

# DATABASE

## MORANE-SAULNIER MS406

WORDS: TONY HOLMES



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**ABOVE:** Finnish Air Force MS406C-1 serial MS-308 serving with 1/LLv 28 at Joensuu. SA-KUVA

**Page 82** "THE BEST FIGHTER IN THE WORLD"

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# Development

The Morane-Saulnier fighter was a competitive, if flawed, machine when it first appeared

**T**he MS406 could trace its lineage back to 1934, when Morane-Saulnier designer Paul-René Gauthier created a cantilevered low-wing monoplane interceptor at the company's Puteaux plant to fulfil a specification issued to the French aircraft industry by the Service Technique de l'Aéronautique (STAé) for a single-seat fighter. The machine had to be armed with either one or two 20mm cannon and be capable of achieving a speed of 280mph (450km/h) at an altitude of 13,125ft (4,000m).

The STAé specification generated quite a response from the French aircraft industry, and no fewer than five designs were selected to progress to prototype stage — the Bloch MB150, the Dewoitine D513, the Loire 250, the Morane-Saulnier MS405 and the Nieuport Ni160. Three of the five designs, including the MS405, proposed the use of the 860hp liquid-cooled Hispano-Suiza 12Y engine with a single engine-mounted 20mm cannon and two wing-mounted 7.5mm machine guns.

Considered an interim fighter until more advanced types came off the drawing boards, the MS405 was built around the Hispano-Suiza 12Ygrs 12-cylinder liquid-cooled engine, which produced 860hp at an altitude of 13,125ft (4,000m). It was to be armed with one 20mm Hispano S7 cannon mounted between the cylinder banks and firing through the propeller hub, and two drum-fed 7.5mm MAC 1934 machine guns in the wings.

The prototype was built at Puteaux and assembled at Villacoublay, where flight-testing was commenced by famed aerobatic pilot Michel Détrouyat in 8 August 1935. Following initial trials with Morane-Saulnier, MS405 number 01 was handed over to the Centre d'Essais du Matériel (CEMA) at Villacoublay

on 20 February 1936. A lengthy series of flights took place through to the end of 1937, by which time 01 had chalked up more than 300 flying hours. During this time the MS405 had revealed its sturdiness, pleasant handling characteristics and good control in a dive.

However, it was not devoid of defects, none of which would be eradicated. In particular, the semi-retractable ventral radiator was the source of many problems. When lowered it caused pronounced drag that dramatically reduced the top speed, and when it was raised the engine overheated so much that it could not be pushed to its full power. The undercarriage, having no locking device, was prone to lower in hard turns or dive recoveries — no small handicap in a dogfight. As the official technical services did not consider it essential to provide heating for the wing machine guns, they froze above 13,125ft (4,000m), which was the usual combat altitude in 1940. Like all combat aircraft of its era the MS405-01 had no armour — not even an armoured windshield — and no self-sealing tanks, while its complex and vulnerable electrical and hydraulic systems would prove to be another Achilles' heel.

In spite of these issues, as early as November 1936 it had become obvious that the MS405 was the winning design in the STAé competition, although Morane-Saulnier had to wait until 1 March 1937 to receive an order for 16 pre-production examples from the Ministère de l'Air. Orders for production-standard fighters would follow in April (50 aircraft) and August (80).

By then the designation MS406 had been assigned to the proposed production model, the fourth pre-production MS405 being completed as MS406 number 4. Like front-line examples that eventually reached the Armée de l'Air, this aircraft was fitted



with a Hispano-Suiza 12Y31 engine driving a variable-pitch Chauvière 351M propeller — the latter was replaced by a constant-speed Ratier 1607 on production MS406s.

In June 1937 Détrouyat displayed the MS405-01 at the international meeting at Bruxelles-Évère, where it was optimistically presented as "the best fighter in the world". It might not have been the best, but it was

**BELOW: When it was shown at the international air display at Brussels-Évère in July 1937, the MS405 was hailed as the "best fighter in the world".**

VIA CHRISTIAN-JACQUES EHRENGARDT





**ABOVE: The MS406 factory at Angers is a hive of activity in this May 1939 photograph, taken during the visit of French Air Minister Guy La Chambre.** AGENCE TRAMPUS VIA BARTEK BELCARZ

surely one of the fastest, as Détroyat returned to Puteaux at an average speed of 270mph (430km/h) — quite an achievement at that time. Alas, the reputation was short-lived.

After completing more than 300 hours of test flying, the MS405-01 was utilised by Morane-Saulnier to solicit export orders for the fighter until it was written off in a crash at Villacoublay on 8 December 1937 while being flown by a Lithuanian pilot.

By the spring of 1938, the Ministère de l'Air began to attach considerable urgency to the introduction of the MS406 into front-line service. MS406 number 1 first flew on 20 May 1938, and the last of the 16 pre-production machines finally took to the air on 21 June 1938 almost three years after the initiation of flight-testing. This served as a pattern aircraft for the production model. The Armée de l'Air was lagging so far behind in re-equipping its fighter units with modern types that no fewer than 1,082 MS406s were ordered within a few weeks.

In order to accommodate these numbers, production was to have to be split between several recently nationalised companies: the Société Nationale de Construction Aéronautiques de l'Ouest (SNAO), the Société Nationale de Construction Aéronautiques

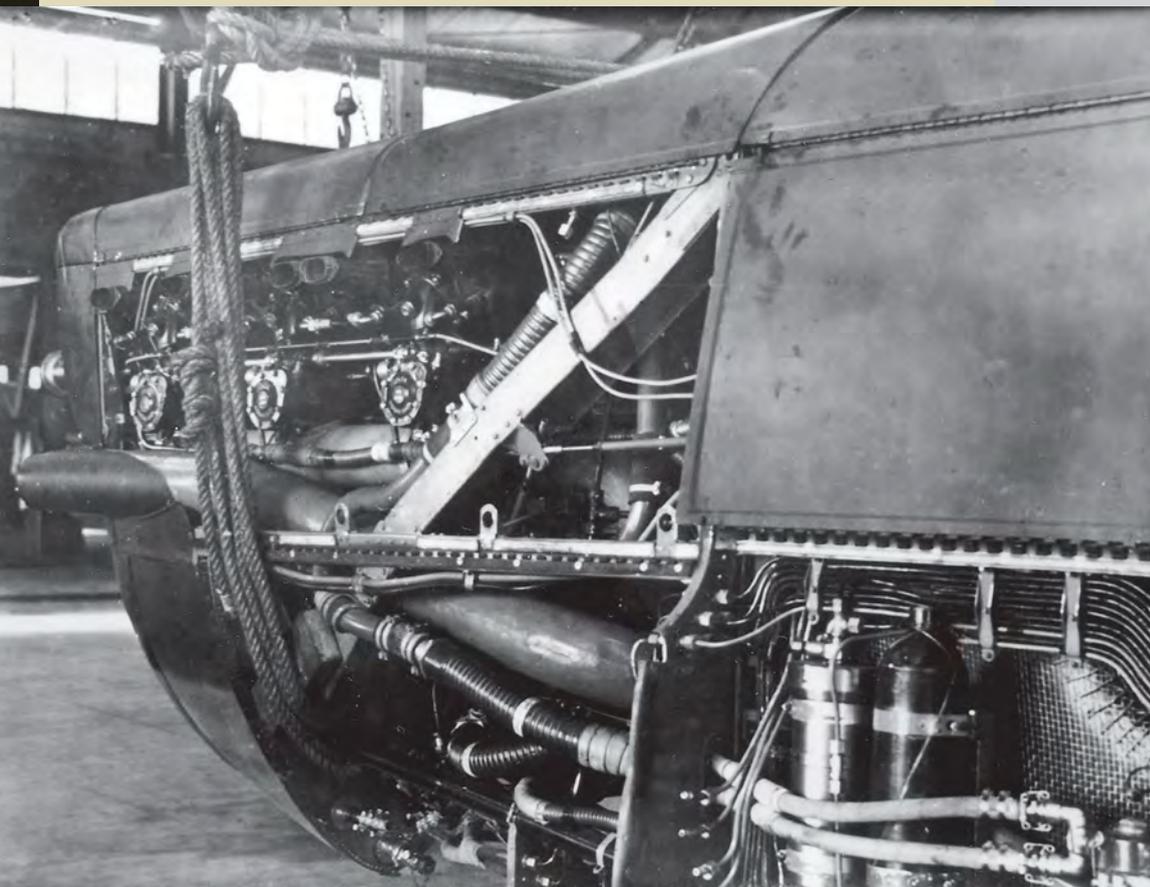
du Midi (SNCAM) and the Société Nationale de Construction Aéronautiques du Centre (SNCAC). Although 11 factories would indeed manufacture parts for the MS406, the Ministère de l'Air quickly realised that there were considerable savings to be made

if the aircraft were assembled on a single production line. All contracts for aircraft after MS406 number 65 with SNCAM and SNCAC were duly cancelled in January 1939, and production moved exclusively to the SNAO plant at Nantes-Bouguenais. **A**



**ABOVE: Fresh from the factory, two MS406s rev up on the SNCASO tarmac before their maiden flights in May 1939. The aviator securing his helmet is Michel Détroyat, Morane-Saulnier's chief test pilot and a renowned aerobatic performer in Morane aircraft between the wars.** VIA CHRISTIAN-JACQUES EHRENGARDT

# Technical Details



**ABOVE:** The engine cowlings of this MS406 have been removed to reveal the 36-litre, water-cooled Hispano-Suiza 12Y31 engine, and its associated 'plumbing'. VIA BARTEK BELCARZ



**ABOVE:** A detailed cockpit view of captured MS406 number 1013, found by German troops at Dreux in June 1940. The Morane fighter had a unique 'wraparound' layout to its instrument panel not seen in other contemporary types. VIA BARTEK BELCARZ

Had the MS406 been easier to build, more would have been available in 1940

**U**nlike the other rival designs for the French fighter requirement, which employed all-metal stressed-skin monocoque structures, the MS405 and subsequent MS406 represented a more conservative structural approach to the fighter

requirement by retaining classic steel-tube construction with a fabric-covered aft fuselage and control surfaces. However, the wings and central and forward fuselage featured Plymax (okoumé plywood and aluminium bonded together) stressed skinning. They also incorporated 'novel' features

such as a retractable undercarriage, an enclosed cockpit, landing flaps and a variable-pitch propeller, equipment usually regarded by old-time pilots of the day as 'gadgets'.

Despite its simple structure, the MS406 required twice as many man-hours as the Messerschmitt Bf 109 to be assembled (1,600) — as many as the Spitfire I, which was reputed to be an industrial nightmare to build. This further delayed French fighter units' conversion to the type. Moreover, companies manufacturing essential parts such as propellers and gunsights created bottlenecks because of their low output. Nevertheless, a grand total of 1,077 (this very number is still an issue for debate) MS406s were taken on charge by the Armée de l'Air before the armistice of June 1940.

Minor modifications were made following feedback from front-line units. From January 1939, all aircraft received undercarriage strengthening, and during the following summer a turn-over pylon was introduced as standard. The Hispano-Suiza S9 cannon originally fitted to early MS406s was replaced with the faster-firing HS 404 weapon from March 1939. Finally, rudimentary pilot armour was provided for fighters in operational service.

## MS406C-1 specifications

### POWERPLANT

One Hispano-Suiza 12Y31, 860hp

### DIMENSIONS

Length: 26ft 9.25in (8.16m)  
Height: 9ft 3.75in (2.84m)  
Span: 34ft 9.75in (10.61m)

### WEIGHTS

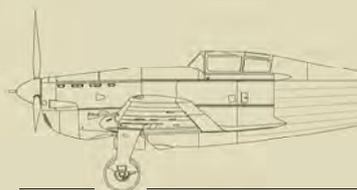
Empty: 4,173lb (1,893kg)  
Loaded: 6,000lb (2,722kg)

### PERFORMANCE

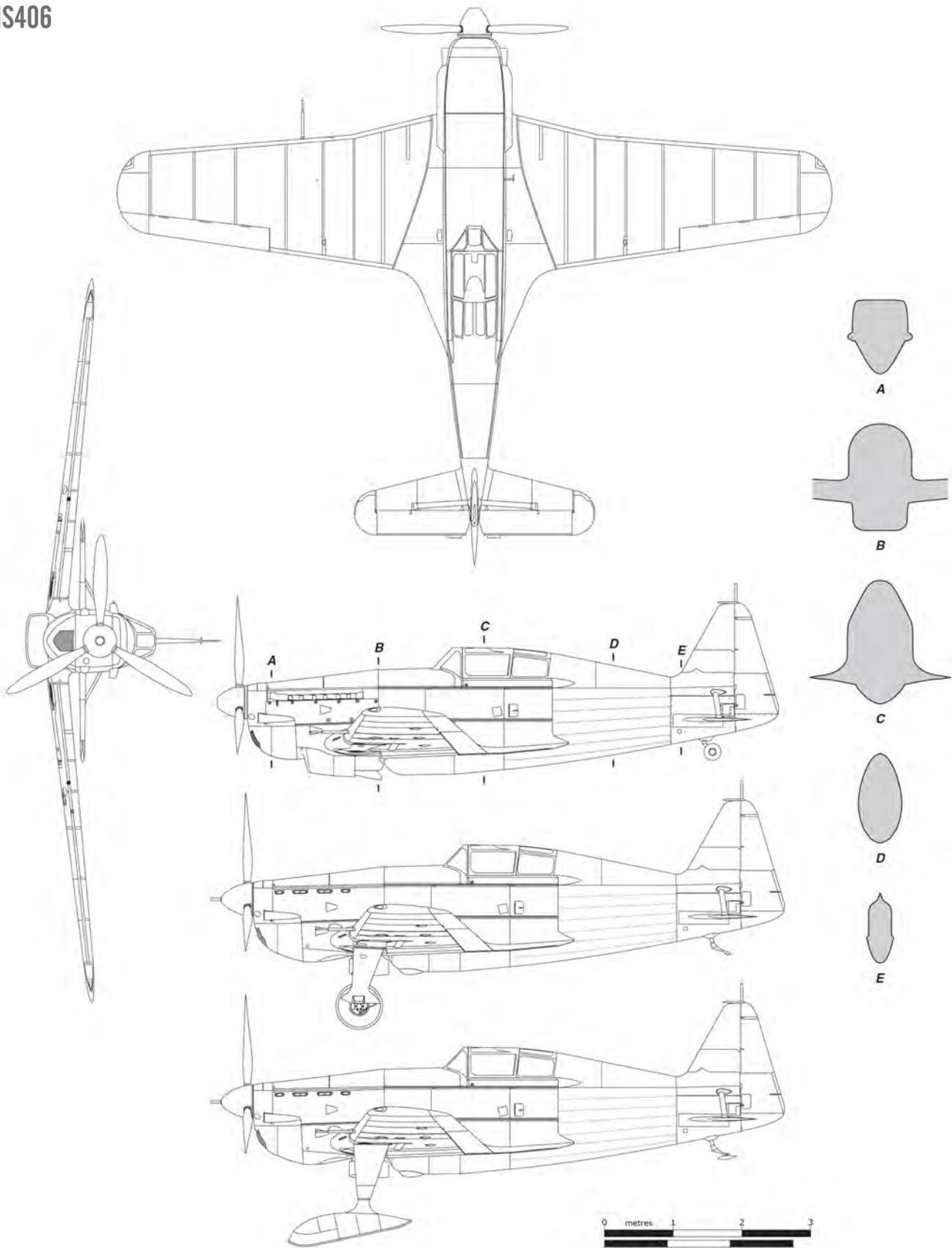
Maximum speed: 302mph (486km/h)  
Range: 466 miles (750km)

### ARMAMENT

One 20mm Hispano-Suiza HS 404 cannon firing through propeller hub, two 7.5mm MAC 1934 machine guns in wings



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**ABOVE: MS406s from GC II/3 prepare to take off from Connantre on a patrol over the Franco-German border in March 1940.** VIA CHRISTIAN-JACQUES EHRENGARDT

**Often outclassed against enemy fighters in French service, the MS406 was a more potent opponent when improved in Finnish hands**

**T**he first unit to get its hands on the Morane-Saulnier monoplane fighter, albeit in early pre-series MS405 form for operational evaluation only, was the 4th Escadrille of Groupe de Chasse (GC) II/7 at Dijon in the summer of 1938. Although the MS405s suffered minor teething troubles, the Groupe II pilots found France's first modern fighter vastly superior to the Blériot SPAD 510 biplane flown by the rest of the unit. Early-build MS406s followed in September 1938, allowing the 6th and 7th Escadres de Chasse to begin their conversions in early 1939.

The Armée de l'Air had hoped to usher a significant number of MS406s into service during 1938, but a shortage of vital components and equipment due to poor planning by the Ministère de l'Air — as well as a lack of engines — meant that it was not until the end of the year that production-standard fighters started to trickle off the SNCAO assembly line.

With only a solitary factory building HS 12Y31 engines, Hispano-Suiza was unable to keep pace with demand. The ministry attempted to solve this problem by ordering engines from Czechoslovakia, but this source was cut off following the German occupation in 1938. The French government tried to obtain HS 12Ys from the USSR and Switzerland, but without success.

Eventually, the SNCAO production line at Nantes-Bouguenais got into full swing, with six aircraft being built daily by April 1939; this had increased to 11 four months later. Many could not be delivered directly to the Groupes de Chasse, however, owing to shortages of various items of equipment.

GCs I/7, I/6, II/6, II/7, I/2, I/3, II/2, III/6 and III/7 had all initiated conversion to the MS406 by May 1939, pilots finding that the aircraft was both easy to fly and highly manoeuvrable. Indeed, aviators

accustomed to the Blériot SPAD 510 or the Dewoitine D500/510 experienced few problems in converting onto the more advanced type.

By the time hostilities between France and Germany commenced on 3 September 1939, MS406 production had reached a tempo of 11 aircraft per day. Of the 573 examples by then accepted by the Armée de l'Air, 346 MS406s equipped 10 front-line Groupes de Chasse based on French metropolitan soil as follows:

GC I/2	Beauvais-Tillé
GC II/2	Clermont-les-Fermes
GC III/2	Cambrai-Niergnies
GC I/3	Velaine-en-Haye
GC II/3	Fayence
GC III/3	Salon-de-Provence
GC II/6	Anglure-Vouarces
GC III/6	Villacoublay
GC II/7	Luxeuil-Saint-Sauveur
GC III/7	Ambérieu

Each Groupe was equipped with 26 fighters, split between two Escadrilles.

## WAR IN THE WEST

With almost 350 MS406s included in the Armée de l'Air's order of battle on 3 September 1939, the fighter was clearly destined to play an important role in defending France from German aggression. Sadly, the aircraft quickly proved ineffectual in combat against the Luftwaffe's

primary fighter, the Messerschmitt Bf 109E.

During the period of the 'Phoney War', from 3 September 1939 through to 10 May 1940, 18 MS406s were lost in combat. Six of their pilots were killed, one taken prisoner and six wounded. Most of these aeroplanes fell victim

to Bf 109Es, including the first example to be lost on 21 September 1939 — a GC I/3 machine flown by Sous-Lt Marius Baize, who was downed by Hauptmann Dr Erich Mix of Stab I./JG 53.

On 24 September GC I/3 took its revenge, when a section of four Moranes clashed with six Bf 109Ds



of JGr 152 near Saarbrücken. The French pilots lost their leader, Cne Roger Gérard, who was able to take to his parachute, but not before despatching one of his opponents. Sgt Jean Garnier was wounded during the Messerschmitts' first attack, and when he broke off and landed on an auxiliary airfield at Etting he was killed when a Bf 109 that had followed him down strafed his Morane on the ground. Despite being set upon by German fighters, Adj-chef Antonin Combette managed to bring down a Bf 109. Upon Combette's return to Velaine-en-Haye, his mechanics counted 28 bullet holes in his MS406.

This clash had effectively ended in a draw, with two machines destroyed and one damaged on either side. Morale was still high among French fighter units at this early stage of the conflict, however, as Pierre Salva, a former sous-lieutenant with GC I/3, noted.

"Our Moranes have not been outperformed by the [Bf] 109s. Though much slower, they held their own thanks to their better manoeuvrability. While awaiting aircraft that will replace them — one which is much in the news is being built at Toulouse and called the Dewoitine 520; it is fast, manoeuvrable and well-armed, in other words the ideal fighter — our Moranes will play their part without giving their pilots the feeling they have been sacrificed."

The inferiority of the MS406s was further exposed when a captured Bf 109E-3 from II./JG 54 was test-flown by the Armée de l'Air in late 1939. However, the Ministère de l'Air officially stated throughout this period that the MS406's superior manoeuvrability would carry the day.

Due to the need to protect the French border, which extended from Dunkirk in the north to Switzerland in the south, fighter units had to be spread out all along the 500-mile (800km) front. Many were not to see a Luftwaffe aeroplane — apart from high-flying and fast reconnaissance aircraft that they could not catch — before the German onslaught of 10 May 1940. The 'hottest' areas were allocated to the Curtiss H-75A units, with most Morane groups being based where nothing happened. They therefore had fewer opportunities to clash with the Luftwaffe. For instance, GC III/3 saw only two combats during the entire 'Phoney War'. This was probably just as well, for many of the pilots being rushed into the front line to serve with newly established MS406 units had

come straight from the air force flying schools.

Future Spitfire ace Sous-Lt Gabriel Gauthier enjoyed decidedly mixed fortunes on 21 December when 12 Moranes escorting a Potez 63.11 between Karlsruhe and Aachen were intercepted by 10 Bf 109Es from I./JG 54. As six Messerschmitts tried to attack the Potez, the rest engaged the Moranes. Having been separated from his section during the mêlée, Gauthier went after two Bf 109s on his own.

"I picked up the closest and opened fire at 50m [55 yards], seeing pieces ripped off its tail. The pilot bailed out and I watched his aeroplane crash near Sponeck. But I had not noticed another 'Monsieur Schmitt' [one of the nicknames given by the French to the Bf 109, another being 'bouts carrés', referring to the German fighter's squared wingtips] that had crept up behind me. I only became aware of his presence when all hell broke loose in the cockpit. Instruments were smashed, debris and shrapnel flew all around me and then I was hit in the head. Blood began to flow over my face and I lost consciousness. I came back to life at 100m [330ft] — just in time to pull up and avoid striking the ground. My strength grew dim and I had lost the use of my left arm. I thought I would never be able to reach my airfield, so I opted for a belly landing in an open pasture. I fainted again and I woke up only to discover that I was in a hospital. The war was over for me."

Gauthier's Bf 109 was one of 27 German aircraft claimed as destroyed (of which 25 were officially confirmed) by MS406 pilots between September 1939



**ABOVE:** Five GC I/3 pilots pose for war correspondents after their successful combat on 24 September 1939 against Bf 109Ds of JGr 152. They are, from left to right, Sous-Lts Pierre Salva and Lucien Potier, Cne Bernard Challe, Sgt Chaussat and Sgt-chef Jean Octave. VIA CHRISTIAN-JACQUES EHRENGARDT

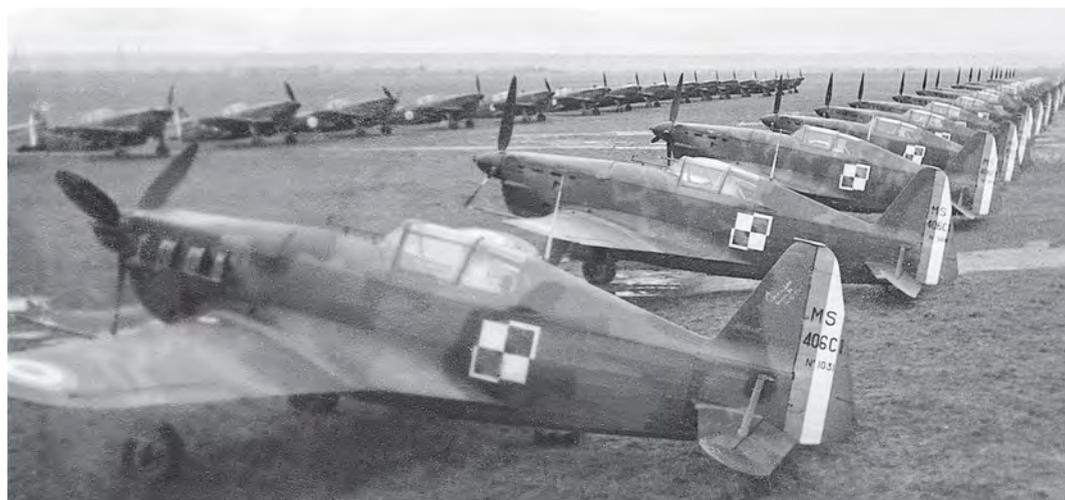
## MS406 units, spring 1940

Unit	Number of aircraft	Base	CO
<b>Zone d'Opérations Aériennes Nord</b>			
GC III/1	30 (20)	Norrent-Fontes	Cdt Paoli
GC II/2	26 (22)	Laon-Chambry	Cdt Bertrou
GC III/2	34 (28)	Cambrai-Niergnies	Cdt Geille
GC III/3	28 (23)	Beauvais-Tillé	Cne Le Bideau
<b>Zone d'Opérations Aériennes Est</b>			
GC I/2	31 (27)	Toul-Ochey	Cdt Daru
GC II/6	34 (20)	Anglure-Vources	Cdt Fontanet
GC III/7	34 (23)	Vitry-le-François	Cdt Crémont
<b>Zone d'Opérations Aériennes Sud</b>			
GC III/6	36 (30)	Chissey-sur-Loue	Cdt Castanier
GC II/7	35 (24)	Luxeuil-Saint-Sauveur	Cdt Durieux
<b>Zone d'Opérations Aériennes Alpes</b>			
GC I/6	25 (22)	Marseille-Marignane	Cdt Tricaud

Note: The numbers in brackets denote how many aircraft were immediately serviceable.

and April 1940. Although better fighters in the form of the D520 and Bloch MB152, as well as the H-75, were entering service in increasing numbers with the Armée

de l'Air by the spring of 1940, 10 Groupes de Chasse were still equipped with MS406s. This left the Morane-Saulnier to bear the brunt of the fighting to come.



**ABOVE:** MS406s at Lyon-Bron on 27 March 1940 — Lyon-Bron was where all Polish airmen destined to serve with the Armée de l'Air were trained. In the foreground is number 1031, fitted with Bronzavia flame-damping exhausts. VIA CHRISTIAN-JACQUES EHRENGARDT

# DATABASE MORANE-SAULNIER MS406

## BATTLE OF FRANCE

On 10 May 1940 the German armies marched into Holland and Belgium and started the penetration through the Ardennes that would lead to their decisive breakthrough at Sedan four days later, and their subsequent sweep behind the Allied troops massed in Belgium.

At dawn on the 10th the Luftwaffe tried to pull off a major coup by attacking the main French airfields. This proved to be unsuccessful in the main, for despite German propaganda announcing triumphant results for the attacking bombers, few aircraft were actually destroyed on the ground. Indeed, most of the Allied fighter force remained unscathed. GC III/2, however, suffered heavy losses at Cambrai, with six Moranes being destroyed.

Having had a quiet 'Phoney War' at Luxeuil, Sgt Pierre Boillot of GC II/7 found himself in the thick of the action in his underpowered MS406 from the very start of the campaign. "Our Moranes, after spending the harsh winter of 1939-40 in the open, were hard put to exceed 260mph [418km/h], and on the morning of 10 May 1940 we were to be faced with the unpalatable fact that the intruding He 111 bombers that we endeavoured to intercept were almost as fast as our fighters when flying in formation, and faster when flying singly, while the Do 17s and Ju 88s were capable of showing us a clean pair of heels."

He 111s that attacked Luxeuil-Saint-Sauveur destroyed nine MS406s on the ground. Several pilots managed to get into the air,

and the patrouille led by Cne Henri Hugo caught a Heinkel in the wake of the attack, as related by Boillot.

"Because the He 111s were fast it took a lot of time for us to reach them if we did not attack them from higher up, which we seldom did because of the poor performance of our early-warning system. In fact, we were usually warned of incoming air raids when bombs fell on our airfields. The first firing pass was to be made at point-blank range because you had few chances to make a second one. But, unlike the Dorniers we had met until then, the Heinkels could absorb much punishment, and wiping them out of the sky was a tedious and dangerous task.

"Thanks to a magnificent manoeuvre ordered by our leader [Hugo], we were able to intercept a single He 111, despite it flying faster and higher than us. It made the mistake of turning inside us, which helped our leader to be in a good shooting position for a few seconds — enough time to hit one of its engines. The enemy aeroplane slowed down, allowing the two young men that we were [Boillot was 22] to finish it off. That was all our glory — finishing off an aeroplane that would have gone down anyway!"

When dusk fell on the first day of the 'real war' in the West, MS406 units had fared much better than had been feared. They had claimed 21 confirmed victories, but had only lost eight aircraft in aerial combat, with three pilots being killed and two badly injured. Of course, the MS406's well-known defects had

not improved. Guns kept jamming above 13,000ft (3,962m), and engines were overheating when pilots tried to catch the fast German bombers, but morale was still high among the pilots. The worst was yet to come, however, for the deadly Bf 109 was nowhere to be seen on 10 May. It would soon make its mark on the campaign.

Many Polish fighter pilots had fled to France after their country fell into German hands in September 1939. Following training to Armée de l'Air standards and basic tuition in French, six patrouilles of three pilots each (plus three mechanics, one rigger, three mechanical assistants and three soldiers) were assigned to MS406-equipped GCs III/1, I/2, III/2, III/6 and II/7 on 27 March 1940.

Bf 109Es began to appear in increasing numbers from 12 May, as did heavily armed — but far less manoeuvrable — Bf 110s. The MS406 units enjoyed moments of success against both types, despite increasing attrition and the hurried abandonment of airfields inflicting growing attrition on the French fighter force. For example, on 13 May six fighters from GC II/2 claimed six Bf 110s destroyed in just 20 seconds, and on 9 June GC I/2 was credited with downing nine Bf 109s from a formation of 11 (three were claimed by ace Cne Robert Williams in just 15 seconds) for the loss of two MS406s.

Boillot also enjoyed success against the Luftwaffe, and he quickly learned that he could hold his own against the much vaunted Bf 109E if he flew the



**ABOVE:** Looking like a caricature of a typical Frenchman as seen by foreigners, GC II/2's Adjudant-chef Pierre Dorcy was a tough warrior, claiming six victories.

SHD/AIR VIA CHRISTIAN-JACQUES EHRENGARDT

MS406 to its strengths. "The Messerschmitt fighters were very much faster than our Moranes", he wrote, "being able to out-climb and out-dive them, but, heaven be praised, the MS406 was the more manoeuvrable aeroplane and could always out-turn its German opponent — an advantage without which our casualties would have been multiplied many times, and one responsible for no small number of those kills gained by the French warplane in fighter-versus-fighter combat. This superior manoeuvrability told when we found ourselves opposing the less-experienced Luftwaffe pilots foolish enough to allow us to gain a convenient position from which we could make effective use of our very destructive Hispano-Suiza cannon. One shell through that poorly protected fuel tank aft of

**BELOW:** Badly damaged in combat with Bf 110s on 16 May 1940, MS406C-1 number 358 was force-landed at Cambrai-Niergnies airfield by Sous-Lt Albert Lansoy from GC 6/2. Abandoned in the face of advancing enemy troops, 358 was picked over by groundcrew from Bf 109E-equipped 3./JG 21. VIA BARTEK BELCARZ



## EXPORT SUCCESS

A handful of foreign air forces flew the MS406, and some saw combat with it. Lithuania became the first export customer when it ordered 13 MS406Ls in 1938. They were never delivered, however, as the French government placed an embargo on their export. Modified to Armée de l'Air standards, they were allocated to various Groupes de Chasse instead.

Switzerland had also chosen the MS406 in 1938 following evaluation of the MS405 the previous year. Designated the MS406H, the aircraft was similar to the standard MS406 supplied to the Armée de l'Air except for its cockpit instrumentation, radio and armament. The first two examples were built in France, after which all remaining Swiss MS406Hs were constructed by the Eidgenössisches Flugzeugwerk (EFW) at Emmen.

Designated the D-3800 in Switzerland, EFW-assembled fighters began to reach the Fliegertruppe in November 1939. These replaced Dewoitine D27 parasol-winged fighters. A total of 82 D-3800s were eventually built by EFW, which switched to production of the D-3801 in December 1940.

The latter machine was effectively an improved MS406 fitted with an uprated S1 engine (based on the original HS 12Y51) built under licence by Swiss manufacturers Saurer and SLM. It also had a fixed radiator, which replaced the retractable unit fitted in the MS406. Finally, an armoured windscreen and structural strengthening were also incorporated into the revised design. More than 200 D-3801s were built by EFW, Dornier-Werke and Pilatus, production continuing until 1945. The aircraft enjoyed a long career with the Fliegertruppe, initially serving as a fighter before being progressively relegated to the ground attack role. The last example was retired in May 1959.

In early 1939 Poland contracted Morane-Saulnier to supply it with 160 MS406s, with the first 50 to be delivered by August of that year. These were to have been shipped to Romania in crates via the Mediterranean, offloaded and then sent by train to Poland. However, following pressure exerted by the Germans, the Romanian government refused to permit the offloading of the first shipment of fighters, which were sent back to France. The order was cancelled following the invasion of Poland on 1 September 1939.

Finland had hastily received 30 MS406s from Armée de l'Air stocks during the winter of 1939-40 as the French government supported

the Finns in their war with neighbouring Russia. These were issued to Lentolaivue (LLv) 28, which was sent into action in February 1940. Following France's surrender to Germany in June 1940, a further 27 MS406s and MS410s (the latter being upgraded MS406s fitted with a fixed radiator bath and heated wing guns) were sold to the Finns in 1941.

As with the D-3801, Finnish MS406s were also improved through fitment of a more powerful engine. This took the form of captured examples of the Klimov M-105P, which was a Soviet derivative of the HS 12Y engine capable of producing 1,100hp (820kW). The engines, along with VISH-61P propellers, were supplied by the Germans, who had captured significant quantities of both during their initial thrust into the USSR. Fitted with Soviet armament and a Bf 109G oil cooler, the revised MS406 was christened the 'Mörkö Morane' (Ghost Morane) by the Finns. A total of 41 MS406s were converted to this standard in 1943-44, and they served on with the Ilmavoimat until 1952.

Following the Wehrmacht's occupation of Vichy France in November 1942, a number of surviving MS406s that had equipped training units were seized. Some were impressed into service with the Luftwaffe as advanced trainers with fighter training wings in France (specifically Jagdgeschwader 103), and at least 46 examples were supplied to the Croatian Air Force following their overhaul.

Turkey had also been an early customer for the MS406, 40 being delivered by Morane-Saulnier in February-March 1940 in an attempt to gain favour with this neutral country in France's war with Germany.



**ABOVE:** Taken on Swiss Air Force charge in September 1940, D-3800 serial J-76 served until December 1954.

SWISS DEPARTMENT OF DEFENCE, CIVIL PROTECTION AND SPORT

the Bf 109E cockpit was all that it took to down the German fighter! Fortunately for us, the proportion of relatively inexperienced pilots of the Jagdwaffe that we encountered over France was quite high, and despite the limitations of our Moranes we ensured that many of them did not survive long enough to become experienced."

By late May a handful of the MS406 units had managed to re-equip with the superior D520, while several others had been withdrawn from the front line after suffering heavy casualties. After a long pause to eradicate the Dunkirk pocket, the Wehrmacht and the Luftwaffe launched the ultimate offensive against the French armies on 5 June that reached its climax 20 days later with an armistice. By then only five Groupes de Chasse were still flying the MS406, and it was now too late to undertake their conversion.

This was the order of battle at 17.00hrs on 4 June (the figures in brackets denote the number of immediately serviceable machines):

GC III/1	29 (18)	14 pilots	Valence
GC I/2	unknown	unknown	Damblain
GC II/2	unknown	unknown	Chissey
GC I/6	22 (16)	16 pilots	Lognes-Émerainville
GC III/7	28 (19)	22 pilots	Orly

During the final stages of the Battle of France, surviving MS406s from GCs II/2, I/6 and III/7 undertook 'patrouilles simples' in an attempt to hinder the progress of armoured vehicles as they raced south-westward towards the Channel. With its liquid-cooled engine, lack of armour and self-sealing tanks and light armament, the MS406 was definitely not best suited to such a mission.

Proving this point, GC I/6, which flew more strafing missions than any other Morane-equipped Groupe de Chasse, would hold the unenviable record for the highest number of pilots put out of commission during the campaign: 10 killed, three captured and nine seriously injured. The primary reason for this mortifying rate of attrition was

that from 5 June GC I/6 primarily conducted ground attack sorties.

Despite France being on the verge of defeat, the Aéronautique Navale (the French naval air arm) activated Escadrille AC 5 at Hyères in mid-June. Within a few days it had taken on 18 MS406s handed over by the Armée de l'Air. All of them were worn out and many were unserviceable for lack of armament. However, at 19.00hrs on 20 June AC 5 carried out its first operational sortie, six Moranes pursuing Do 17s that proved faster than the combat-weary French fighters, especially as they had already dropped their bombs. Four days later, Second-maire Henri Pivet of AC 5 was shot down by flak over Royan.

That same day, 24 June, strafing sorties were ordered to be undertaken by GC III/1, GC I/2, GC II/2 and GC I/6 in the Valence-Beaurepaire area, the high command hoping that the French fighters would slow the German advance down the Rhône Valley. Returning from his sortie, Adj Jean

Marchelidon of GC I/2 caught sight of an Hs 126.

"Back to the east of Valence, at 6.10pm, I spot on my right an aeroplane that is flying up the Rhône River. I head towards it and I see it dive. I fly past it, it shoots at me and I notice black crosses. I recognise a Henschel Hs 126. On my first pass, three-quarter astern, I see hits on its tailplane. I make three more passes — on the last one I shoot at point-blank range dead astern. I see the aeroplane enter a steep dive and hit the ground."

The Hs 126, belonging to 5.(H)/13, crashed at Beaumont-Montoux. Its pilot had been killed and the observer was mortally wounded. This Henschel proved to be the Armée de l'Air's last victory of the 1939-40 war.

However, over Valence-Beaurepaire German flak had taken its toll. Miraculously, all of the aircraft of GC I/2 and GC II/2 returned home with varying degrees of battle damage, but

# DATABASE MORANE-SAULNIER MS406

GC III/1 and GC I/6 each lost a Morane. Sous-Lt Henri Raphenne of GC I/6 crashed near Romans and was found dead by German soldiers, who buried him with full military honours in a nearby cemetery. He was the last member of the Armée de l'Air killed during the campaign. Symbolically, he was flying a MS406.

The Morane-equipped Groupes and Patrouilles de Protection had claimed 171 confirmed aerial victories and 93 probables. However, some 380 MS406s had been lost (admittedly, not all in combat), the type suffering the highest proportionate attrition rate of any French fighters engaged in the campaign.

On 25 June the armistice was enforced. France was divided into two parts — a so-called Zone Libre (Free Zone) mainly in southern France under the new Vichy government, which was subservient to Germany, and a Zone Occupée (Occupied Zone) mainly in northern France — including Paris — and covering the whole of the French Atlantic and the Channel and North Sea coasts.

According to the terms of the armistice the Armée de l'Air was

## THE MS410

The basic MS406 gave birth to many different versions, but none of them reached operational status, at least in France. The most promising was probably the MS410, equipped with a fixed radiator, four belt-fed wing guns, jet exhaust pipes and the provision for two underwing 140-litre (30.8-gallon) ferrying tanks. It was planned to modify 621 MS406s into this new configuration, but the scheme was delayed due to SNCAO's heavy commitment to production of the MS406 and the Lioré-et-Olivier LeO 451.

The first machine, number 1035, flew in April 1940. The German onslaught a few weeks later led to abandonment of the programme. Most MS406s earmarked for conversion were sent back to front-line units to make up for the heavy losses sustained in combat, with only 12 aircraft actually being modified. As the type was obsolete at that time, the MS410 would have made no significant difference for the Armée de l'Air's struggle with the Luftwaffe.

to be disbanded, all of its aircraft being disabled as soon as possible to prevent them from being flown to England or Egypt.

**BELOW:** In September 1940, German Flugbaumeister Fl Stabsingenieur Wernitz toured France in search of serviceable French aircraft that could be used either in the training of Luftwaffe aircrew or sold to Germany's allies. Wernitz photographed this collection, including two MS406C-1s, two Breguet Bre 693 ground attack aeroplanes and a solitary Douglas DB-7 bomber, at Bléville near Le Havre.

VIA BARTEK BELCARZ



## VICHY FIGHTERS

How many MS406s survived the Battle of France? This is a difficult question to answer, partly because the census demanded by the German and Italian Armistice Commissions was obviously false. Counting French aircraft after 25 June 1940 is an exercise resembling geometry — how to reason correctly using incorrect figures. However, 453 MS406s were listed in the Free Zone, about 200 in northern Africa and around 50 in other territories (Syria-Lebanon and Indochina).

While no combat units of the Armée de l'Air de l'Armistice continued to fly the MS406 in the

Free Zone, the air force was kept alive in North Africa by the Germans thanks to its bold response to the shelling of the French fleet at Oran (Mers el-Kébir) by the Royal Navy on 3-6 July 1941. Nevertheless, the MS406 was quickly phased out, the last units still equipped with the fighter being disbanded and their machines stored. The exceptions were GC I/7 in Syria-Lebanon and the two Escadrilles based in French Indochina, both territories loyal to Vichy.

GC I/7 was the first to bring the guns of its Moranes to bear, the unit having been spared the bloodletting

of the Battle of France following a transfer to Rayack, in the Lebanon, during March 1940. Following the cessation of hostilities in France in late June, it was kept in the Vichy French order of battle by the German Armistice Commission.

In early May 1941 the Germans, who wanted to help insurgents force the British out of Iraq, received Vichy approval to land and refuel transport aeroplanes in Syria. However, the British were not in a laissez-faire mood. On 14 May Bristol Blenheims and Curtiss Tomahawks strafed German aircraft at Palmyra. It was the start of a new

conflict between the RAF and the Armée de l'Air de l'Armistice.

In the early phase of the campaign the latter had only 20 Moranes to defend the 620-mile (1,000km) border between Syria and the British territories of Palestine, Transjordan and Iraq. On 18 May MS406s attempted, unsuccessfully, to intercept incoming bombers. Ten days later, however, Sous-Lt André Vuillemin shot down a Blenheim near Aleppo.

On 8 June Commonwealth and Free French troops crossed the border in Operation 'Exporter'. Two Groups equipped with D520s,

**BELOW:** These MS406s have just been withdrawn from storage at Châteauroux and are ready to be flown to Salon-de-Provence, where they will be used by the École de l'Air to train fighter instructors. All wear the standard 'Vichy' markings consisting of garish yellow and red stripes. ECPA-D VIA CHRISTIAN-JACQUES EHRENGARDT



# MORANE-SAULNIER MS406 DATABASE



**Morane-Saulnier MS406C-1 461**  
Armée de l'Air d'Armistice  
CHRIS SANDHAM-BAILEY

hurriedly sent to Lebanon and Syria, were to bear the brunt of the air defence. However, GC I/7 kept on fighting. Two 'Blenheims' were claimed by Adj-chef Georges Amarger on 4 and 7 July, the second, which was actually a Vickers Wellington of No 80 Squadron, being noteworthy as the only night victory credited to a French fighter pilot during World War Two.

This campaign, as any other fought by the French between 1940 and 1942, ended in an armistice on 14 July 1941. GC I/7 had completed 591 operational sorties, claiming two aerial victories and two probables. The few surviving MS406s were duly handed over to the RAF, joining a handful of Free French examples that had been operating alongside British fighters in Egypt since France's defeat the previous year.

## INDOCHINA

In the Far East, Escadrille de Chasse 2/595 had been formed at Bach Mai, in French Indochina, on 1 October 1939 with 12 of the 20 MS406s disembarked at Saigon the previous month. Two problems soon arose. Firstly, there were few or no fighter pilots among the local airmen, which meant that the best pilots in-theatre had to undergo a specific training course prior to being given the MS406 to fly. Secondly, there were no spare parts in Indochina, and cannibalisation could only be performed after the first accidents had occurred.

On 22 September 1940 a border incident was caused by Japanese troops patrolling around the French outpost at Lang-Son. A small war raged for four days, Moranes playing a minor role by escorting Potez 25TOE reconnaissance biplanes. It was hoped that their presence would act as a deterrent for Japanese Army Air Force (JAAF) Nakajima Ki-27 'Nate' fighters active in the area.

On the last day of hostilities Sgt Williams Labussière, flying as wingman for Adj-chef Tivollier, spotted a hostile twin-engined aeroplane over Ha-Gi. Labussière

related: "I waved at Tivollier, who did not understand my signal but showed me by sign language that we had to turn back. I did not agree. Diving on the aeroplane, I identified it at once as Japanese. It had no reason to be there. I gave a warning shot ahead of it. Immediately, the rear gunner opened fire and I was surrounded by bullets. This time I pressed the trigger for good and set its left engine ablaze. The pilot manoeuvred with great skill to reach a cloud and it was gone from my sight. With too little fuel for a chase, I made it for home.

"Cne Gangloff [commander of EC 2/595] was delighted to hear this good news. We were ordered not to open fire except for self-defence. Obviously I had acted in self-defence, he added, smiling. However, I had no idea of the fate of my alleged victim. It would not be long before I knew. A couple of days later an army truck arrived at Bach Mai and unloaded a motley collection of metal parts and armament. I asked the sergeant who was in charge where all this stuff came from. He answered that it was secret, and that he was not allowed to speak. However, through an indiscretion, I learned the debris was parts of a Japanese bomber — 'my' bomber!"

"I required authorisation to record this victory in my logbook, and my capitaine wrote a report for the attention of the staff. That was when the shit hit the fan! A few days later a staff officer came to Bach Mai and summoned the two of us. We got bawled out in the harshest way and my logbook was confiscated. When I got it back, the entry regarding my mission had been scratched out in red ink, although my victory was still clearly legible. However, officially, nothing had happened!"

Such was the obedience of the Vichy authorities to the Axis powers.

Escadrille de Chasse 2/596 was formed on 10 October 1940, equipped with MS406s that had either been withdrawn from storage or transferred from EC 2/595. With the defeat of France by the Germans, Hanoi harbour and a few airfields were conceded to Japan on the orders of the Third Reich. Thailand (or Siam, as the country was still called at that time) had now regained enough confidence to demand the return of territories annexed by the French at the turn of the century. Soon the Thais and the French began violating each other's airspace and, one thing leading to another, war broke out. When conflict with Siam flared up, EC 2/595 was sent to

Dong Hene (in Laos) and EC 2/596 to Siem Reap, adjoining the famous Angkor Wat temple in Cambodia.

A series of short, sharp dogfights took place between MS406s and Thai Curtiss Hawk III biplane fighters escorting Vought V-93S Corsair biplane bombers in December 1940 and January 1941, with ex-JAAF Mitsubishi Ki-30 'Ann' bombers supplied to the Thai air force also being engaged. Both sides would claim victories and suffer losses prior to a ceasefire coming into effect on 28 January. Needless to say, under pressure from Japan the French yielded large parts of Indochina to Thailand. The Morane units had flown 52 sorties (203 hours) and lost two of their number. Only 14 remained airworthy. Indochina had not received any new aircraft or spare parts since late 1939, and it would never do so. In July 1941 EC 2/596 was disbanded and Cne Pierre Pouyade took command of EC 2/595.

On 27 January 1942 an American raid took place on Hanoi. Three Moranes were scrambled, but they deliberately took a reciprocal course so as not to tangle with what the pilots considered friendly forces. However, in doing so, they flew too close to Japanese airspace and three Ki-27s of the 84th Dokuritsu Hikô Chutai were directed to intercept them. Because of the so-called 'Vichy markings' on the Moranes, comprising yellow and red stripes, they were allegedly mistaken for American fighters.

Lt Maurice Hutter recalled: "We saw them dive upon us and, knowing their habit of shooting on sight at anything that flew, I made a sign to my wingmen to break off and run away. Unfortunately, the Japanese had the benefit of both height and speed, and they easily caught up with our puffing Moranes. Delisle, hoping they would recognise their mistake, wagged his wings and even lowered his undercarriage. His aircraft caught fire at the first burst. He just had time to bail out. Bassaget and I had no other choice than to face them.



**ABOVE: Premier-maitre André Châtel (right) and Maître Jean Mouligné (left) in a theatrical pose for the camera with MS406 number 306 of EC 2/596 at Dong Hene in November 1940. Châtel and Labussière of the Aéronautique Navale were the only 'true' fighter pilots in French Indochina at that time.**

VIA CHRISTIAN-JACQUES EHRENGARDT

Development

Technical Details

In Service

Insights

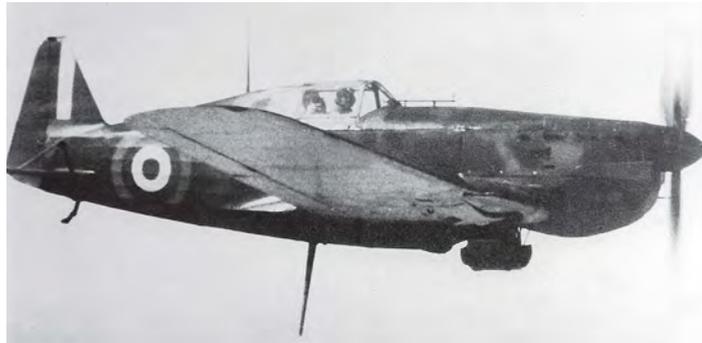
# DATABASE MORANE-SAULNIER MS406

“The combat was already lost. Their nimble monoplanes were much faster than ours on their last legs. My weapons jammed at the first burst. I saw Bassaget fall in flames. Not wishing to share his fate, I dived to the ground and pulled out at the last moment. Two Japanese had followed me. I hit a tree with my left wingtip. The aeroplane crabbed along and came down in a field of sugar cane. Contact was rough and I was ejected out of the cockpit. In a semi-unconscious state, I crawled away and ducked into a rice field. The Japanese made three or four passes to strafe the burning wreck.”

Adj-chef Bassaget was killed and Sgt-chef Delisle injured, while Hutter suffered contusions. The Japanese CO, Maj Nagumo Tsunao, visited EC 2/595 to apologise and even called on the two pilots in hospital. That was the last action seen by MS406s in Indochina. The final machines were soon put out of commission one after another owing to a lack of spares, with cannibalisation eventually showing its limits.

## MADAGASCAR

Madagascar had remained loyal to the Vichy Government. This isolated island in the Indian Ocean, thousands of miles away from France and facing the British territories of south-east Africa, had little or no military aviation, apart from a handful of peacekeeping squadrons flying antiquated biplanes. Several



**ABOVE: This RAF-marked MS406C is either AX674 or AX675, in service with Free French Flight No 2 in Egypt during August 1940. It is in the hands of Sous-Lt A. Peronne.** VIA ANDREW THOMAS

military airfields had been built long before World War Two, the key one being Diego Arrachart, close to Diego Suarez — one of the largest natural harbours in the world, comparable with Pearl Harbor or Scapa Flow.

On 7 January 1941, Escadrille 565 was formed in anticipation of 17 MS406s being shipped from France. The first three machines were disembarked in October. Escadrille 565 moved the following January with its 17 Moranes to Ivato, near the capital Tananarive. A month later this Escadrille merged with another equipped with Potez 63.11s to become the Groupe Aérien Mixte (GAM).

Fearing that Madagascar might supply Japanese submarines on their journeys to the French Atlantic coast — which indeed happened — the

British High Command responded by instigating Operation ‘Ironclad’, but it confined the campaign’s objective to the capture of Diego Suarez. Apart from three South African Air Force flights forming No 20 Squadron, SAAF (with 22 Martin Marylands and Bristol Beauforts), the British counted upon two aircraft carriers, HMS *Illustrious* and HMS *Indomitable*, and especially on the 20 Grumman Martlet IIs of 881 and 882 Squadrons aboard the former.

In the meantime, the GAM had despatched 13 MS406s to Diego Arrachart. These bore the brunt of the British onslaught, which started on 5 May 1942. Fairey Albacores from *Indomitable* destroyed five Moranes on the ground, the remainder being withdrawn to Anivorano and Ambilobé. At 16.30hrs three MS406s took off to strafe the landing beaches,

and one mysteriously disappeared — no claim was submitted by any Royal Navy unit.

At dawn on 7 May, Martlets of 881 and three Moranes were patrolling the same area south of Diego Suarez. They inevitably met. The British counted two pairs of Moranes, and Lt Cdr John C. Cockburn made a head-on pass on the first pair. He took a few 20mm rounds in his aircraft’s engine and wings. Probably hit by Cne Leonetti, Cockburn crash-landed in Courier Bay. Sub-Lt J. A. Lyon followed his leader into the attack, but changed his mind on seeing the ‘first pair’ on his heels. He shot one down before the top cover entered the fray and brought down two more Moranes. Three MS406s were indeed lost to the Martlets, Leonetti managing to bail out, Lt Michel Laurant force-landing and Cne Jean Bernache-Assollant being killed.

This was the sole aerial combat of the whole campaign. The French surrendered at Diego Suarez late on the morning of 7 May. Hostilities were resumed on 10 September 1942. As far as is known, only two MS406s were still airworthy. Operating on various secondary airfields in the savannah, they played hide-and-seek with the SAAF until only one, number 815, was left, owing to a lack of spares. The final recorded operational flight of the last Morane was a reconnaissance over Betroka on 20 October, flown by Sgt André Largeau. Madagascar was entirely conquered on 6 November 1942.

## WAR IN THE NORTH

Although the MS406’s combat career in French colours was all but over by mid-1941, the 87 examples supplied to the Finns between 1940 and 1942 saw considerable action through to the war’s end. Most of them arrived shortly after Finland had somehow emerged from the 1939–40 Winter War both unconquered and independent — although it had lost

huge tracts of land — despite the Russians committing 2,318 aircraft to the conflict. The Ilmavoimat (Finnish Air Force), by comparison, could muster only 114 aircraft, of which 45 were fighters. Just 35 of those were reasonably modern Fokker D.XXIs.

Immediately after fighting had broken out on 30 November 1939,

the Finnish purchasing commissions frantically went in search of combat aircraft, like many other nations at that time. Military materiel became harder to obtain, and prices escalated. Authorised by the Finnish government, ambassadors in Britain and France approached those countries’ respective governments for any kind of equipment, especially

aircraft that could quickly be made operational. The French military attaché in Helsinki received a telegram on 28 December 1939 informing him that the French government had initially decided to donate 50 fighters to Finland. Shortly after the Winter War had ended Prime Minister Edouard Daladier informed the French parliament that

**BELOW: Latva, eastern Finland, was the location of these 1./LeLv 28 MS406s — with MS-328 on the right — in September 1943.** SA-KUVA





**Morane-Saulnier MS406C-1 MS311**  
LeLv 28, Finnish Air Force

CHRIS SANDHAM-BAILEY

the nation had donated 145 aircraft and much else to Finland. In fact, only 36 aircraft ever arrived.

Of the 50 promised MS406s, 30 were drawn from Air Depot 304, packed in crates and shipped from 10 January 1940 onwards to Malmö, Sweden, for assembly. On 17 January Cne Raoul Etienne's group of seven Frenchmen, six technicians and a test pilot arrived at the Aerotransport facilities in Malmö. At the same time the crated aircraft were reaching Sweden. Assembly began on 19 January, and the first Morane was ready for delivery 10 days later. The MS406s were then flown to Västerås in central Sweden for collection by Finnish pilots. The first two departed for Finland on 4 February 1940, and all 30 were picked up in lots of two to five aircraft by the end of the month.

Lentolaivue (LLv) 28 was established to fly the MS406s on 8 December 1939, with Maj Niilo Jusu in command. Based at Säkylä, south-western Finland, the squadron was tasked with the protection of vital ports in this area. It began building up in strength prior to the arrival of new fighters in Finland, which three weeks later were known to be MS406s donated by France. On 2 February the first two Moranes arrived at the squadron's base, and by the end of the month all 30 had been received. At this point the MS406s were armed with only three 7.5mm machine guns, as the engine-mounted 20mm cannon did not reach LLv 28 for a further three months.

Wasting no time, the unit performed its first combat mission from Säkylä on 6 February 1940, flying in the defence of Turku and other south-western ports. Eleven days later the Morane pilots drew first blood, sending a bomber down over the south-western archipelago. Following a series of losses to its medium bomber force in south-

western Finland, Polikarpov-equipped units of the Baltic Fleet air forces claimed to have downed six new fighters on 2 March, which they identified as Brewster Buffaloes. Both the type and numbers were pure fiction, as the Finns did not lose a single aeroplane on that date, and the Brewsters had not yet arrived in-theatre in any case. The new aeroplanes encountered by the Soviet aviators were Moranes, later misidentified as Spitfires.

Eleven days later the Winter War ended following an armistice negotiated in Moscow. By then LLv 28 had flown 288 sorties with its MS406s in just 35 days, claiming 14 aerial victories and losing one aircraft, but no pilots.

Following the German occupation of France in late June 1940, the Finns opened negotiations with the Third Reich in an effort to buy war-booty, including captured aircraft. On 1 October that year a contract was duly signed between the Finnish and German governments. It included the sale of captured French arms

to Finland in return for the transit of German troops and supplies via Finland to northern Norway, which the Wehrmacht had occupied in the spring of 1940.

As part of this agreement, 10 captured MS406s were bought. They had arrived in crates by 4 January 1941 and were quickly assembled and overhauled by the State Aircraft Factory. By the end of 1941, another 15 aircraft had been obtained. The first three arrived in June, seven more were received in August, and the remainder in November.

By then Finland was once again at war with the USSR following the German invasion of Russia, codenamed Operation 'Barbarossa' on 22 June 1941. The campaign was revealed to Finnish military leaders only four weeks prior to its launch. Just before the offensive commenced, large numbers of German aircraft were based on airfields in southern Finland, carrying out missions such as reconnaissance and channel mining. Soviet intelligence quickly discovered their presence, and the communists assumed that these bases would also be used for major attacks on Leningrad. They therefore decided

to attack these airfields first, drawing up a plan for a six-day bombardment offensive.

Soviet air raids began early in the morning of 25 June 1941. During the course of the day the Russians flew 263 bomber and 224 fighter sorties, attacking several locations in southern and south-western Finland, including airfields and purely civilian targets. After these attacks the Finnish parliament declared war on the Soviet Union. Thus, the Continuation War began.

LLv 28, assigned to Lentorykmentti 2, was then based at Naarajärvi and commanded by Capt Sven-Erik Sirén. It had 27 serviceable Moranes in three flights. The unit's task at this point was to protect the mobilisation of the field army in south-eastern Finland.

LLv 28 (which became LeLv 28 during a unit reorganisation in May 1942) remained heavily engaged with the enemy throughout the Continuation War, its MS406s being progressively upgraded with Russian engines and armament in order to improve the fighter's initially chronic serviceability — particularly in the winter. On 16 July 1942 Finland also bought 30 MS406s directly from Vichy France. This drew protests from the Germans, who claimed that official channels were not used, but nothing more came of it. The aircraft were flown to Finland in three batches by 9 September 1942, the State Aircraft Factory giving them a full overhaul prior to their reaching squadrons in October.

Just prior to that, the Ilmavoimat issued Moranes to the 1st Flight of LeLv 14, based at Tiiksjärvi — Finland's northernmost airfield, close to the White Sea — on 1 August 1942. The flight had to wait until 5 November to claim its first victory. On that date a pair of Moranes led by 1Lt Martti Kalimas flew a reconnaissance mission to Segozero, where they were bounced by a single LaGG-3. Another LaGG soon appeared on the scene and both were sent down. Since five more Russian



**ABOVE: Victorious pilots of 2/LLv 28 at Karkunranta on 9 September 1941. They are (left to right) 2nd Lt Lasse Lehtonen, Sgt Urho Jääskeläinen, 2nd Lt Martti Inehmo and SSgt Urho Lehtovaara. On this day Lehtovaara, flying MS-304, claimed three I-16s to boost his overall score to 10. Parked behind is MS406 MS-606. SA-KUVA**

# DATABASE MORANE-SAULNIER MS406



**ABOVE:** Groundcrew working on a Morane in its dispersal at Äänislinna, east Karelia. SA-KUVA

fighters were seen approaching, the Finns decided to break off and return to Tiiksjärvi.

On 14 February 1944 the squadrons at the front were renamed according to their function. Since LeLv 14 was basically a reconnaissance squadron (Tiedustelulentolaivue), its new abbreviation was TLeLv 14, while LeLv 28 became HLeLv 28 due to its role as a fighter squadron.

Both continued to fly MS406s, re-engined aircraft fitted with captured Russian Klimov M-105P motors beginning to enter service in the spring of 1944. Although the M-105P had the same external measurements as the Hispano-Suiza 12Y31 from which it was developed, the output of the Soviet engine had been increased from 860hp to 1,100hp. The prototype had been ordered as early as 22 October 1942, former Vichy MS406 serial MS-631 being the first Morane to be fitted with an M-105.

WO Aarne Siltamäki took the aircraft aloft for the first time on 4 February 1943. The initial flights were successful and the prototype was due for further development, but the importance attached to this programme diminished somewhat when Messerschmitt Bf 109Gs



**ABOVE:** Post-Continuation War 'Mörkö-Morane' MSv-633 of HLeLv 21 at Rissala, where it arrived on 17 March 1945. Two weeks later, blue and white cockades were painted on the aircraft as demanded by the Allied Supervision Commission. OLLI RIEKKI VIA KARI STENMAN

had begun to arrive in Finland from Germany a few weeks later.

Engineers initially struggled to solve problems with MS-631's liquid cooling system, although these were rectified by the spring of 1944. Soon after that two more Moranes were converted, and by 21 November 1945 all 41 remaining MS406s had been modified to this standard. The 'Mörkö Morane' (Ghost Morane), as it was dubbed, had a top speed of 317mph (510km/h) at 13,100ft (4,000m), could climb to 16,400ft (5,000m) in eight minutes and

had a service ceiling of 33,780ft (10,300m). Armament consisted of one Maser MG 151 20mm cannon housed between the cylinder banks and a single Chatellerault MAC 1934 7.5mm machine gun in each wing.

On 1 July 1944, HLeLv 28 received its first Bf 109G-2 — the unit was sent 10 more during the course of the month. These equipped the 2nd and 3rd Flights, while on 11 July the 1st Flight took on its first 'Mörkö Morane' at Värtsilä. Five days later SSgt Lars Hattinen claimed the type's first victory after

being scrambled from Värtsilä. "I took off at 18.00hrs to intercept aeroplanes heading west from Ägläjärvi. At Tolvajärvi I saw four Yak fighters, two at 1,000m [3,300ft] and two at 3,000m [9,800ft], and on the deck I saw six Il-2s. I attacked the lower pair of Yaks, which flew in an agitated manner. They evaded right away and a turning fight ensued, which the upper pair also joined. The aeroplanes were very agile and equal to the [Morane], and it was hard to put a bead on them. After some turning around the top pair went for the deck and the other pair attempted to break off eastwards.

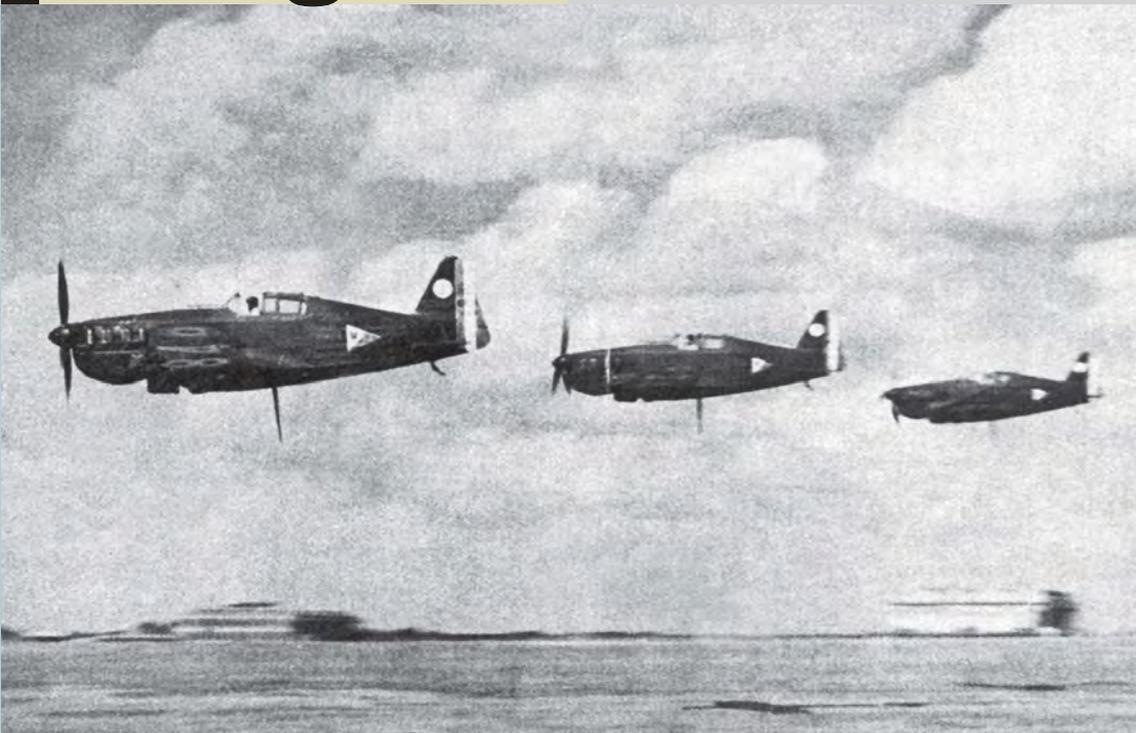
"The battle went on for some 15 more minutes, until I got a clean shot at the aeroplane I had first targeted. I gave it a burst, but it kept evading. On the second burst it caught fire and fell into a swamp from 10m [35ft]. I tried to get the other Yak, but he had a speed advantage of maybe 20km/h [12mph]. It broke off. Then I went after the Il-2 formation flying to one side of me. I fired at them from the side, but my cannon was out of action. I gave them a burst with my wing guns but, knowing they have no effect on Il-2s, I gave up the chase.

"The [Morane] had proven itself to be equal to the Yak fighter. Although the latter machines were very agile and their pilots skilful in handling them, the Yaks did not get into a firing position during my fight with them."

On 19 August 1944 all aerial activity ceased, and on 4 September the commander of the Ilmavoimat ordered the air regiments to inform their squadrons that all fighting was to stop at 07.00hrs that day. The ceasefire duly came into effect, and two weeks later it was confirmed with the signing of the Moscow Armistice. HLeLv 28 had been credited with 118 victories for the loss of 26 MS406s during the Continuation War. The surviving 'Mörkö Moranes' were eventually retired from service on 11 September 1948. **A**

**BELOW:** MS406 serial MS-325 from 2./LeLv.28 preparing to take off from Äänislinna on 17 March 1942. SA-KUVA





**ABOVE: A late peacetime appearance by three Dijon-based GC I/3 MS406C-1s during the July 1939 display at Brussels-Evere.** KEY COLLECTION

**They might not have outweighed its drawbacks, but the Morane had its good points**

**A**s previously mentioned, the MS406 was blessed with pleasant handling characteristics, being in possession of excellent manoeuvrability and no serious vices. However, it was quickly shown to be inferior in combat to its main rival, the Messerschmitt Bf 109E. The MS406 was seriously underpowered, and at anything approaching its alleged top speed the fighter's ethylene-glycol radiator had to be retracted, whereupon the engine rapidly overheated. The undercarriage 'pop-out' problem could prove fatal when engaging the enemy, as could the freezing of the wing gun firing mechanism and the propeller pitch actuation gear.

Future 13-victory ace Pierre Boillot achieved a number of kills in the aircraft during the Battle of France. He had first flown the MS406 upon being posted to GC II/7 as a sergeant pilot in the summer of 1939. "The fighter taxied extremely positively thanks to the wide track of its undercarriage, and as engine power was on the low side for such an aircraft, the MS406 showed little tendency to swing during the take-off roll. Once in the air it was easy to fly. A low wing loading and fine aerofoil behaviour at low speeds made both for confidence and a slow approach, and there was no tendency to flick-stall when the nose was pulled up for

a three-point landing. Efficient braking and the tailskid ensured a short and straight landing roll.

"Unfortunately, pleasant though the characteristics of the MS406

were from the pilot's viewpoint and excellent though the basic airframe undoubtedly was, as a whole Morane-Saulnier's offering did not add up to an entirely satisfactory combat aircraft. It was decidedly underpowered, and this problem of insufficient power was compounded by too great a fuselage frontal area and a totally outdated cooling system that had a deleterious effect on performance, however it was operated. At anything approaching the alleged maximum speed — 298mph at 13,125ft — the radiator was perforce retracted and the liquid-cooled engine was soon overheating. Whichever of the two remedies was selected — reducing boost pressure or lowering the radiator — speed fell off to around 280mph [450km/h].

"Our MS406s formed part of a large batch fitted with the two-pitch Chauvière propeller, the pitch change of which was actuated pneumatically. At altitude, the pitch change mechanism almost invariably iced up solid, and thus we were faced with the choice of one of two evils. We could adopt fine pitch in order to climb at best speed with the knowledge that once we had gained altitude we would be unable to change to coarse pitch and our maximum



**ABOVE: An unidentified Ilmavoimat MS406 making a low pass. The Finnish pilots got the most out of the Morane.** SA-KUVA



# DATABASE MORANE-SAULNIER MS406

attainable speed would be 186mph [299km/h], or we could elect to climb to altitude slowly by employing coarse pitch, placing a heavy load on the engine with a drop in rpm in consequence, and with the knowledge that by the time we reached the height at which we hoped to intercept intruders, they would probably be long gone. Thus, when we reached the altitudes at which Luftwaffe bombers normally operated we were either too slow or too late to catch them!

“The lack of an ‘up’ lock for the hydraulically actuated undercarriage also caused us problems in fast-maneuvring dogfights. It was most disconcerting for the pilot when, applying positive g, the wheels popped out of their wells and added a measure of drag at a critical moment. It was even more disconcerting when g was reduced and the wheels returned to their fully retracted position with a bang. A hit in the hydraulic system and down came the wheels,

rendering the MS406 a sitting duck with nothing that the pilot could do to rectify the situation.

“We certainly could have done much better in 1940 had our mounts possessed higher performance and better systems and equipment. Had the MS406 been given 20 per cent more horsepower, belt-fed guns and the necessary heating to ensure they didn’t freeze solid in low temperatures, a good gunsight and a reliable constant-speed propeller, then Morane-Saulnier’s

fighter could well have been as valuable as was the Hurricane to the RAF.”



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## THE THREE SURVIVORS

Sadly, not a single example of a genuine Morane-Saulnier-built MS406 survives today. There are, however, three examples of the Swiss-built D-3801 still in existence, one of which is a flyer. J-143/HB-RCF, owned by the Association Morane Charlie-Fox, includes parts from three D-3801s saved from the scrapyard in the early 1970s by military pilot Hansruedi Dubler. Under the direction of warbird engineer Max Vogelsang, the forward fuselage of J-84, the wings of J-276 and other key components from J-143 were combined in a six-year, 10,000-hour restoration undertaken at Vogelsang’s Wohlen workshop in Switzerland. Fitted with an overhauled Hispano-Suiza 12Y31 engine, the aircraft made its first flight in 41 years from Stans-Buochs on 9 June 2000.

Initially restored in Swiss Fliegertruppe colours from 1940, the D-3801 was repainted as an MS406 from GC II/5’s SPA 167 during the ‘Phoney War’ period following its purchase by the Association Morane Charlie-Fox in April 2005. Recently, it was adorned in the Battle of France colours of GC I/2, but since 2013 it has returned to Swiss markings. It is based at Bex.

The remaining two D-3801s are very much static museum pieces, J-276 having been resident in the Flieger-Flab-Museum at Dübendorf since the early 1960s. Sister aircraft J-227 was donated to the Musée de l’Air et de l’Espace at Le Bourget at much the same time, this aircraft being displayed in Armée de l’Air colours.



**ABOVE:** The only airworthy survivor: Bex, Switzerland-based D-3801 J-143/HB-RCF of the Association Morane Charlie-Fox, in the hands of its regular pilot Daniel Koblet. SWISS DEPARTMENT OF DEFENCE, CIVIL PROTECTION AND SPORT