the cabin aided the crew in reaching the side door while the engines are running. A 120-round ammunition box is fitted to the 20MM Hispano-Suiza HS 404 cannon, which is mounted on the extended dorsal turret.

The LeO 451 pilot's instrument panel was located in the port cockpit area. This is from a post-war LeO 451E test aircraft, which slightly differed from wartime aircraft. The semicircular control wheel was mounted on a control column arm, which extended from the left side. Instruments on the upper row include (from left): the anemometer (air speed indicator), the Sperry gyroscope, and the variometer (vertical speed indicator). Two fuel pressure gauges are located under the wheel, with two cowl flap adjustment levers located beside these gauges. (Author's Collection)





The pilot's seat was raised off the cabin floor to allow greater visibility through the canopy. The retractable dorsal gun turret was mounted aft of pilot's seat, while radio equipment was stowed on racks along the cabin side. The fuselage bomb bay was mounted aft of the radio equipment. A round window is fitted into the oval access hatch located to starboard. The navigator/bombardier crawled through the opening to starboard of the pilot's seat to reach his station. Interior surfaces were painted Apple Green (FS14108), with black radio boxes and Night Blue (FS35045) cockpits.

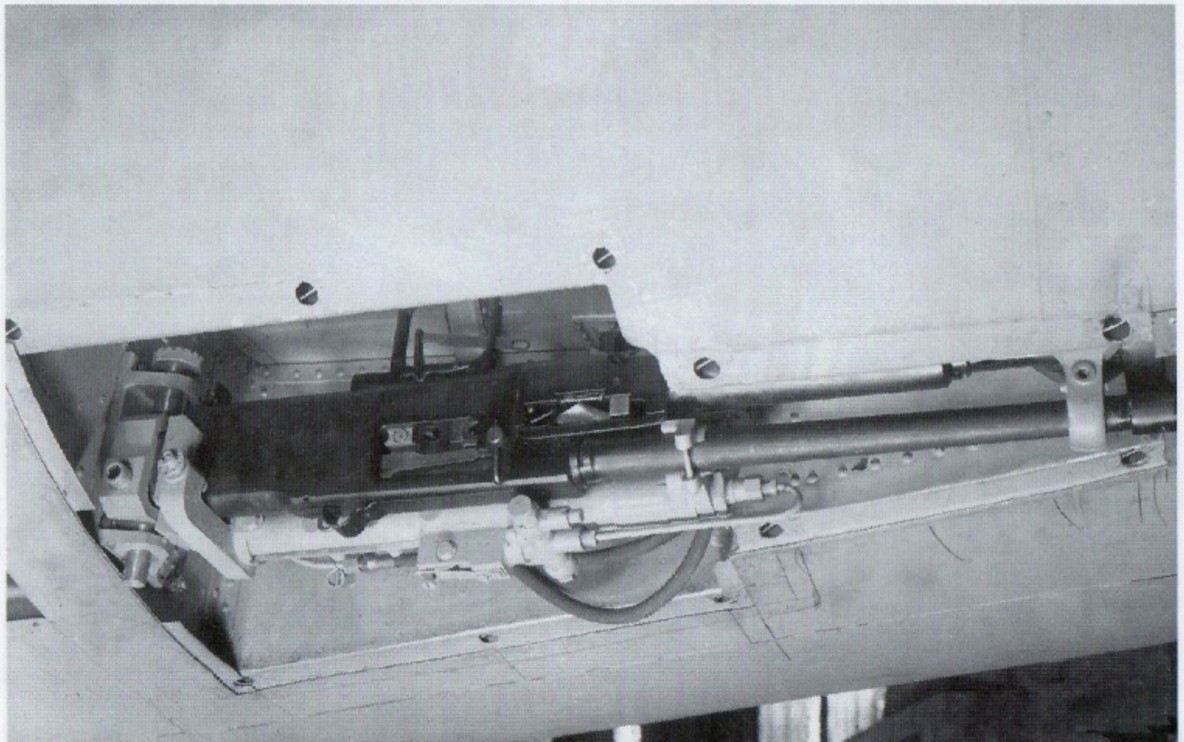


A dual control device was installed at the navigator/bombardier station of this LeO 451E test aircraft after World War Two. Wartime aircraft lacked flying controls in this crew position. A clear escape hatch was located on the upper nose section. Optically flat glass panels were fitted in the lower glazing for clear sighting of the target. The pilot's instrument panel and right rudder pedal are mounted to port. (Author's Collection)



The radio operator manned the LeO 451's ventral turret, which was hydraulically extended from the lower fuselage. This crewman sat on a cushion at the turret's front. The 7.5mm MAC 1934 machine gun has not been fitted to this aircraft. This turret generated considerable drag and was lowered only when necessary on a mission. It was offset to left of the centerline.

One 7.5mm MAC 1934 machine gun was fixed to fire forward under the starboard side nose. Access panels were removed for servicing this weapon, which was fed with 300 rounds. The pilot aimed and fired this weapon, usually at enemy fighters approaching from the front. The MAC 1934 had a muzzle velocity of 750 m (2461 feet) per second, a range of 500 m (1640 feet), and a firing rate of 750 rounds per minute. (Author's Collection)



LeO 451 in Combat

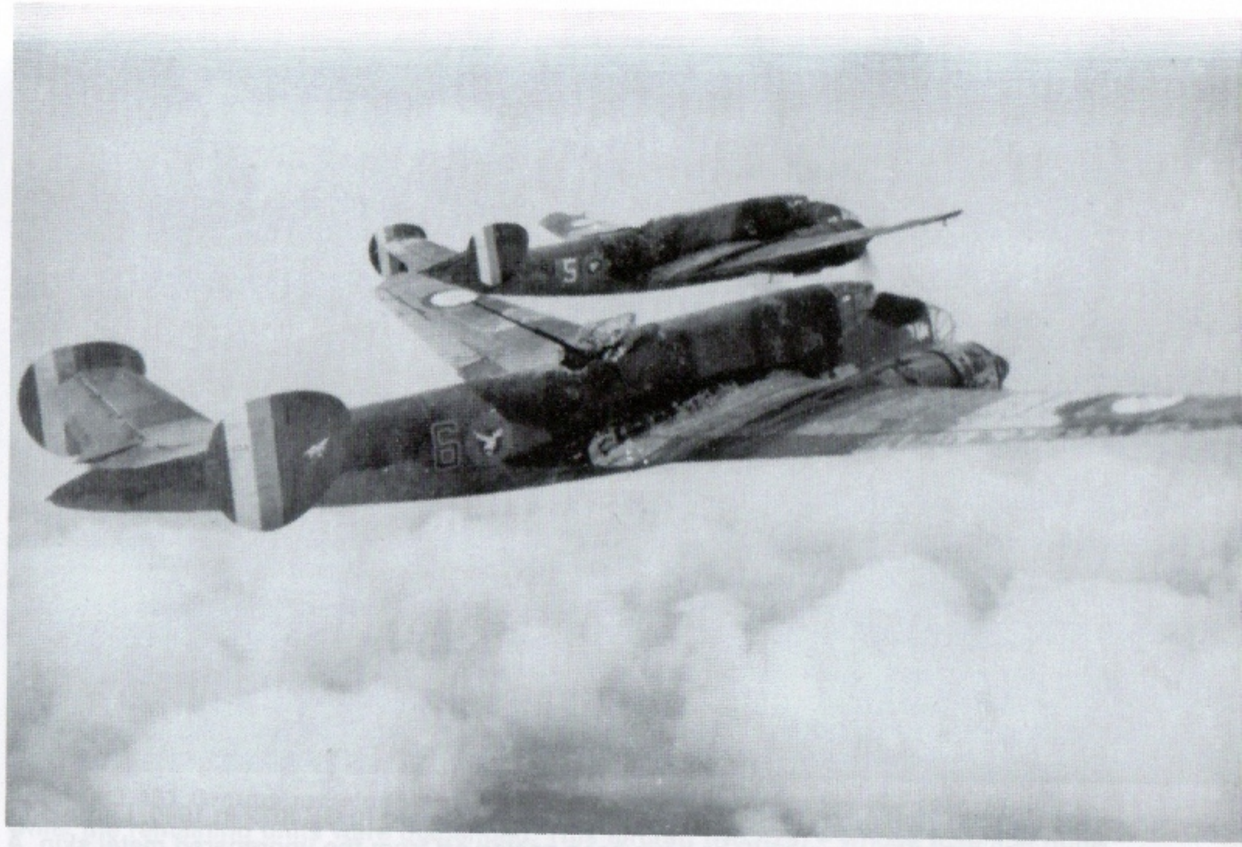
GB I/31 entered World War Two with a mixed inventory of five LeO 451s and eight obsolete Bloch 200s. It was based at Connantre and began operations by flying reconnaissance missions over Germany. It suffered its first combat loss on 6 October 1939, when LeO 451 No 6 was attacked by Messerschmitt Bf 109Es and was eventually downed by anti-aircraft fire near Euskirchen. During the following weeks, Bloch 200 and Bloch 210 equipped Groups were gradually withdrawn from operations in order to each receive their full complement of 27 LeO 451s. During this process, GB I/12 from Auzainvilliers and GB II/12 at Damblain withdrew to Orléans-Bricy on 7 September and accepted their first LeO 451s on 13 September and 6 October, respectively. GB I/31 at Connantre and GB II/31 from Marigny-le-Grand withdrew to Lézignan, while GB I/32 from Dijon and GB II/32 from Chissey reached Orange-Plan de Dieu. GB I/11 and GB II/11 – both at Toulouse-Francazal moved to Mas de Rue, and GB I/23 and GB II/23 both went from Istres to Le Vallon. All these units were due to reach operational status by late February of 1940, but this schedule was counting on regular deliveries. The *Armée de l'Air* had accepted only 106 LeO 451s by 10 March 1940, with only 59 of these on unit strength.

When German forces launched their attack on 10 May, the *Armée de l'Air* had taken 222 LeO 451s on charge, but only 94 of these were assigned to first-line bomber units and just 54 of these 94 were serviceable. The *Armée de l'Air* held 22 aircraft in reserve, while most of the 106 remaining LeO 451s were either under repair or modification. Only two *Groupes de Bombardement* in France were combat ready: GB I/12 at Soissons-Saconin and GB II/12 at Persan-Beaumont. GB I/31 arrived at Persan-Beaumont to reinforce *Groupement* (Grouping) No 6 on 15 May, but Heinkel He 111s attacked the airfield four days later and destroyed several LeOs. By 21 May, the worsening situation caused the *Etat-major de l'Armée de l'Air* (EMAA; French Air Force High Command) to withdraw *Groupement* No 6 southwards for rest. Subsequently, GB I/12 and GB II/12 redeployed to Orléans-Bricy, and GB I/31 and GB II/31 moved to Chartres. Meanwhile, other LeO 451 equipped units were thrown into battle. GB I/11 arrived from Marigny-le-Grand and Pont-sur-Yonne at Etampes (south of Paris) on 23 May and entered combat two days later, when they attacked German columns in the Bapaume area. The arriving GB II/23's 13 LeO 451s at Etampes soon reinforced this Group.

Groupement No 6 received its complement of LeO 451s and was back in action on 28 May, when 21 aircraft attacked several bridges near Aubigny with reasonable success. Three days later, 20 LeO 451s without fighter escort bombed German targets in the Amiens-Abbeville area. Nine French bombers were lost to German defenses. EMAA considered this high loss rate in switching to night bombing operations on 1 June. This change resulted in the redeployment of GB I/12 to Montbard, GB II/12 to Tavaux, GB I/31 to Châlons-sur-Saône, and GB II/31 to Til-Chatel.

The relentless German advance worsened the situation for the French forces in early June. This prompted the *Armée de l'Air* to order LeO 451 units to resume daylight missions as soon as possible. The Battle of France was becoming hopeless for the defenders and bomber units were ordered to withdraw to French North African bases. *Groupement* No 6 aircraft flew southwards to Istres, while GB I/11 and GB II/25 aircraft moved to Bordeaux-Mérignac on 16 June. Three days later, four *Groupes de Bombardement* were ordered to cross the Mediterranean and reach Algeria. Only *Groupement* No 6's units remained in southern France to mount a few attacks against communication targets.

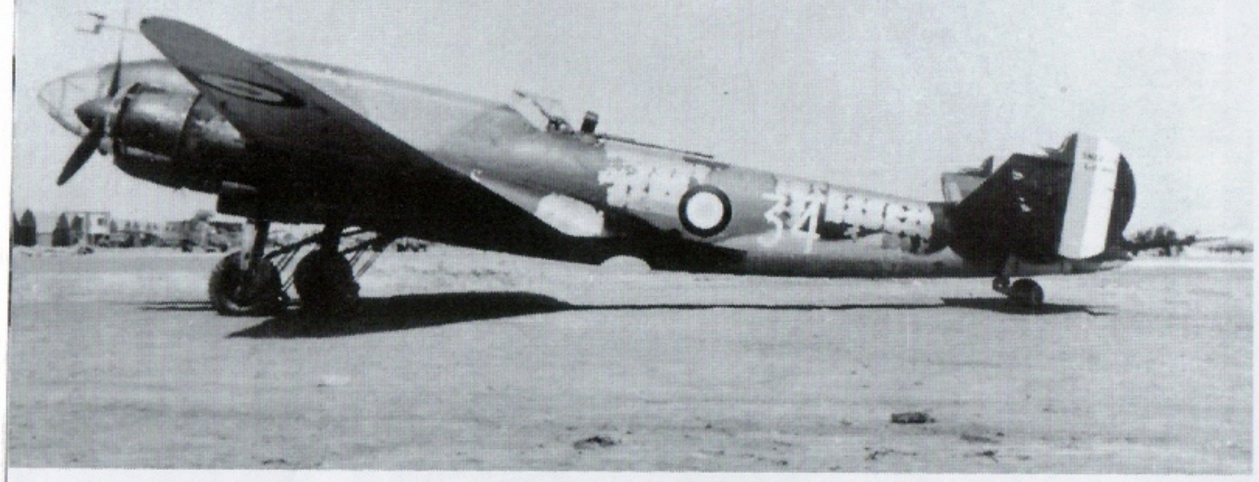
The signing of the Franco-German Armistice at Rethondes on 22 June 1940 meant that 183



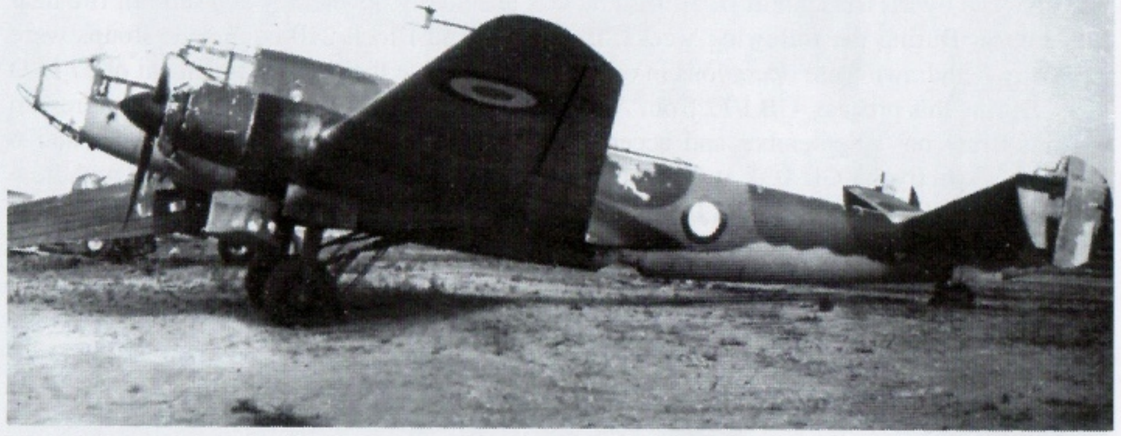
Two GB I/12 LeO 451s with later vertical stabilizers fly over France in mid-1940. The foreground aircraft (Red 6) is No 234 from the Group's 2nd *Escadrille*. It was delivered to the *Armée de l'Air* on 16 May 1940. Its wingman (White 5) was assigned to the 1st *Escadrille*. The poor quality of French aircraft paint resulted in rapid deterioration of the camouflage. It was common for aircraft to show large patches of bare metal. (CAC)

LeO 451 No 222 – fitted with the original fins – was delivered to the *Armée de l'Air* on 7 May 1940. It was assigned to *Centre d'Instruction au Bombardement* (CIB; Bombardment Training School) at Toulouse and was eventually transferred to the *Aéronavale*. It flew with *Escadrille* 4F from Hyères, France and Oran, Algeria before being returned to the *Armée de l'Air* and flown by *Groupe de Transport* (GT) I/15. (M. Bénichou Collection)



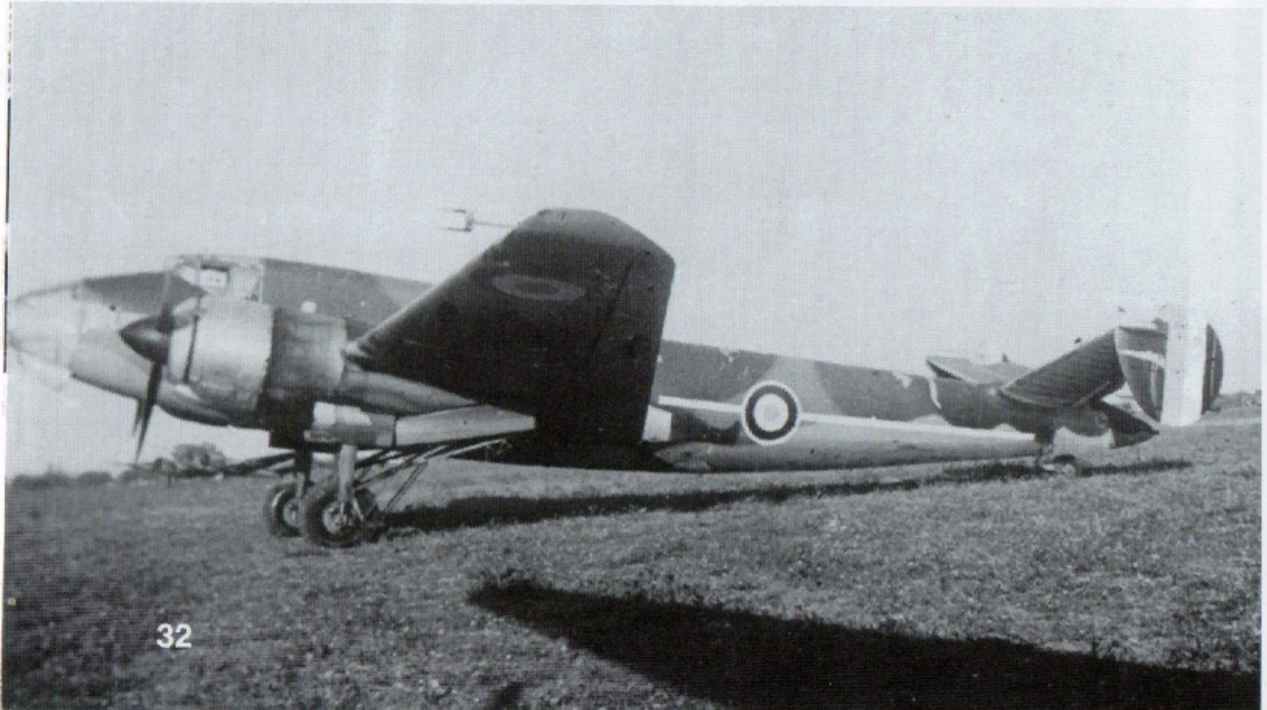


This LeO 451 (White 34) is believed to have been assigned to GB II/12 in 1940. Large portions of the fuselage camouflage have been peeled off from the unprepared metal skin. A 30-round ammunition drum is mounted on the breech of the dorsal 20MM Hispano-Suiza HS 404 cannon. The ventral escape hatch immediately aft of the wing trailing edge is open.



This aircraft was among 183 LeO 451s that remained in Metropolitan France at the time the Franco-German Armistice was signed on 22 June 1940. Another 135 aircraft had flown to French North Africa by that date. This aircraft was probably located in southern France and has its ventral turret lowered. An obsolete Bloch 200 bomber is parked in the background. (CAC)

An unidentified LeO 451 is painted in the Vichy French identification markings required from 6 July 1940. It consisted of a White fuselage band and a white border to the cocarde. The Vichy Roundel Red (FS21105) and Yellow (FS13538) cowl and tail markings were adopted on 24 June 1941. The camouflage pattern varied in large proportions from one aircraft to another. Upper surfaces were usually Khaki Green (FS24087), Chocolate Brown (FS20117), and Dark Blue Gray (FS36176), while undersurfaces were painted Light Blue Gray (FS25189). (M. Bénichou Collection)

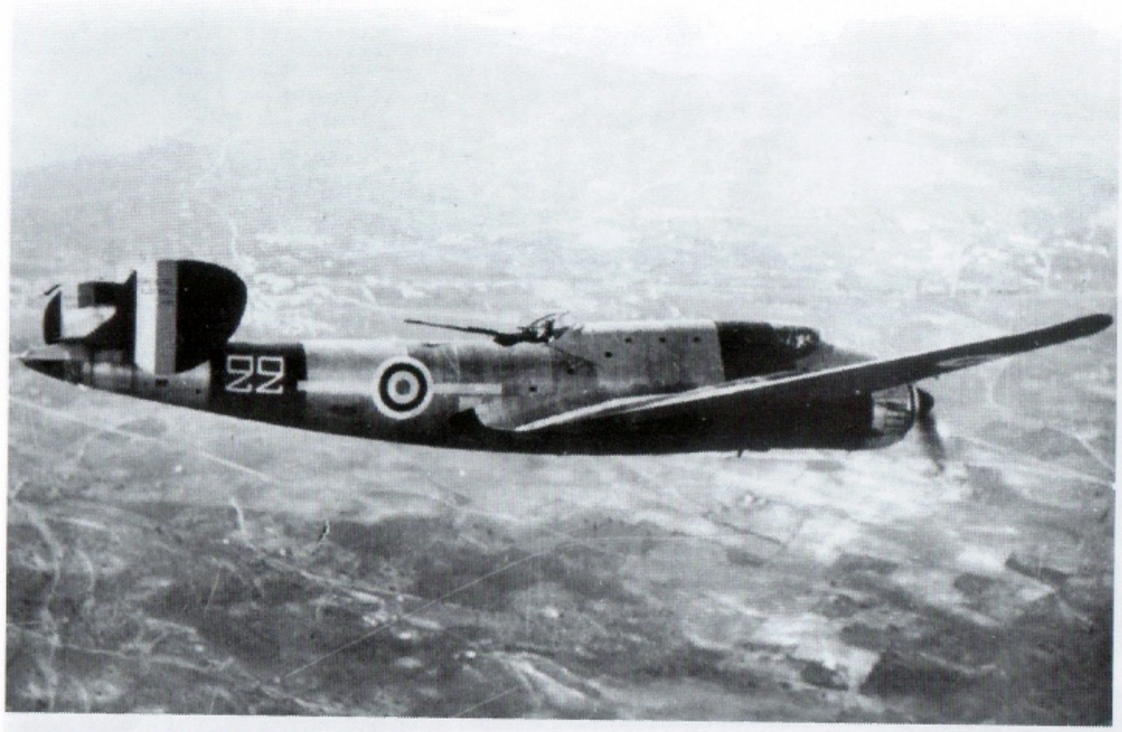


LeO 451s remained in France and 135 in French North Africa. The *Armée de l'Air* accepted 360 aircraft and the *Aéronavale* took 13 machines out of the 452 LeO 451s built to that date. The French lost 130 LeO 451s to combat and accidents.

Modifications were progressively introduced to all surviving LeO 451s in *Armée de l'Air de l'Armistice* (Vichy Air Force) service during late 1940 and 1941. These included installing new enlarged vertical tail assemblies, which were tested on aircraft No. 51 in March of 1940. They were retrofitted to existing LeO 451s from September of 1940. Two rear-firing 7.5MM MAC 1934 machine guns with 750 rounds per weapon were installed alongside the 20MM cannon in an AB74 dorsal mount. The AB74 replaced the SAMM-AB26 dorsal mount with only the 20MM weapon previously fitted to LeO 451s. German authorities allowed resumption of LeO 451 production and the Vichy government ordered 225 aircraft to be built at Ambérieu. These bombers were partially assembled using existing parts and subassemblies seized in the German Occupied Zone of France. Only 102 LeO 451s were completed from this order by early November of 1942.

Anglo-American forces invaded French North Africa (Operation TORCH) on 8 November 1942. The Vichy Air Force in Morocco and Algeria sent LeO 451s against the Allied invasion force. The French lost 11 LeOs resisting the landings, including nine shot down by British Fleet Air Arm Grumman Martlet (F4F Wildcat) fighters. Vichy French forces in North Africa ended hostilities with the Allies on 11 November.

The pro-Allied Free French established *Groupement Mixte* (Mixed Grouping) No 8 as part of the Northwest African Tactical Air Force (NATAF) in February of 1943. This Grouping consisted of three LeO 451-equipped Groups: GB I/11, GB II/23, and GB I/25. These units flew night bombing missions, beginning with one against Axis targets in Nefta, Tunisia on 24 February. *Groupement Mixte* No 8 operations continued until the last German and Italian troops in Tunisia surrendered on 12 May 1943.



White 22 was a LeO 451 assigned to the 2nd *Escadrille* of GB I/25. The dorsal 20MM Hispano-Suiza HS 404 long barreled cannon is extended for firing. This highly effective gun was installed on a SAMM AB26 power-operated mount and fed with 120 rounds. The HS 404 had a muzzle velocity of 880 M (2887 feet) per second and a firing rate of 700 rounds per minute. This LeO 451 has the later, enlarged vertical stabilizers.

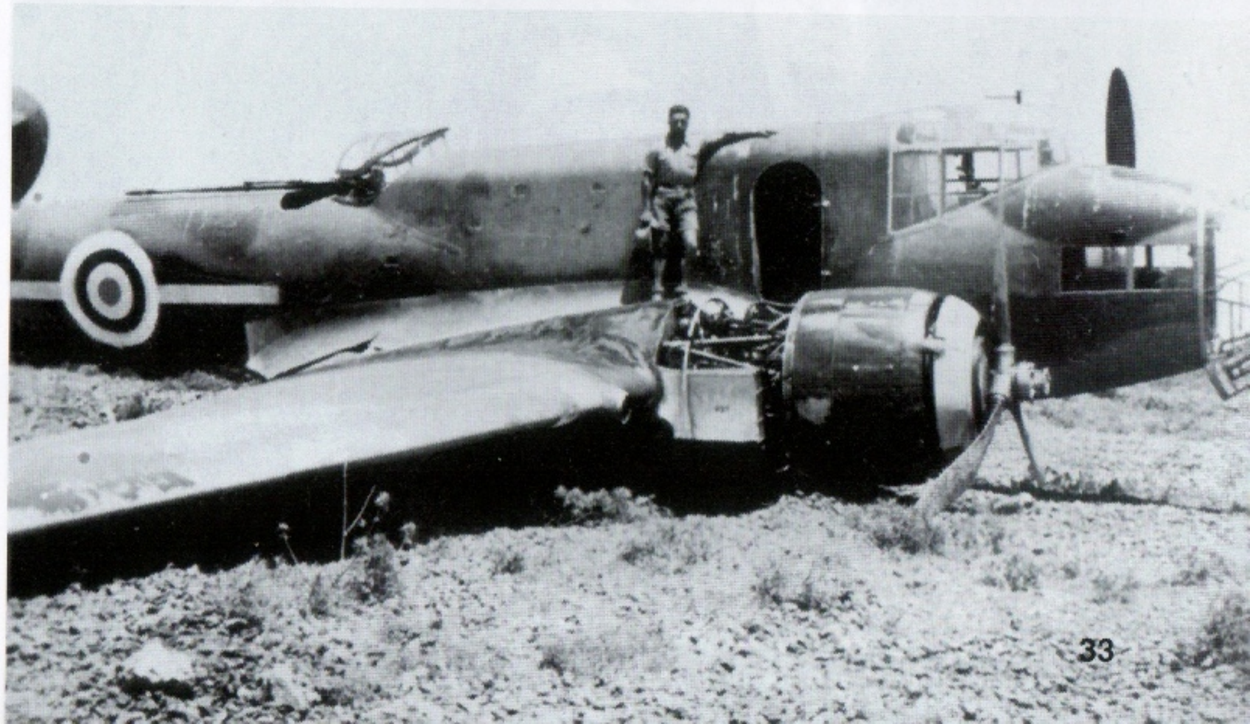
LeO 451 No 377 (White 14) of GB I/11 is parked in a hangar at a Vichy French airfield. This aircraft was delivered to the *Armée de l'Air* on 8 June 1940. Nearly all paint on the fuselage has worn away. The Squadron insignia on the tail shows a golden eagle on a white oval dropping a bomb. This insignia was previously used by the BR123 *Escadrille* in World War One. (CAC)

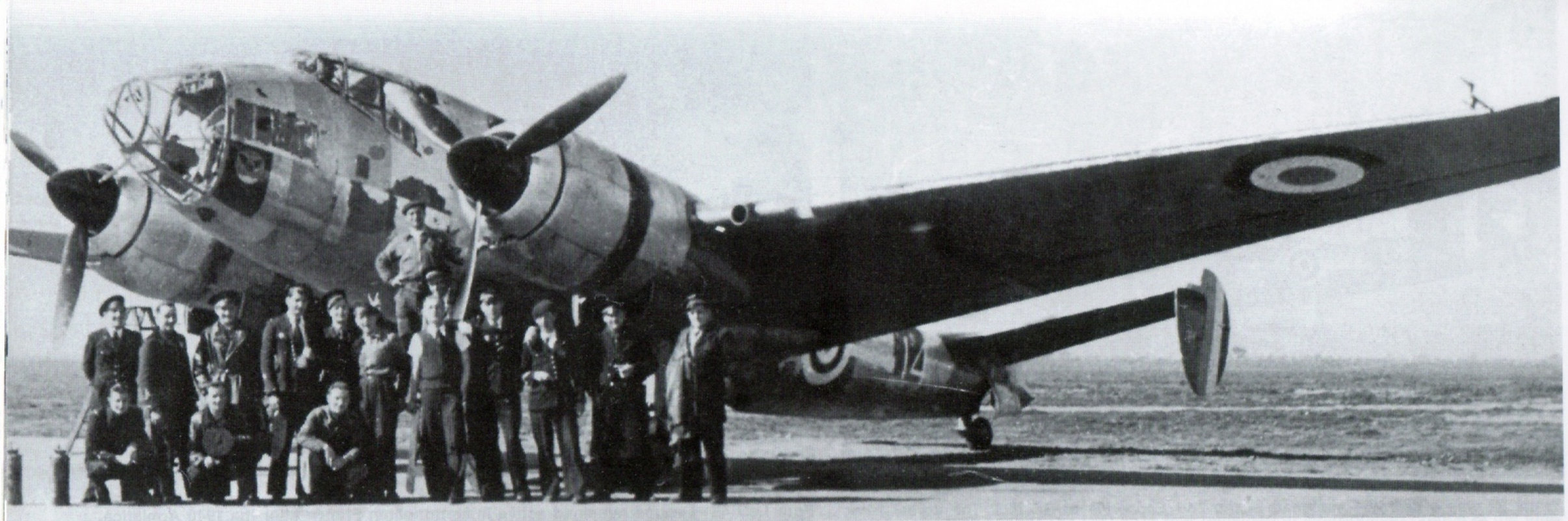




Four LeO 451 Groups remained active in Metropolitan France after the 1940 Armistice, while the remaining units were disbanded. This aircraft (No 429) – whose fuselage number is believed to be 32 – was assigned to GB II/11, one of the disbanded groups. The vampire bat unit insignia is painted on the vertical stabilizer. Aircraft No 429 was delivered to the *Armée de l'Air de l'Armistice* on 4 September 1940, but its final fate is unknown. (Boulle Collection)

A crewman stands on the wing of a LeO 451, which crash-landed after British Royal Air Force (RAF) fighters attacked it over Syria in mid-1941. This bomber was believed to be assigned to GB I/25, which transferred from Tunisia to Syria in June of that year. British and Free French forces downed 18 *Armée de l'Air de l'Armistice* LeO 451s during this campaign. The Vichy French lost six other LeO 451s to accidents and six more during ferry flights to and from Syria. (Boulle Collection)





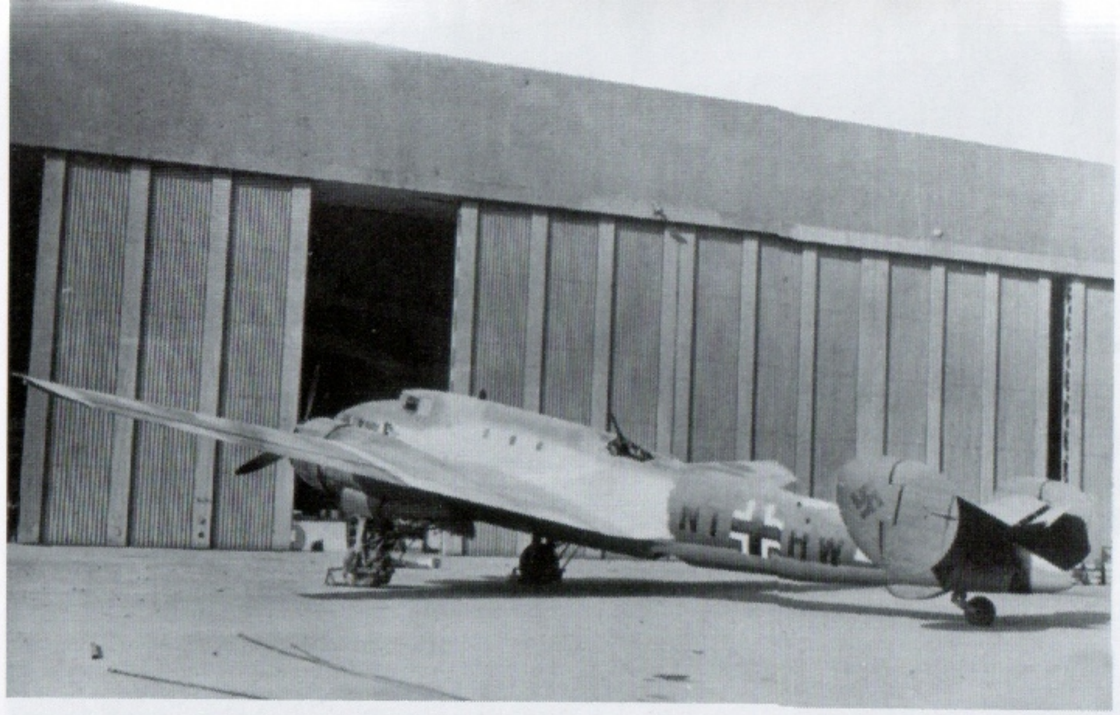
Personnel gather before LeO 451 No 3004 (White 14), which has lost much of its upper surface paint to wear. This bomber was built at SNCAO's Bourguenais factory, whose LeO 451s were numbered in the 3001 to 3046 range. No 3004 was flown successively by GB II/25 and GB I/25 at El Aouina, Tunisia. The insignia of an unknown *Escadrille* is painted on the nose. This bomber was abandoned when the North African campaign ended in 1943. (Boulle Collection)

Armorers load 50 KG (110 pound) bombs into the main bomb bay of a GB I/25 LeO 451 in Tunisia in 1943. This aircraft could accommodate twenty 50 KG, five 200 KG (441 pound), or two 500 KG (1102 pound) weapons in the fuselage. Two additional wing root bomb bays each held either one 200 KG or one 100 KG (220 pound) bomb.



Two LeO 451s of the *Aéronavale*'s *Escadrille* 6B are prepared for a mission. Vichy French aircraft were required to have Roundel Red and Yellow tail and cowl stripes from 24 June 1941. Black anchors are painted on the fuselage *cocardes*. The foreground LeO 451 is believed to be No 160, which was eventually returned to the *Armée de l'Air* and operated by the *Ecole de l'Air* (Air Academy) at Salon-de-Provence. (M. Bénichou Collection)





The Luftwaffe used LeO 455 No 001 (NT+HW) as a flying test bed for the Gnôme & Rhône 14R radial engines. It was destroyed in March of 1944; however, the cause of its demise is unknown. A 13MM Rheinmetall MG 131 machine gun on a D30/131 ring mount replaced the 20MM Hispano-Suiza cannon in the dorsal position. (J.Y. Lorant Collection)

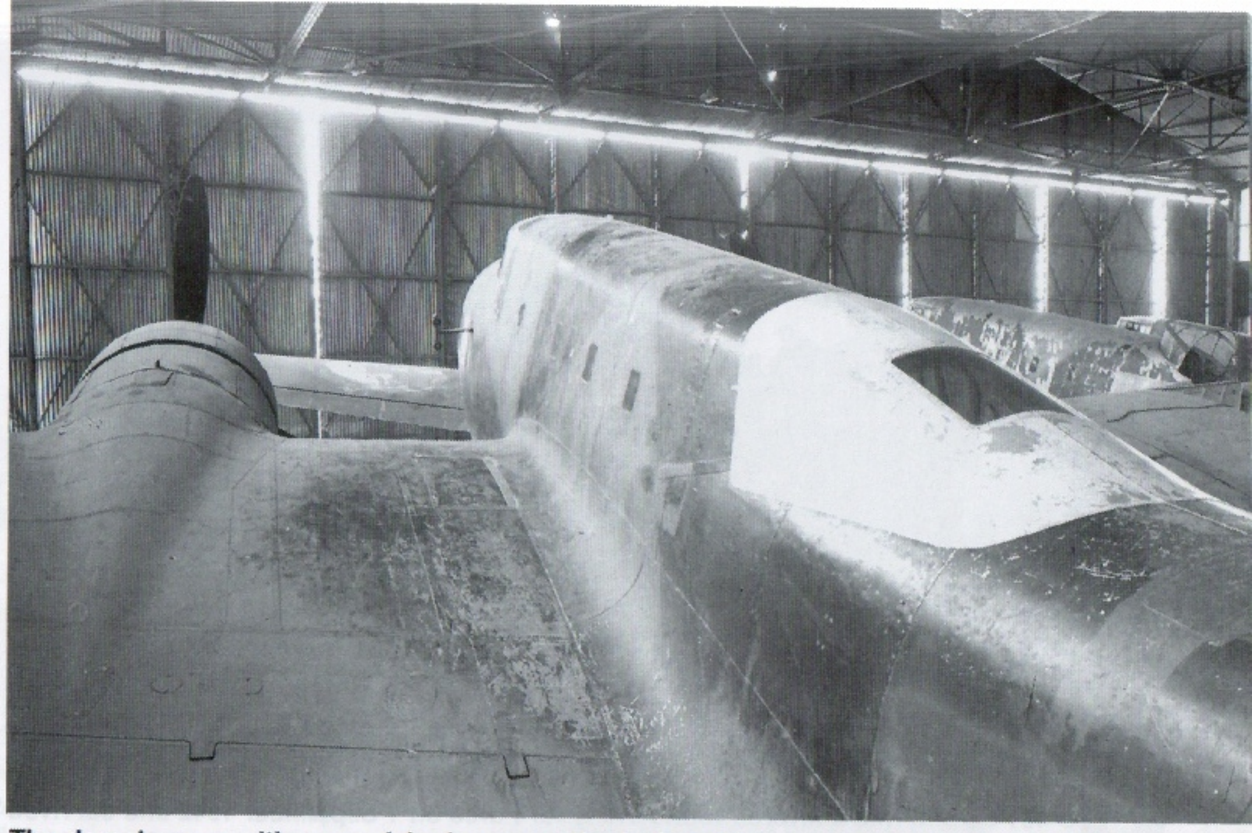
LeO 45 in Foreign and Post-War Service

German forces seized 94 LeO 45s after invading the French Unoccupied Zone (Vichy France) on 11 November 1942. The Germans transferred 66 of these aircraft to the Italian *Regia Aeronautica* (Royal Air Force), which assigned them to the 51° *Gruppo Autonomo Bombardamento Terrestre* (Independent Land Bomber Group) at Bologna and the *Reparti Scuola della Specialita Bombardamento* (Bomber Specialist School Unit). The German Luftwaffe wanted to use the 28 remaining LeO 451s as fast liaison and transport aircraft and the Marseilles-Marignane plant modified these bombers into **LeO 451T** (*Transport*) aircraft. Deutsche Lufthansa ordered 100 new LeO 451Ts for Luftwaffe use in 1943.

The French inventoried at least 67 LeO 451s in Metropolitan France and French North Africa when World War Two in Europe ended on 8 May 1945. Only a few of these aircraft were readily serviceable; however, the reformed *Armée de l'Air* eagerly sought all types of aircraft. The *Direction Technique & Industrielle de l'Air* (DTIA; Aviation Technical and Industrial Directorate) asked SNCASE[1] at Marignane to refurbish 14 LeO 451s. Eleven of these aircraft were used as **LeO 451E** (*Essais*; Test) flying test beds for missile tests, while the aircraft engine manufacturer SNECMA[2] operated the three remaining aircraft under the designation **LeO 455**. Simultaneously, the *Atelier Industriel de l'Air* (AIA; Aviation Industrial Facility) at Algiers, Algeria modified a LeO 451 with 1200 HP Pratt & Whitney R-1830-67 radial engines and seating for six passengers. This LeO 453 variant demonstrated a cruising speed of 400 KMH (249 MPH) and a range of 3500 KM (2175 miles). Successful tests resulted in an order for 39 additional LeO 453s, which served in the *Armée de l'Air* until 1957.

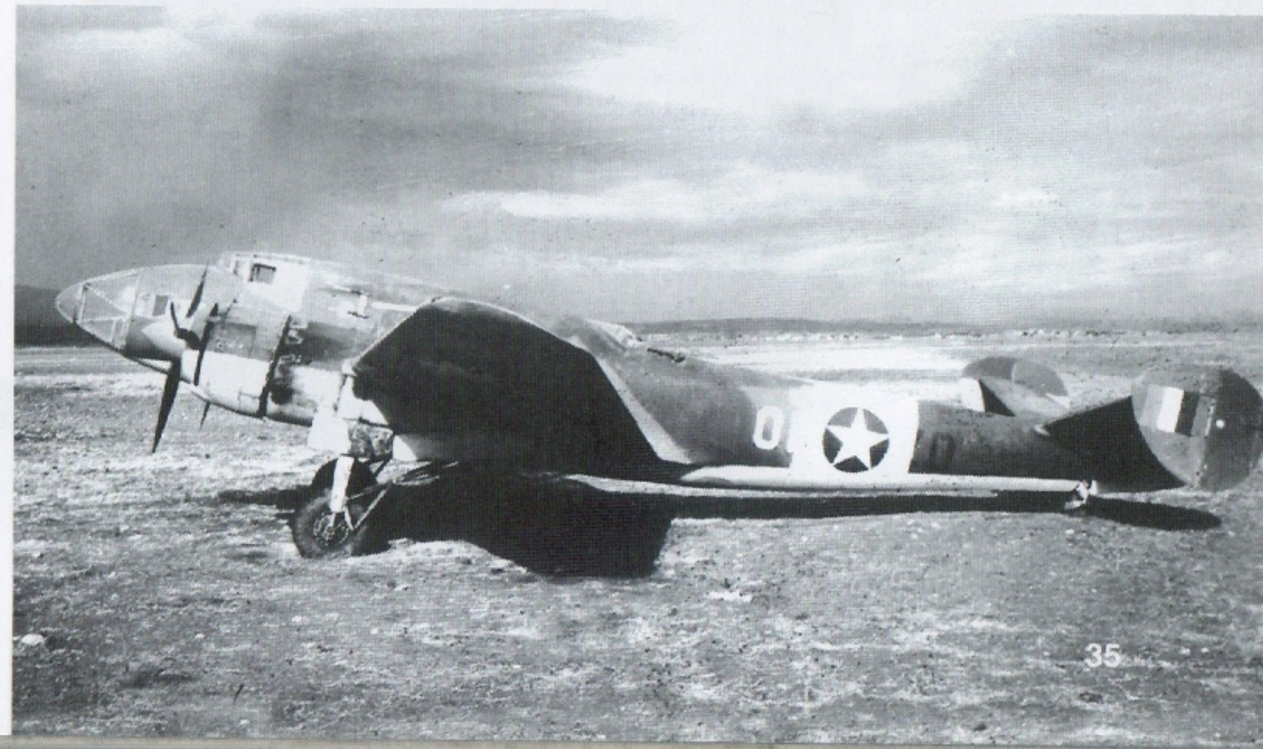
[1]SNCASE: *Société National de Construction Aéronautiques du Sud-Est*; National Aircraft Construction Company of the Southeast. Lioré & Olivier was incorporated into SNCASE when the French aeronautical industry was nationalized in 1936.

[2]SNECMA: *Société Nationale d'Étude et de Construction de Moteurs d'Aviation*; National Aviation Engine Design and Construction Company.



The dorsal gun position was faired over on the LeO 451T transport conversion for the Luftwaffe. This variant also had all armament deleted and windows added to the fuselage sides. Folding wooden benches inside the fuselage held 17 to 23 passengers. When flown in the tanker role, the LeO 451T fuselage held eight 200 L (53 gallon) fuel drums.

US forces advancing through Sicily captured this German-flown LeO 451 (DK+ZD). US stars were painted over German *Balkenkreuzen* and a tricolor fin flash replaced the swastika. Upper surfaces were RLM 70 Black Green (FS34050) and RLM 71 Dark Green (FS34079), while undersurfaces were RLM 04 Yellow (FS33538). The 57th Fighter Group, US Army Air Forces used this LeO 451 as a 'hack.' This aircraft's ultimate fate is unknown. (M. Olmsted Collection)





LeO 451 No 538 was delivered to the Vichy Air Force on 1 September 1942 and survived the war. Aero-engine manufacturer SNECMA used it after the conflict as a flying test bed for propellers and engines. The Cross of Lorraine insignia on the vertical stabilizer was the emblem of the Free French forces. This aircraft was eventually registered F-BDXY. (SNECMA)

This LeO 453S Search and Rescue (SAR) aircraft was flown by *Escadrilles* SASM (*Sections d'Avions de Sauvetage en Mer*; Air-Sea Rescue Sections) 98 and 99 after World War Two. This was one of 40 LeO 453s powered by 1200 HP Pratt & Whitney R-1830-67 Twin Wasp radial engines. Red bands are painted on the wings and fuselage of this LeO 453S for greater visibility in the SAR role. Other LeO 453s were used for liaison, testing, and photographic missions. (J.M. Cuny)





LeO 451E No 7 (formerly LeO 451 No 199) was used as the mother aircraft for various types of ECA (*Equipements & Conduites Automatiques*; Automatic Equipment & Conduits) flying bombs. It received the civil registration F-BDJD. An ECA S20 flying bomb is mounted under No 7's fuselage in November of 1948. (ECA)

The LeO 455 was fitted with 1590 HP Gnôme & Rhône 14R radial engines. The Bouguenais factory was to have mass-produced it in 1940, but only three prototypes were built. Two aircraft (Nos 499 & 500) were modified to LeO 455 configuration after the war and used by SNECMA as test beds. Virtually no information on these tests has emerged. (SNECMA)





The first LeO 451E (No E1, ex-No 449, F-BCDK) was used for various tests at the *Centre d'Essais en Vol* (CEV; Flight Research Center) at Brétigny-sur-Orge, France. It is seen here fitted with a ventral tunnel, which was used to test various engine afterburning (reheat) systems. The aircraft was painted overall aluminum, with black lettering and ROULAND on the nose. This LeO 451E was named for a French pilot killed during a test flight. (CEV)

The CEV used the first LeO 451E (No E8, F-BCAK) to test pulse jet engines similar to those that powered the German V-1 (Fieseler Fi 176) flying bomb. This engine was mounted atop the fuselage, although engine vibrations and fire hazards were reported during test flights. A pulse jet engine eventually equipped the Arsenal Ars. 5501 target drone, which had a similar appearance to the V-1. (CEV)





Test equipment was mounted to the nose and lower fuselage of this LeO 451E (No 493, F-BDJE). The aircraft was used for testing the BHT radio-controlled bomb. Pylons under the fuselage held the weapon in place before release from the aircraft. Sensors on the LeO 451E measured atmospheric conditions and the BHT's performance from release to impact on the ground. LeO 451Es were employed on various tests until the mid-1950s.

Breguet 690 AB2 Series

The STAé issued its *Chasse – Triplace* (C3; Three-Seat Fighter) specification in October of 1934. This called for a three-seat, two-engine fighter able to fly escort, intercept, and fighter director missions and armed with forward-firing cannon. Five designs were built in response to this specification: the **Breguet 690**, **Hanriot 220**, **Loire-Nieuport 20**, **Potez 630**, and **Romano 110**. The Breguet aircraft was designed under the leadership of Georges Ricard and was both compact and attractive. It featured a short tapering monocoque fuselage and cantilever wings. The Breguet 630 was armed with two forward firing 20MM Hispano-Suiza HS 404 cannon and one 7.5MM MAC 1934 machine gun for aft defense. Breguet selected the 680 HP Hispano-Suiza 14AB02 (port)/03 (starboard), 14-cylinder, air-cooled, radial engine to power this aircraft. Both propellers turned inward to cancel out engine torque and reduce handling problems if one engine failed in flight.

Breguet 690 prototype construction began in 1935, although the *Armée de l'Air* did not officially order it until 26 March 1937. Meanwhile, the Potez 630 was declared the winner of the C3 competition. Breguet 690 01 construction was slow due to a ten month delay in delivery of the Hispano-Suiza engines. The aircraft was finally completed in early 1938 and made its first flight on 23 March 1938. Preliminary tests went without serious problems and Breguet delivered the prototype to CEMA at Villacoublay for state tests in July of 1938. This evaluation showed the Breguet 690 had good performance, which was superior in many areas than the Potez 630.

Promising test results led to the *Armée de l'Air* ordering 100 **Breguet 691 AB2** (*Assaut Bombardement – Biplace*; Two-Seat Attack Bomber) aircraft on 14 June 1938. Breguet engineers had a difficult task in adopting the Breguet 690 fighter into a bomber. A bomb bay with superimposed bomb racks replaced the navigator's station. The starboard 20MM cannon was retained, but two 7.5MM machine guns replaced the port weapon. All three nose weapons were deflected 15° for strafing attacks. Other changes included a modified undercarriage, oil cooler intakes repositioned from the wings to the engine nacelles, and a fuel capacity increase from 705 L (186 gallons) to 985 L (260 gallons). The first 100 Breguet 691s were powered by two 700 HP Hispano-Suiza 14AB10/11 radial engines, which were to be replaced by 745 HP Hispano-Suiza 14AB12/13s from aircraft No 101. Both engines turned either Ratier (Aircraft Nos 1 to 50) or Hamilton-Standard (from No 51) three-bladed, variable pitch propellers.

The Breguet 690 No 01 prototype first flew on 23 March 1938. It was powered by two 680 HP Hispano-Suiza 14AB02/03 14-cylinder air-cooled radial engines. They turned three-bladed Hamilton-Standard propellers in opposite directions to eliminate engine torque. Two long-barreled 20MM cannon were mounted low in the nose. The upper nose probe collected test data. (Breguet)



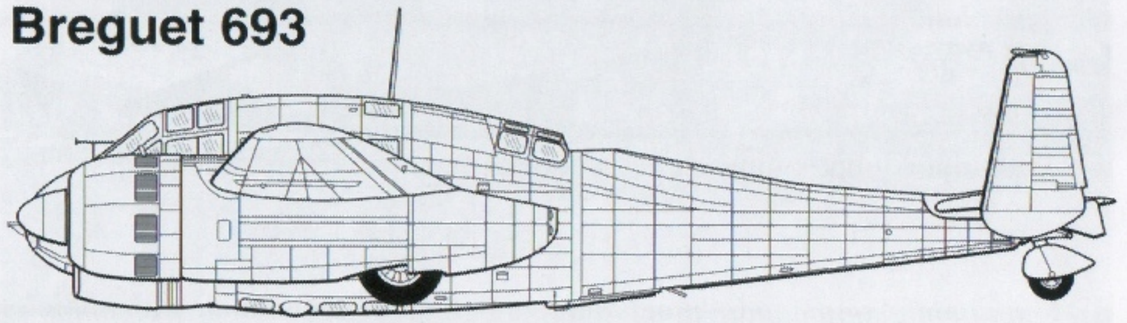
Breguet quickly initiated production of the Breguet 691, in contrast to the rest of France's aeronautical industry. The prototype first flew on 22 March 1939 and the initial production aircraft was rolled out and flown eight weeks later, on 15 May. The Hispano-Suiza 14AB engines proved unreliable and Breguet decided to replace them with the Gnôme & Rhône 14M engine, despite its larger diameter than the 14AB. The firm pulled Breguet 691 No 19 from the assembly line and installed two 700 HP Gnôme & Rhône 14M6/7 engines. It was redesignated **Breguet 693** No 1 and first flew on 25 October 1939. Breguet transferred the aircraft to CEMA on 24 November, where it demonstrated equivalent performance to the Breguet 691. The *Ministère de l'Air* (Air Ministry) ordered priority for Breguet 693 production and ended Breguet 691 production with aircraft No 78. The first production Breguet 693 made its maiden flight on 2 March 1940.

The Breguet 693 AB2 had a wingspan of 15.4 M (50 feet 6 inches), a length of 9.7 M (31 feet 10 inches), and a height of 3.2 M (10 feet 6 inches). The aircraft weighed 3006 KG (6627 pounds) empty and 4892 KG (10,785 pounds) fully loaded. Production aircraft were powered by two 700 HP Gnôme & Rhône 14M6 (port)/7 (starboard), 14-cylinder, air-cooled, radial engines. The aircraft's maximum speed was 490 KMH (304 MPH) at 5000 M (16,404 feet), while it had a service ceiling of 9500 M (31,168 feet) and a maximum range of 1350 KM (839 miles).

This light bomber carried a 400 KG (882 pound) bomb load inside its fuselage bomb bay. Windows fitted in the bomb bay doors gave its crew greater lower visibility. It usually carried a load of eight 50 KG (110 pound) bombs. The Breguet 693 was also armed with three forward firing weapons in the nose. Two 7.5MM MAC 1934 machine guns with 100 rounds per weapon were mounted to port, while a 20MM Hispano-Suiza HS 404 cannon with 60 rounds was located to starboard. A rear firing 7.5MM MAC 1934 machine gun with 100-round drums was located on a flexible mount in the aft cockpit. A crew of two flew this bomber: pilot and radio operator/rear gunner.

The largest issue facing the French aeronautical industry in the months prior to World War Two was procuring large numbers of engines. The Air Ministry requested Breguet and other manufacturers to develop alternative variants of their aircraft fitted with British and American powerplants. Breguet 690 No 1 was re-engined with two 825 HP Pratt & Whitney SB4G Twin Wasp Junior 14-cylinder radial engines. The aircraft was redesignated the **Breguet 695**. This American engine had a greater frontal area than the Hispano-Suiza 14AB and required larger NACA cowlings. The installation resulted in increased drag, lowered performance, and a restricted field of view for the pilot. Despite these drawbacks, the *Ministère de l'Air* ordered 15 pre-production Breguet 695s and the first aircraft made an uneventful maiden flight on 3 March 1940.

Breguet 693





The Breguet 690 No 01 prototype makes a low level high speed flypast. Georges Ricard led the team that designed it as a three-seat fighter (*Triplace de Chasse*; C3); however, the *Armée de l'Air* decided to employ the Breguet 690 as a two-seat attack bomber (*Assaut Bombardement – Biplace*; AB2). The aircraft's overall color is unknown, but it is believed to be a light gray. (Breguet)

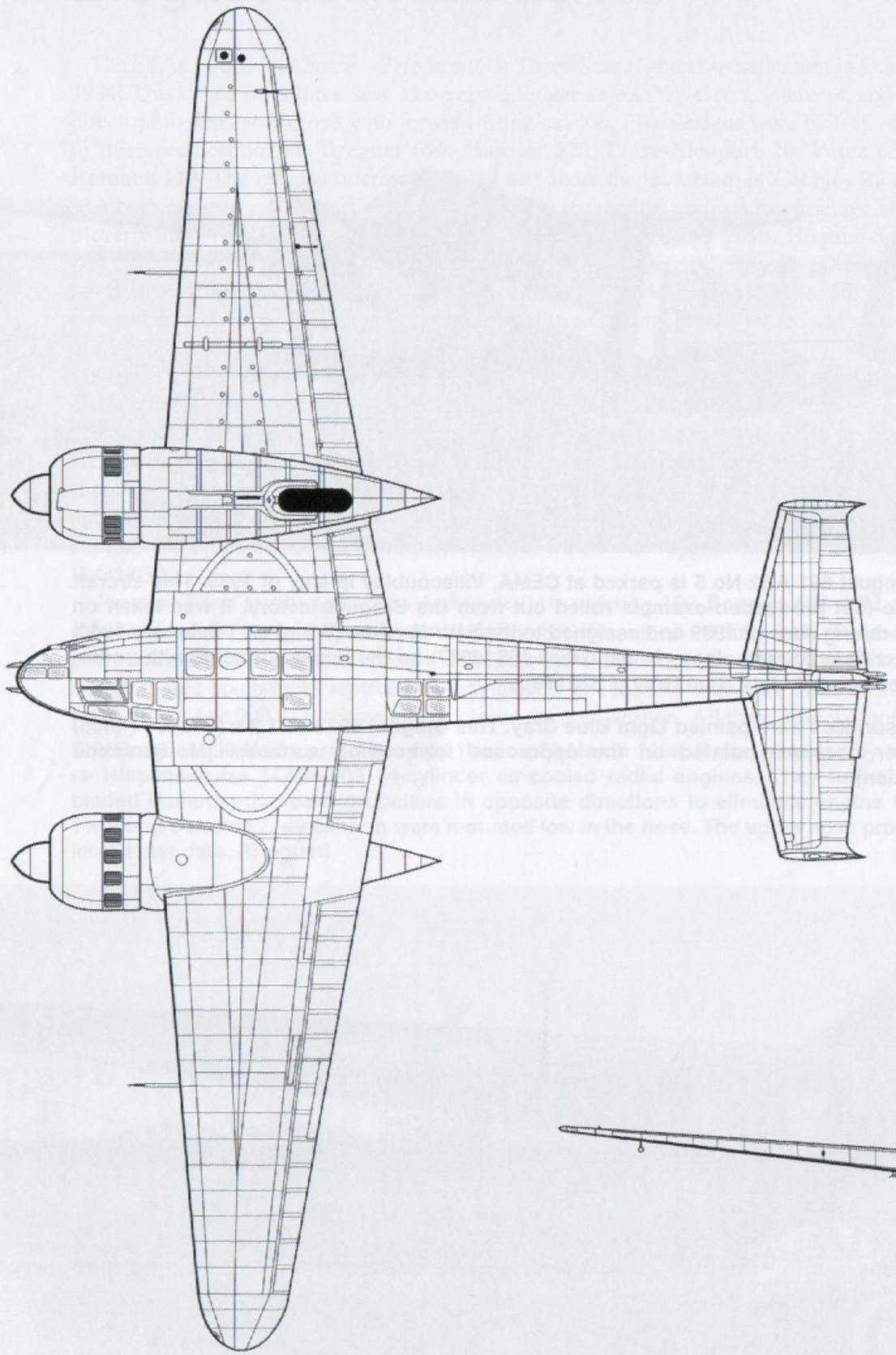


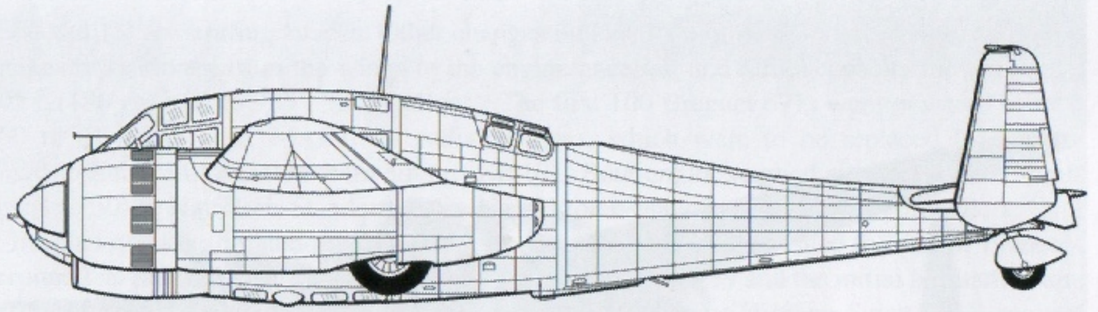
The Breguet 691 AB2 No 5 is parked at CEMA, Villacoublay in May of 1939. This aircraft was the first production example rolled out from the Breguet factory. It was taken on charge during June of 1939 and assigned to the 54th *Escadre* (Wing) on 1 February 1940. The aircraft is painted glossy Khaki Green (FS14087) on the upper surfaces, with under-surfaces painted Light Blue Gray (FS25189).

This factory fresh Breguet 693 AB2 No 2 rests between test flights at Villacoublay in March of 1940. The aircraft was painted in the standard French three-tone upper camouflage of flat Khaki Green (FS24087), Chocolate Brown (FS20117), and Dark Blue Gray (FS36176).

Under surfaces were painted Light Blue Gray. This Breguet 693 has 1.2 M (3 foot 11 inch) diameter *cocardes* painted on the upper and lower wing surfaces. (M. Bénichou Collection)

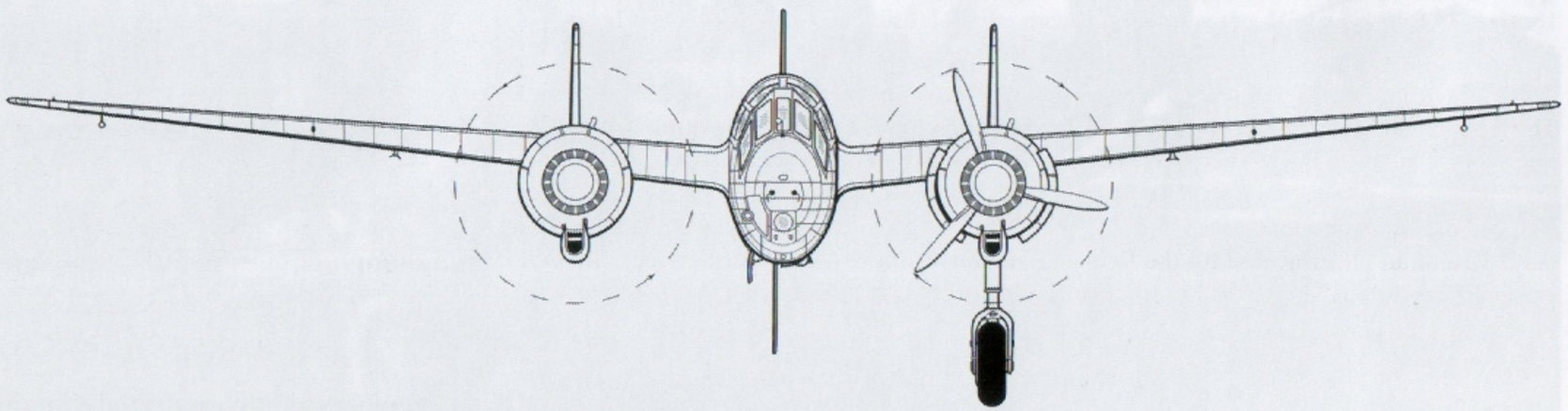






Breguet 693 AB2 Specifications

Wingspan:.....15.4 M (50 feet 6 inches)
Length:.....9.7 M (31 feet 10 inches)
Height:.....3.2 M (10 feet 6 inches)
Wing Area:.....29.2 M^2 (314 square feet)
Empty Weight:.....3006 KG (6627 pounds)
Maximum Weight:..4892 KG (10,785 pounds)
Powerplant:.....Two 700 HP Gnôme & Rhône 14M6 (port)/7 (starboard), 14-cylinder, air-cooled, radial engines.
Armament:.....One fixed, forward-firing, 20MM Hispano-Suiza 404 cannon with 60 rounds, and two fixed, forward-firing, 7.5MM MAC 1934 machine guns with 500 rounds, and one rear-firing 7.5MM MAC 1934 machine gun with 100-round drums. Maximum of 400 KG (882 pounds) of bombs inside the fuselage bomb bay.
Performance:
Maximum Speed:.490 KMH (304 MPH) at 5000 M (16,404 feet)
Service Ceiling:....9500 M (31,168 feet)
Maximum Range:.1350 KM (839 miles)
Crew:.....Two



Breguet 690 Series in Combat

The first production Breguet 691s were delivered to the *Armée de l'Air* in the fall of 1939. The 1st *Escadrille* (Squadron) of *Groupe de Bombardement d'Assaut* (GBA; Assault Bomber Group) I/54 began converting to this bomber in October of 1939, soon followed by the Group's other *Escadrilles*. Both the 51st and 54th *Escadres* (Wings) formed the 6th *Brigade de Bombardement d'Assaut*. On 15 April 1940, this Brigade was disbanded and replaced by *Groupement d'Assaut* (Assault Grouping) No 18 (GBA I/54 and GBA II/54) and *Groupement d'Assaut* No 19 (GBA I/51 and GBA II/51). Breguet 693s became available during this period and *Groupement d'Assaut* No 18 swiftly replaced their Breguet 691s with the newer aircraft.

The *Armée de l'Air* had 19 Breguet 691s and 38 Breguet 693s in front-line units when German forces attacked France and the Low Countries (Belgium, the Netherlands, and Luxemburg) on 10 May 1940. *Armée de l'Air* storage centers held an additional 20 Breguet 691s and nine Breguet 693s at the same time. Twelve Breguet 693s of GBA I/54 flew the type's first combat mission on the evening of 12 May, when they attacked *Wehrmacht* (German Armed Forces) units in the Tongres-Looz-Waremmes area of northeastern France. German anti-aircraft fire shot down eight aircraft over the target. Two other Breguets crashed trying to return to base, while two aircraft returned to base; however, one of these was damaged beyond repair. The rapid German advance forced GBA I/54 to retreat from Montdidier to Etampes and GBA II/54 from Royes to Brétigny, south of Paris, on 16 May. *Groupement d'Assaut* No 19 – equipped with Breguet 693s and Potez 633s – redeployed from Etampes to Briare on the same day. The latter Grouping entered combat on 20 May, when 14 Breguets strafed German columns in the Arras-Cambrai-Bapaume area. Breguet 693s made several attacks on *Panzer* (Armored) forces when the Germans launched an offensive along the Somme River on 5 June. The French aircraft flew 58 sorties and lost only three aircraft in their attempts to halt the German advance.

The final Breguet 693 missions were flown north of Poitiers and also near Châtellereault on 22 June – the day the Franco-German Armistice was signed. The GBAs were assembled at Mont-de-Marsan the next day before they redeployed to Toulouse-Francazal in Unoccupied (Vichy) France. During the Battle of France, the Breguets flew approximately 500 sorties against the Germans with varying degrees of success and heavy losses. The GBAs lost 25 Breguet 691s, 79 Breguet 693s, and two Breguet 695s in action. Production of these aircraft was halted when German troops reached the Villacoublay and Bourges factories. These plants had completed 75 Breguet 691s, 224 Breguet 693s, and 50 Breguet 695s by that time.

Variants

George Ricard and his team considered several derivatives of the basic Breguet 690 airframe. The first variant was the **Breguet 692** AB2, which was to be powered by 980 HP Gnôme & Rhône 14N radial engines. This aircraft remained on the drawing board and was never built. The **Breguet 694** was a three-seat armed reconnaissance aircraft powered by 710 HP Gnôme & Rhône 14M 4/5 radials and armed with only two machine guns. Belgium's SABCA[1] agreed to build 32 aircraft under license for the Belgian *Aviation Militaire* (Army Air Service). Sweden ordered 12 additional aircraft from Breguet. Neither order was fulfilled, but the prototype was

[1]SABCA: *Société Anonyme Belge de Constructions Aéronautiques*; Belgian Aircraft Construction Public Limited Company.



This Breguet 693 (White 2) was assigned to *Groupe de Bombardement d'Assaut* (GBA; Assault Bomber Group) I/51 in 1940. This is the aircraft flown by the Group's commanding officer, which has a composite insignia painted on the aft fuselage. The emblem consists of the phoenix of the 1st *Escadrille* (Squadron) and a trumpeting rabbit of the 2nd *Escadrille*. (CAC)

Breguet 693 No 65 (White IV) was flown by the 2nd *Escadrille* of GBA I/51. The trumpeting rabbit insignia is painted on the vertical stabilizer and the aircraft's individual number on the aft fuselage is the Roman numeral four. This unit began operations on 20 May 1940, when its Breguets strafed German convoys in the Arras-Cambrai-Bapaume area of northeastern France.





A Breguet 693 (White 3) assigned to the 2nd *Escadrille* of GBA I/54 flies over eastern France. The rear gunner has opened his canopy to provide a greater field of fire for his 7.5MM machine gun. This unit flew its first operational mission on the evening of 12 May 1940, when 11 aircraft attacked *Wehrmacht* motorized columns near Tongeren. Eight of these Breguet 693s were shot down. (SHAA)



This Breguet 693 AB2, Red 11 (probably No 1011), flew with the 2nd *Escadrille* of GBA I/51 during the spring of 1940. The Breguet 693 had a maximum speed of 360 KMH (224 MPH) at sea level and 480 KMH (298 MPH) at 5000 M (16,404 feet). It could climb to 4000 M (13,123 feet) in 8.5 minutes. (Valentin Collection)



This Breguet 693 AB2 was assigned to the 1st *Escadrille* of GB I/54. The Roundel Red (FS21105) and Yellow (FS13538) cowling and tail stripes were made mandatory for Vichy aircraft on 24 June 1941. The cowlings were painted with nine stripes each of yellow and red, while both the cowling front sections and the propeller spinners were red. Ss. Lieut. [2/Lt] De La Porte du Theil on the nose commemorated a former pilot killed in action. (Valentin Collection)

completed and initially flown on 20 January 1940. Breguet delivered this aircraft to the *Aéronavale* on 1 June 1940; further details regarding its fate are unknown.

The **Breguet 696** B2 was a two-seat bomber powered by two 700 HP Gnôme & Rhône 14M 6/7 engines. A single prototype first flew on 3 November 1939; however, this project did not progress further. The 17th Breguet 691 was re-engined with 1070 HP Gnôme & Rhône 14N 48/49 radials and redesignated the Breguet 697. It demonstrated outstanding performance from its initial flight at Villacoublay on 19 October 1939. The **Breguet 697** was intended to be the proof of concept aircraft for the **Breguet 700** C2 destroyer (heavy fighter). The French Air Ministry ordered two Breguet 700 prototypes on 17 February 1940, but the German invasion the following May prevented their construction. The **Breguet 698 Bp2** (*Bombardement en piqué – Biplace*; Two-Seat Dive-Bomber) was to be equipped with dive-braking ailerons, but this concept did not pass the design stage. One final variant was the **Breguet 699 B2**, which was basically a Breguet 696 B2 powered by two 825 HP Pratt & Whitney SB4G radial engines. This project did not reach the prototype stage.



The commanding officer of GBA I/54 flew Breguet 693 AB2 No 88 in 1941-42. A composite insignia of the Groupe's two *Escadrilles* – the fighting cock of the 1st *Escadrille* and the crossed guns of the 2nd *Escadrille* – is painted on the aft fuselage. GBA I/54 flew from Lézignan, France from August of 1941 until disbanded in November of 1942. (Valentin Collection)

This Breguet 693 AB2 (Red 13) was assigned to the commanding officer of GBA I/51 at Lézignan in March of 1941. The aircraft had just been repainted with full Vichy markings, including cowling and tail bands. This Breguet 693 is believed to be overall Light Blue Gray, which was unusual for a ground attack aircraft. The bomb bay doors are opened for servicing and loading up to 400 KG (882 pounds) of ordnance. Windows fitted in the bomb doors improved lower visibility for the bomber's crew. (Valentin Collection)



Red 1 was a Breguet 695 AB2 of the 1st *Escadrille* of GBA I/51 during the summer of 1942. This Group was stationed at Lézignan during this period and formed *Groupement* (Grouping) No 18 with GBA I/54. The ventral radio antenna extended in flight and retracted for landing. German forces seized GBA I/51's aircraft in November of 1942 and transferred some Breguet 693s and 695s to Italy.



Bloch 175 B3

French military aviation authorities became aware of the *Armée de l'Air*'s lack of a medium attack bomber in 1936. This aircraft was envisioned to fill the gap between the Breguet 690 light attack bomber and the LeO 45 B4 medium bomber. Henri Deplante led a team at SNCASO[1] that began designing a medium attack bomber in late 1936. Their study led to the **Bloch 170**, a multipurpose aircraft intended to meet the requirements of two categories. One was the AB2 (*Assaut-Bombardement – Biplace*; Two-Seat Attack Bomber), while the other was the A3 (*Reconnaissance d'Armée – Triplace*; Three-Seat Armed Reconnaissance).

The Bloch 170 was an all-metal, low cantilever wing monoplane powered by two 950 HP Gnôme & Rhône 14N6 (port)/7 (starboard) 14-cylinder, air-cooled, radial engines. André Curvale piloted the Bloch 170 No 01 prototype on its maiden flight on 15 February 1938. It made a wheels-up landing on 17 March, which severely injured the pilot. The second prototype was completed and began test flights shortly thereafter. Bloch 170 02 differed from the first prototype in having a longer canopy, deleted ventral gondola, and revised vertical tail surfaces.

The *Ministère de l'Air* (Air Ministry) ordered an initial batch of nine Bloch 170 AB2s from SNCASO when *Plan II* was adopted in October of 1936. The subsequent approval of *Plan V* amended this order in January of 1939 to include one **Bloch 175 B3** (*Bombardement – Triplace*; Three-Seat Bomber). The other eight aircraft under this contract were armed reconnaissance machines: six **Bloch 174 A3**s, one **Bloch 176 A3**, and one **Bloch 177 A3**. The Bloch 174 prototype – powered by two 1030 HP Gnôme & Rhône 14N20/21 radial engines – first flew on 5 January 1939. The Bloch 175 incorporated several major structural changes from the reconnaissance variants, most importantly the repositioning of the wing spars to accommodate a larger bomb bay. The Bloch 175 01 prototype first flew in December of 1939.

The Bloch 175 B3 had a wingspan of 18 M (59 feet 1 inch), a length of 12.3 M (40 feet 4 inches), and a height of 3.6 M (11 feet 10 inches). It weighed 4465 KG (9843 pounds) empty and 8023 KG (17,687 pounds) fully loaded. This machine was powered by two 1140 HP Gnôme & Rhône 14N48 (port)/49 (starboard) 14-cylinder, air-cooled, radial engines. The Bloch 175 B3 had a maximum speed of 540 KMH (336 MPH), a service ceiling of 11,000 m (36,089 feet), and a maximum range of 1800 KM (1118 miles).

This bomber carried a maximum 600 KG (1323 pounds) load in its bomb bay, including three 200 KG (441 pound) or four 100 KG (220 pound) weapons. It was armed with two fixed forward-firing 7.5MM MAC 1934 machine guns with 1000 rounds per gun. Two additional 7.5MM weapons with 100-round ammunition drums per gun were located on a flexible dorsal mount, while three 7.5MM MAC 1934s with 500 rounds fired aft from a fixed ventral position. The aircraft had a crew of three: pilot, bombardier/navigator, and radio operator/rear gunner.

Production of Bloch 174 and 175 aircraft was slow from the beginning. Only one Bloch 174 was built of the 30 aircraft intended for completion on 1 September 1939. That same month, the Air Ministry called for SNCASO to deliver 814 Bloch 175 B3s between November of 1939 and July of 1940; however, this plan proved overly optimistic. The *Armée de l'Air* accepted only one Bloch 174 A3 – powered by 1440 HP Gnôme & Rhône 14N48/49 engines – for service by 1 January 1940. SNCASO built 50 Bloch 174 A3s, which entered squadron service in March of 1940. A revised production schedule was given in February of 1940, which called for the delivery of 660 Bloch 175 B3s and 1550 Bloch 176 B3s between April of 1940 and July of 1941. Production difficulties continued, which resulted in the Bloch 175 B3's first flight not occurring until April of 1940.

SNCASO built 20 Bloch 175s before the German invasion of 10 May 1940; however, none saw combat during the Battle of France. Twelve of these bombers were assigned to *Groupe de Reconnaissance* (GR; Reconnaissance Group) II/52 and two others went to *Groupe Aérien d'Observation* (GAO; Aerial Observation Group) 510. Six remaining Bloch 175s were located at *Armée de l'Air* depots awaiting squadron delivery.

One Bloch 174 was equipped with 1050 HP Pratt & Whitney R-1830 SC3-G radial engines and served as the Bloch 176 prototype. This aircraft first flew in September of 1939 and the initial production aircraft was completed in May of 1940. Only five aircraft were built before the Franco-German Armistice of 22 June 1940. One Bloch 176 A3 was delivered to GR II/52 before the Armistice. The Bloch aircraft were popular with their pilots, due to their good performance and outstanding maneuverability. After the Armistice, GR II/52 redeployed to Oran, Algeria, while GR II/33 flew their five Bloch 176s from Tunis, Tunisia. Allied aircraft destroyed most of GR II/42's Bloch 175s on the ground during the Allied invasion of French North Africa (Operation TORCH) in November of 1942.

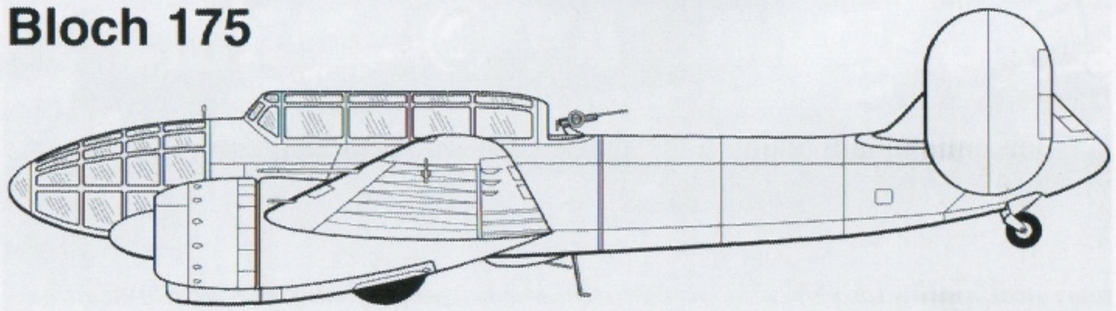
The Bloch 177 used 1600 HP Gnôme & Rhône 14R radials, which were estimated to allow a maximum speed of 700 KMH (435 MPH) for short periods. The sole Bloch 177 first flew in the fall of 1941, but its performance did not reach expectations and no further examples were built.

[1]SNCASO absorbed *Avions* Marcel Bloch during the aircraft industry nationalization in 1936.

The Bloch 170 No 01 was designed as a twin-engine aircraft for either bombing or reconnaissance missions. It featured a cockpit set well forward and a small bomb bay. The ventral gondola was designed to house either a camera or one 7.5MM machine gun. This prototype crash-landed at Villacoublay on 17 March 1938, seriously injuring the test pilot. (Bloch)



Bloch 175





Bloch 175 B3 No 104 (White 12) made a hard landing at Oran-La Sénia, Algeria in 1941. This machine was assigned to the 4th *Escadrille* of *Groupe de Reconnaissance* (GR; Reconnaissance Group) II/52 at this Vichy French base. Allied aircraft destroyed most of this Group's Bloch 175s during Operation TORCH, the Allied invasion of French North Africa on 8 November 1942. (J.J. Petit Collection)



A crew access ladder is extended from the nose of Bloch 175 No 111. This aircraft was flown by the 3rd *Escadrille* of GR II/52 at Oran-La Sénia in 1940-41. The White Vichy fuselage stripe was made into an arrow on this aircraft, with 111 in black on the aft stripe section. The 3rd *Escadrille* insignia – a man's head with a green hat – is painted on the vertical stabilizer.

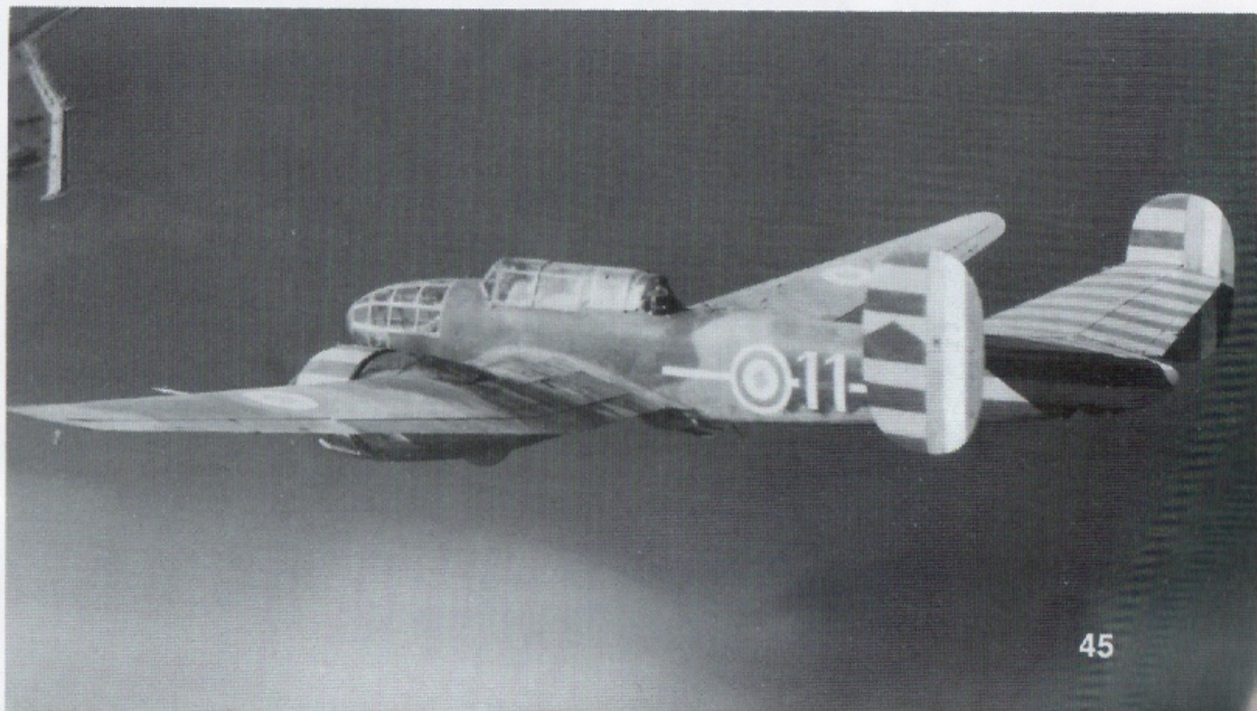
Henri Deplante also conceived the **Bloch 178** high altitude bomber, which was to be powered by two 820 HP Hispano-Suiza 12Y supercharged inline engines. Assembly of the sole example was halted when German forces overran the Courbevoie factory in 1940.

After World War Two ended in 1945, SNCASO designed one final Bloch 175 variant for the French *Aéronavale*. The **SO 175T** (*Torpillage*; Torpedoing) was intended to fly both torpedo bombing and Anti-Submarine Warfare (ASW) missions. The *Aéronavale* ordered 100 aircraft, but only 80 were completed due to budget cuts. These SO 175Ts were delivered between 1946 and 1950 and served with the *Aéronavale* until 1953.

Bloch 175 B3 No 115 was another aircraft assigned to the 3rd *Escadrille* of GR II/52. It is painted in the standard three-tone upper surface camouflage, with Roundel Red and Yellow Vichy tail and cowling stripes. The pilot's canopy is open, while two 7.5MM MAC 1934 machine guns are mounted at the rear canopy position. (M. Bénichou Collection)

Bloch 175 B3 No 116 (White 11) flies with the 4th *Escadrille* of GR II/52 in late 1941 or 1942. Its armament consisted of seven 7.5MM MAC 1934 machine guns: two fixed to fire forward, two more on a flexible dorsal mount, and three aft-firing guns in the ventral position. The Bloch 175's bomb bay held up to 600 KG (1323 pounds) of ordnance, which usually consisted of three 200 KG (441 pound) or four 100 KG (220 pound) bombs. (P. Gaillard Collection)





Amiot 350 B4 Series

The **Amiot 341** long-range postal aircraft was considered the perfection of French aircraft design when it was demonstrated at the 1936 *Salon de l'Aviation* (Air Show) in Paris. Amiot's Jean Calvy supervised its design by engineers Lambert and Girodin. The designers developed the Amiot 341 into the **Amiot 370**, which was designed to compete in a 1937 race between New York and Paris. The *Ministère de l'Air* (Air Ministry) later cancelled the race attempt as too risky, but the aircraft was completed and first flew at Istres on 25 July 1937. It was powered by two 860 HP Hispano-Suiza 12Yjrs (port)/Ykrs (starboard) 12-cylinder, liquid-cooled, inline engines.

The Amiot 370 flew a series of record-braking flights, beginning on 8 February 1938, when it established four world speed records over a 2000 KM (1243 mile) course. Crewed by *Commandant* (Major) Maurice Rossi as pilot and M. Vigroux as navigator, it flew the circuit unloaded at an average speed of 437 KMH (272 MPH). This aircraft also set records while flying the course with 500 KG (1102 pound), 1000 KG (2205 pound), and 2000 KG (4409 pound) loads. The Amiot 370 – with the same crew – broke three world records over a 5000 KM (3107 mile) closed course on 8 June 1938. This aircraft averaged 401 KMH (249 MPH) without load and set marks while carrying 500 KG and 1000 KG loads. On 15-16 August 1939, Rossi and radio operator M. Emont flew the Amiot 370 when it broke the straight-line distance record. This aircraft flew 10,000 KM (6214 miles) in 33 hours at an average speed of 311 KMH (193 MPH).

A parallel development of the Amiot 370 was the **Amiot 340**, a three-seat high performance bomber. It was powered by two 920 HP Gnôme & Rhône 14P 14-cylinder, air-cooled, radial engines. This aircraft made its maiden flight from Istres on 6 December 1937. Early test flights were highly successful and demonstrated its sound design, but concern over the 14P engines' reliability led to their replacement by 920 HP 14N01/02 powerplants. The re-engined Amiot 340 No 01 was flown from Istres to the *Centre d'Essais du Matériel Aérien* (CEMA; Air Material Research Center) at Villacoublay, near Paris, for official trials on 21 March 1938.

Service Technique Aéronautique (STAé; Aeronautical Technical Service) technicians requested a few modifications as a result of the official test program. These included adding a fourth crew station and installing contoured engine cowlings to reduce drag. Before Amiot could make these improvements, the aircraft was used for an unscheduled propaganda flight. *General* Ernst Udet, director of the Reich Air Ministry's Technical Office, invited *Général* Joseph Vuillemin, *Chef d'Etat-major de l'Armée de l'Air* (French Chief of Air Staff), to visit Germany. Vuillemin decided to fly to Germany in the Amiot 340 prototype, which was stripped of its prototype markings. (This would lead the Germans to believe this aircraft was in squadron service.) The Amiot 340 flew from Villacoublay to Berlin on 16 August 1938, averaging 440 KMH (273 MPH) on this journey. Général Vuillemin flew back to France five days later and the Amiot 340 No 01 soon resumed its flight test program.

The modifications STAé technicians requested were made and the aircraft was re-engined with 1020 HP Gnôme & Rhône 14N20/21 radial engines. A twin fin tail assembly replaced the earlier single vertical tail and space was made for a fourth crew member aft of the bomb bay. These changes resulted in the aircraft's redesignation as the **Amiot 351** No 01, which first flew in this configuration on 21 January 1939.

Calvy and his design team redesigned the airframe to simplify mass production and to allow the installation of various engines and tail assemblies. The **Amiot 350** was intended to use two 920 HP Hispano-Suiza 12Y28/29 12-cylinder, liquid-cooled, inline engines. Production Amiot 351s were to be powered by two 950 HP Gnôme & Rhône 14N38/39 engines, while the **Amiot 352** would receive two 1100 HP Hispano-Suiza 12Y50/51s. The 1030 HP Rolls-Royce Merlin III 12-cylinder, liquid-cooled, inline engine was selected for the **Amiot 353**, while new 1070 HP Gnôme & Rhône 14N48/49 radials would go into the **Amiot 354**. The **Amiot 355** was to use 1030 HP Gnôme & Rhône 14Ps and 1130 HP Rolls-Royce Merlin Xs would power the **Amiot 356**. The Amiot 354 and 356 had single fin vertical stabilizers; the others had twin-fin tails.

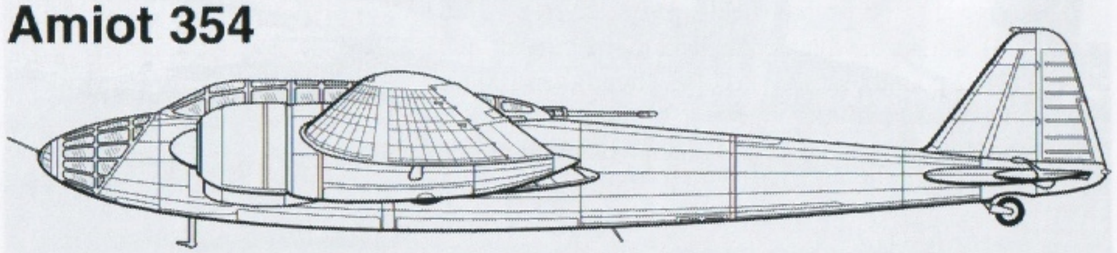
Amiot 350 production series bombers differed from the Amiot 351 prototype in several ways. Its wing span was reduced from 23 M (75 feet 6 inches) to 22.8 M (74 feet 10 inches), while its wing area decreased from 67.5 M^2 (727 square feet) to 67 M^2 (721 square feet). The length was increased from 14 M (45 feet 11 inches) to 14.5 M (47 feet 7 inches), while the height remained at 4.5 M (14 feet 9 inches). The canopy was lengthened and moved from the prototype's port offset position to the centerline. Fuselages were made in three interchangeable sections: front, center, and tail. Six fuel tanks with a total capacity of 2798 L (739 gallons) were located in the wings. The defensive armament consisted of single 7.5MM MAC 1934 machine guns in the nose and ventral positions and one 20MM Hispano-Suiza HS 404 cannon in the dorsal turret.

The *Ministère de l'Air* (Air Ministry) placed the initial production contract in 1938, which called for 20 **Amiot 350 B4**s (*Bombardement – Quadriplace*; Four-Seat Bomber) to be deliv-

The sleek Amiot 370 lands at Istres after a test flight. Its cockpit was faired into the streamlined nose glazing, similar to the Heinkel He 111. This aircraft made its maiden flight on 25 July 1937 and was developed in parallel with the Amiot 340 bomber. *Commandant* (Maj) Maurice Rossi flew the Amiot 370 on a series of record-breaking flights in 1938 and 1939.



Amiot 354

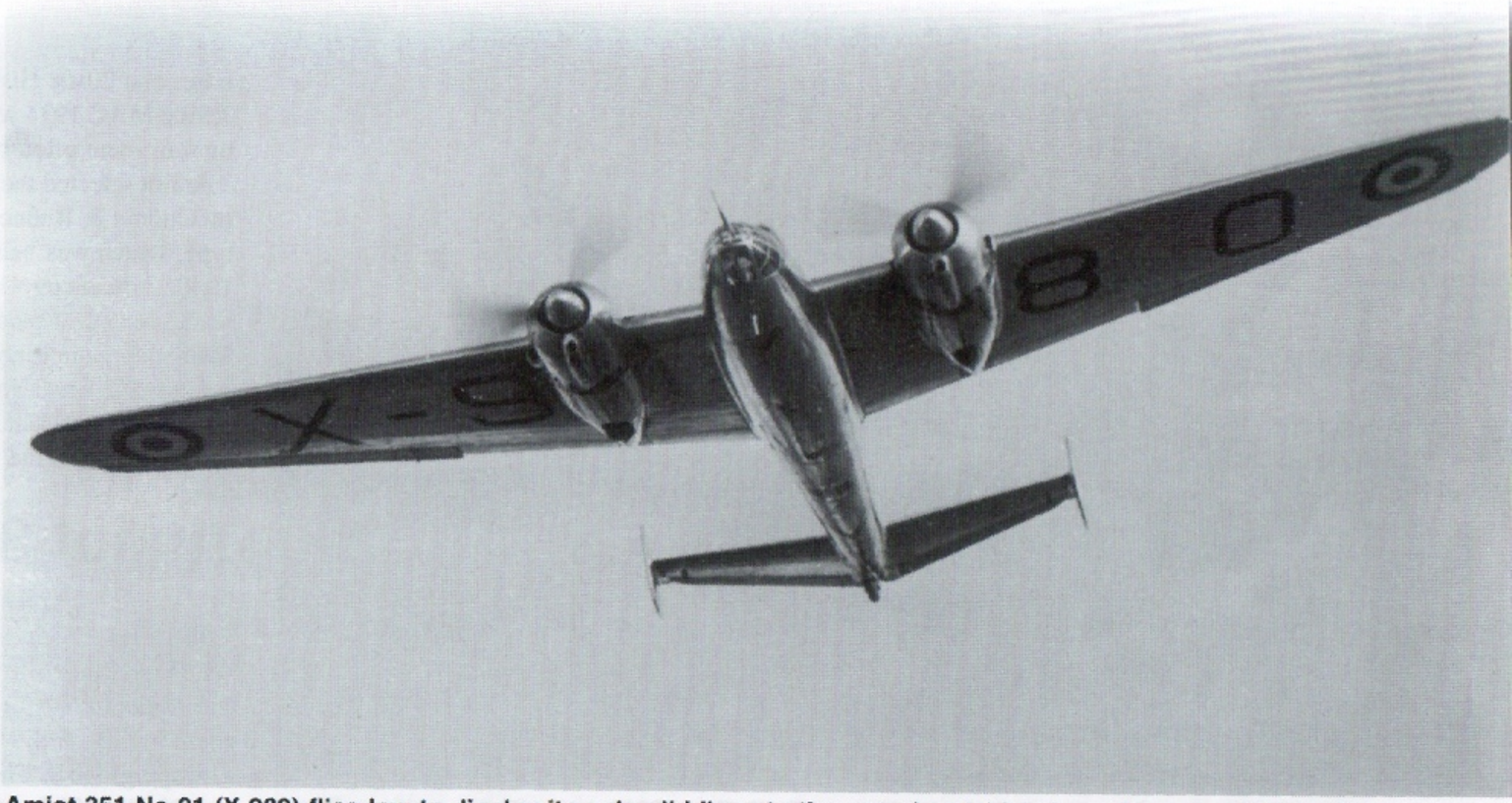


ered by 1 April 1939. Three weeks later, this agreement was amended to add 100 **Amiot 351 B4**s. The contract was soon modified to include 45 Amiot 350s and 75 Amiot 351s, due to overheating problems with the Amiot 351's Gnôme & Rhône 14N engines. The *Ministère de l'Air* placed a second contract for 165 additional Amiot 350 series aircraft in January of 1939. It was then clear that Hispano-Suiza engine production lagged behind demand and the first agreement was amended include 60 Amiot 351s and 60 Amiot 353s. A modification to the second contract specified 30 Amiot 351s, 100 Amiot 353s, and 35 Amiot 356s. On 17 June 1939, a third contract was placed for 212 additional Amiot bombers to meet *Plan V Renforcé* requirements. The Amiot 350 was not put into production and the first two Amiot 351s were completed in the summer of 1939. Their great differences from the prototype required aircraft Nos 1 and 2 to undergo full flight tests at CEMA from 3 November 1939. Minor modifications were made as a result of these tests.

Air Ministry production contracts were modified on 1 December 1939 to include 880 Amiot bombers: 140 Amiot 351s, 560 Amiot 352s, 100 Amiot 353s, 40 Amiot 354s, and 40 Amiot 356s. None of these variants was produced in sufficient quantities. The *Armée de l'Air* had accepted only five Amiot bombers by January of 1940 and this rose to only 17 aircraft by 1 March – well short of the 80 aircraft expected by that date. Eleven of these bombers lacked the 20MM cannon, which was replaced by three 7.5MM Darne machine guns as an interim measure. The HS 404 cannon was not installed until the 47th Amiot bomber was completed. By 1 April 1940, only 21 Amiot 350 series aircraft were in the *Armée de l'Air* inventory, against the scheduled 285 machines. This total increased to only 37 aircraft one month later. Despite the shortfalls, some *Groupes de Bombardement* (Bomber Groups) began converting to the new aircraft.

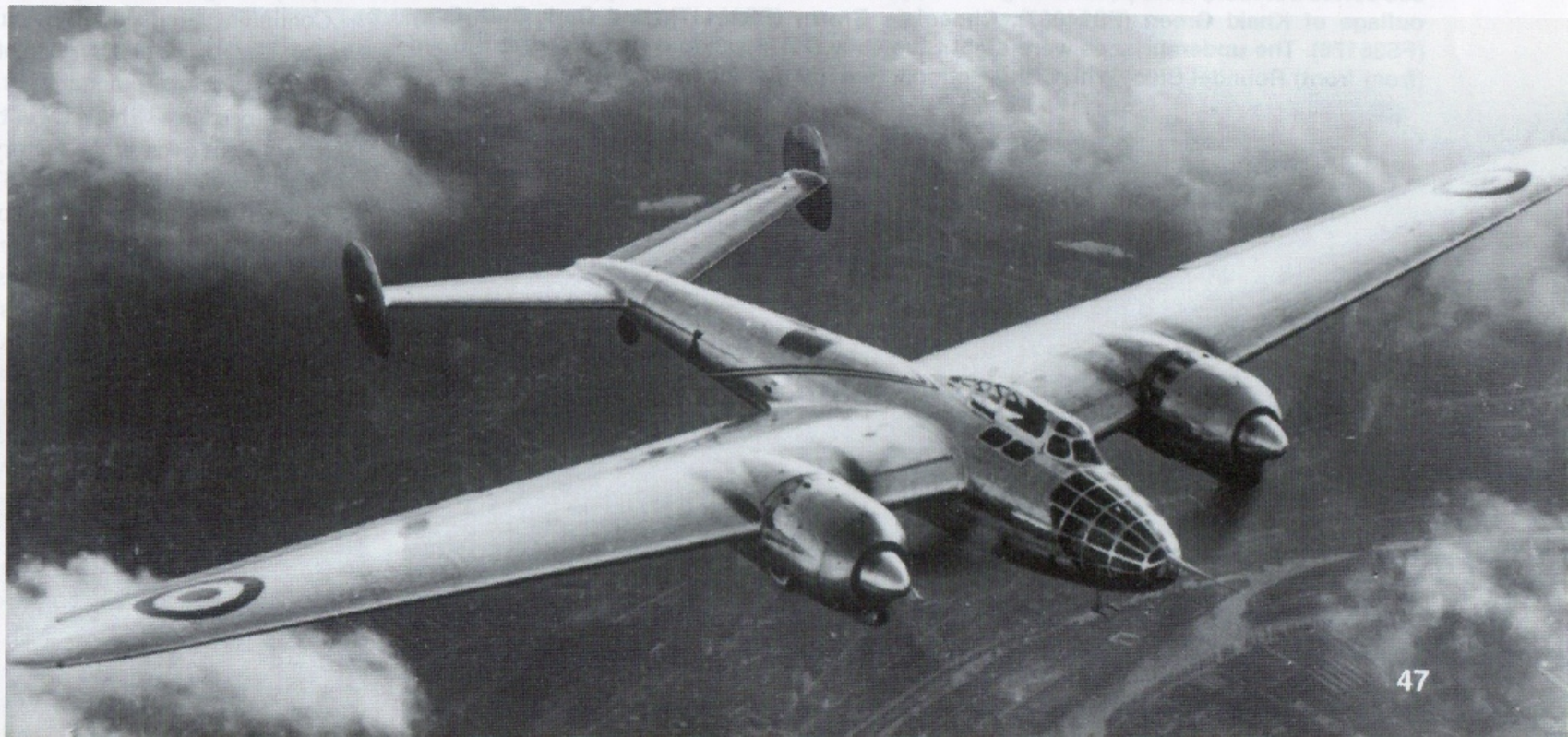
The Amiot 354 B4 had a wingspan of 22.8 M (74 feet 10 inches), a wing area of 67 M^2 (721 square feet), a length of 14.5 M (47 feet 7 inches), and a height of 4.5 M (14 feet 9 inches). Its empty weight was 4719 KG (10,403 pounds), while its maximum weight was 11,285 KG (24,879 pounds). This variant's powerplant consisted of two 1060 HP Gnôme & Rhône 14N48/49 14-cylinder, air-cooled, radial engines. The bomber had a maximum speed of 480 KMH (298 MPH) at 4000 M (13,123 feet), a service ceiling of 10,000 M (32,808 feet), and a maximum range of 2500 KM (1553 miles).

This aircraft's bomb bay held up to 1250 KG (2756 pounds) of ordnance, which came in combinations of two 500 KG (1102 pound), six 200 KG (441 pound), ten 100 KG (220 pound), twenty 50 KG (110 pound), or eighty 10 KG (22 pound) bombs. Defensive armament consisted of one 7.5MM MAC 1934 machine gun with 500 rounds in the



Amiot 351 No 01 (X-980) flies low to display its splendid lines to the crowd watching from the ground. This aircraft was converted from the Amiot 340 No 01 and was powered by two 1020 HP Gnôme & Rhône 14N20/21 radial engines. Provision was also made for an additional gunner with a 7.5MM MAC 1934 machine gun through a ventral hatch aft of the bomb bay. (P. Gaillard Collection)

The Amiot 351 prototype was equipped with a twin fin tail unit when it was evaluated at the end of 1938. These fins were found to be too small and new enlarged fins were designed. The red *cocotte* (paper horse) emblem painted on the fuselage was the personal insignia of *Général* Joseph Vuillemin, *Armée de l'Air* chief of staff. Vuillemin flew this aircraft on his visit to Germany in August of 1938. (P. Gaillard Collection)





This factory fresh Amiot 354 is fitted with a twin fin tail assembly, but its armament has not yet been installed. The aircraft appears to have been painted overall glossy Dark Green (FS24058), with natural metal engine cowlings and propeller spinners. On 1 December 1939, the French Air Ministry had 880 different Amiot bomber variants on order: 140 Amiot 351s, 560 Amiot 352s, 100 Amiot 353s, 40 Amiot 354s, and 40 Amiot 356s. (P. Gaillard Collection)

This unidentified Amiot 354 was built with the definitive single tail fin. It and most Amiot 350 series bombers were painted with the standard French three-tone upper surface camouflage of Khaki Green (FS24087), Chocolate Brown (FS20117), and Dark Blue Gray (FS36176). The undersurfaces were Light Blue Gray (FS25189) and rudders were striped (from front) Roundel Blue, White, and Roundel Red. (M. Bénichou Collection)



nose, one 20MM Hispano-Suiza HS 404 cannon with 120 rounds on a dorsal mount, and one 7.5MM MAC 1934 weapon with 800 rounds in the ventral position. The Amiot 354 was crewed by four men: pilot, bombardier/navigator, dorsal gunner, and radio operator/ventral gunner.

Amiot selected the 12th production aircraft from the assembly line to be fitted with two 1200 HP Gnôme & Rhône 14R2/3 supercharged radial engines. This became the Amiot 355 prototype, which was being prepared for flight testing at Le Bourget airfield near Paris in June of 1940. Advancing German forces resulted in this aircraft's hasty flight south to Pau before being placed in storage at Clermont-Ferrand. Amiot 356 No 01 made its initial flight from Villacoublay in early June of 1940. It was soon evacuated to Toulouse, where it remained. The **Amiot 357** was a high-altitude pressurized bomber powered by two 1200 HP Hispano-Suiza 12Z turbo-supercharged engines. It was nearing completion at Le Bourget when German forces occupied the factory on 14 June 1940.

Amiot 351/354 in Combat

Several *Groupes de Bombardement* began converting from older Bloch 210s to Amiot 351/354 bombers in the spring of 1940. GB I/34 and GB II/34 at Montbard each received a single Amiot on 7 April. GB I/21 and GB II/21 at Avignon-Châteaublanc had six Amiots between them by 10 May. These four *Groupes* formed *Groupement de Bombardement* (Bomber Grouping) No 9. The 21st *Escadre* lacked sufficient Amiots for full reequipment and retained the Bloch 210s for night bombing missions. *Groupement de Bombardement* No 9's squadrons were thrown into battle as soon as their Amiots were combat ready, while simultaneously transitioning into the new bombers.

The first operational Amiot 351/354 mission was an armed reconnaissance operation over Maastricht, the Netherlands, on the evening of 16-17 May 1940. Both Wings assembled at Ferté-Gaucher on 19 May for both transition training and sporadic combat missions with the new Amiot aircraft. The German advance prompted *Groupement de Bombardement* No 9 to redeploy to Agen and Bergerac with their remaining aircraft on 15 June.

Continuing production difficulties slowed Amiot bomber deliveries during the Battle of France. The *Armée de l'Air* had officially accepted only 61 Amiot 351/354 bombers on charge by 20 June. Several other aircraft were delivered to operational units without complying with official procedures. SNCAC[1] is believed to have completed 80 to 85 Amiot bombers before German forces overran the factory on 14 June.

The four Groups flew their 37 Amiot 351s/354s across the Mediterranean Sea to Oran, Algeria on 20 June. One of the bombers was lost en route, but the remaining 36 safely arrived in North Africa. *Groupement de Bombardement* No 9 moved from Oran to Kalaa-Djerda, Tunisia two days later in readiness to attack targets in Italy. (Italy declared war on France on 11 June.) No operational missions were flown before the Franco-German Armistice was signed on 22 June. Only 41 Amiot 351s/354s survived this campaign, including 35 in North Africa (two of the 37 were written off in accidents) and seven more in France.

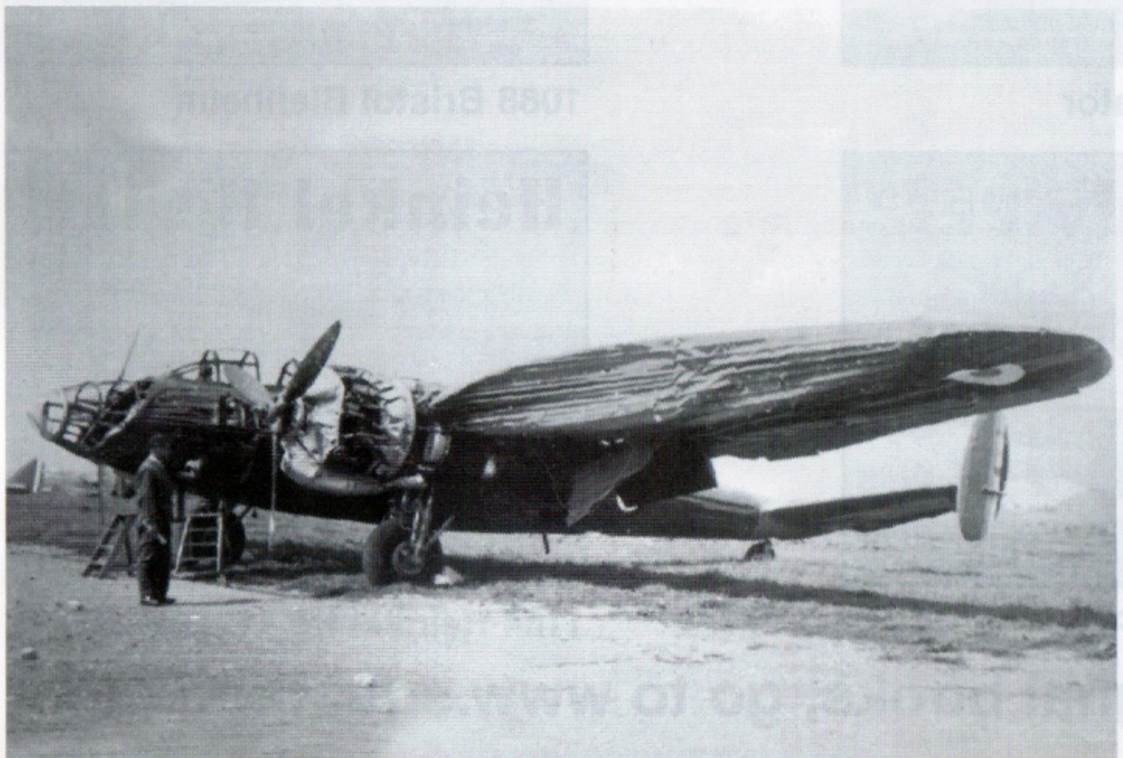
In April of 1941, German occupation authorities allowed the Vichy Government to operate monthly liaison flights between Unoccupied France and French colonies in Africa. Five Amiot aircraft – three Amiot 354s, one Amiot 356, and one Amiot 370 – had their military equipment removed, were allocated civil registrations, and then delivered to Air France. Service began when the Amiot 370 (F-AREU) flew 5500 KM (3418 miles) from Marignane, near Marseilles, to Djibouti, via Athens, Greece on 22-23 July. These flights ended after German forces occupied Vichy France in November of 1942.

[1]Amiot was absorbed into SNCAC during the nationalization of France's aircraft industry in 1936.



Amiot 354 B4 No 10 was delivered to the *Armée de l'Air* on 6 February 1940. Its engine cowlings appear to be either in natural metal or painted a bright color for testing. The *Armée de l'Air* then assigned the Amiot 354 to the *Centre d'Instruction au Bombardement* (CIB; Bombing Training Center) at Toulouse. This Amiot 354 was converted to Amiot 356 configuration – with two 1130 HP Rolls-Royce Merlin X inline engines – at Clermont Ferrant-Aulnat in October of 1942. The Germans seized this aircraft in November of 1942 and its fate is unknown. (P. Gaillard Collection)

The Luftwaffe executed a major bombing raid on the Paris area (Operation PAULA) on 3 June 1940. The primary targets included Le Bourget airfield, where the Amiot 350 series assembly line was located. The German raid killed ten workers and damaged two aircraft beyond repair. Among those aircraft lost was Amiot 354 No 85, whose port wing sustained major damage



An Amiot 354 assigned to GB II/34 is parked at Pont-sur-Yonne in May of 1940. The 34th *Escadre* received their first Amiots on 7 April to replace obsolete Amiot 143Ms. A canvas cover placed over the long canopy prevented glint from giving away this bomber's position to German aircraft. Two Amiot 143Ms (including White 6) are dispersed in the background.



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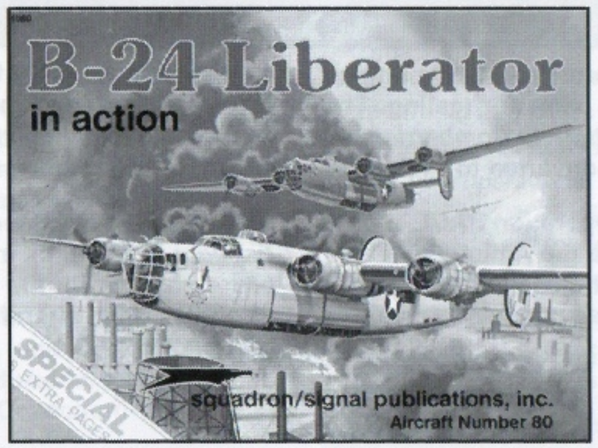
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(Above) This Amiot 143M, White 7 (No. 118/E-349), was assigned to the 4th *Escadrille* of GB II/35 in 1938. The *Escadre* was based at Lyon-Bron and was one of four *Armeé de l'Air* Wings equipped with this bomber before World War Two.

(Below) A Breguet 693, White 7 (No. 1013), heads to attack German forces in northeastern France in June of 1940. This aircraft flew with the 4th *Escadrille* of GBA II/54 at Nangis. LA SULFATEUSE (slang for Machine Gun) is painted above the Squadron's wasp insignia.

Don Greer