

# DATA **BASE**



Colourfully schemed H75A-3 serial 298 of the 2ème Escadrille, Groupe de Chasse I/5, while serving with the Armée de l'Air d'Armistice — the air force of Vichy France. CHRIS SANDHAM-BAILEY

**15**  
IN-DEPTH  
PAGES



# CURTISS P-36/HAWK 75

**WORDS:** THOMAS McKELVEY CLEAVER

September 1939's National Air Races at Cleveland, Ohio, were attended by a number of 1st Pursuit Group/27th Pursuit Squadron P-36Cs in various experimental, washable camouflage schemes. NASM

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The P-36 was the first truly modern fighter for the US Army Air Corps. A typical pre-war P-36A is represented by serial 38-038, on the strength of the 1st Pursuit Group at Selfridge Field, Michigan. AVIATION HISTORY COLLECTION/ALAMY

## It was hardly revolutionary, but the Curtiss Model 75 was America's first truly modern fighter to appear in the mid-1930s

The mid-1930s saw a revolution sweep through many leading air forces, as the all-metal, low-wing fighter design eclipsed all others. The US Army Air Corps (AAC), though among the weakest and least-developed air arms of the period, was an active participant. However, as with contemporary Italian designs, US aeroplanes suffered from the lack of a really good, high-powered, aero engine like the outstanding Rolls-Royce PV12, later to be known as the Merlin, or the Daimler-Benz DB600 series.

The Curtiss-Wright Corporation of Buffalo, New York, had been created in 1929. It merged the Curtiss Aeroplane and Motor Company, founded in January 1916 by American aviation

pioneer Glenn Hammond Curtiss, and the Wright Aeronautical Corporation, established as Wright-Martin in 1919 by Orville Wright and Glenn L. Martin. Both firms were well-known suppliers of aircraft and engines for US military aviation. The Curtiss Hawk series of biplane fighters

had equipped both the AAC and the US Navy, starting with the P-1/F6C series in 1927 and finishing with the P-6/F11C of 1932.

Curtiss was aware of new developments in aircraft structures that made its current products obsolete for future development. The American

company that was most advanced in this respect was Northrop Aviation of Burbank, California. It was founded in 1929 by John K. 'Jack' Northrop, one of the true geniuses of aviation history, and had blazed the way for successful all-metal, low-wing commercial aircraft. These started with the Northrop Alpha, a seven-seat, single-engine fast mail/passenger transport with innovative wing fillets researched at the Guggenheim Aeronautical Laboratory of the California Institute of Technology, and a multi-cellular stressed-skin wing of Northrop's own design. The Alpha flew cross-country at 177mph, and when it entered service with Transcontinental & Western Air (TWA) in April, 1931, a flight from San Francisco to New York took just



The first prototype of the Model 75, registration X17Y, took to the air from the Curtiss factory airfield at Buffalo, New York, on 6 May 1935.

over 23 hours. Such performance was then astonishing.

Northrop followed the Alpha with the Gamma, introducing a fully enclosed cockpit canopy. It twice set speed records from Los Angeles to New York. The Gamma design would later be developed into the AAC's A-17 attack bomber, and a civilian offshoot, the Delta, introduced in 1933, which mainly saw use as a high-speed mailplane.

In 1934, Curtiss-Wright president Ralph Damon hired Jack Northrop's most promising young designer, Donovan R. 'Don' Berlin, bringing him to Buffalo as chief engineer. Damon's brief was to create the AAC's next fighter, which would cement the company as the army's leading aircraft supplier.

Berlin had graduated with a degree in mechanical engineering from Purdue in 1921. Five years later he went to work for Douglas Aircraft as a project engineer, where he met Jack Northrop. When Northrop left Douglas, Berlin went with him and was intimately involved in the design and development of the Alpha, Gamma and Delta.

Northrop, however, disagreed with Berlin over the design of the wing for a proposed fighter. The argument was over Berlin's advocacy of a retractable landing gear configuration created by Boeing in which the gear leg retracted backwards while the mainwheel rotated through 90° to lie flat in the wing. Northrop felt this was unnecessarily complex, and he was unwilling to pay Boeing a royalty to use it. The next Northrop design would feature retractable landing gear that did not have the wheel rotating, with the gear enclosed in massive, drag-inducing nacelles; it was arguably the one big aerodynamic mistake Northrop ever made. After Berlin was fired, Curtiss-Wright came calling, and Berlin took his wing ideas with him to Buffalo.

In 1933, the AAC fighter force was still primarily based around Curtiss P-6E Hawk and Boeing P-12E biplanes. The



**A P-36A allocated to an AAC Air Materiel Division (hence the 'MD' in the tail code) test unit at Wright Field, Ohio, in 1939.**

“The Curtiss-Wright board agreed to privately finance a new fighter that would bring together all the recent advances in aircraft technology”

year before, the Boeing Model 248, an all-metal monoplane with an open cockpit and externally braced wings, had been adopted as the P-26, with deliveries beginning that

December. The P-26 was comparable in performance to the French Dewoitine D500 series, which differed in having internally braced wings. However, the air corps was

aware that the design was too conservative. While there was no way for the service to fund fighter development in the depths of the Great Depression, men like Maj Claire Chennault, the leading AAC advocate of pursuit aviation, were more than open to hearing ideas from the aircraft manufacturers.

In 1934, the Curtiss-Wright board of directors agreed to privately finance the development of a new fighter that would bring together all the recent advances in aircraft technology. The project was known as the Model 75. The prototype was designed that year and first flew on 6 May 1935 from the company airfield at Buffalo, New York. The initial powerplant was a Wright Aeronautical Division GR-1670A1 two-row 14-cylinder radial engine rated at 775hp, driving a Curtiss-Electric three-bladed

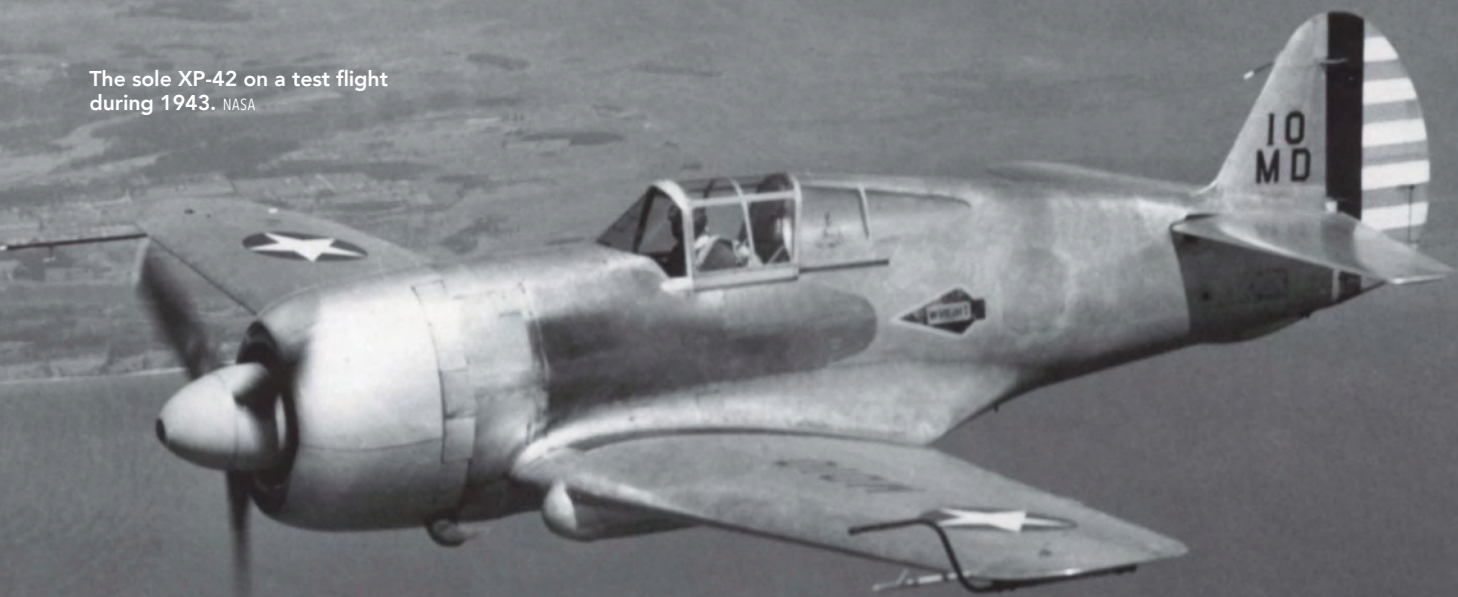
## VARIANT BY VARIANT CURTISS MODEL DESIGNATIONS

- H75A:** Export version with a retractable undercarriage
- H75B:** The 850hp Wright Cyclone-powered prototype for the April 1936 contest
- 75D:** A retrospective designation given to the prototype in its first configuration
- 75E:** The Y1P-36 pre-production aircraft
- 75H:** Simplified version with a non-retractable undercarriage for the export market
- 75I:** Curtiss designation for the P-37
- 75J:** A Model 75A demonstrator, NX22028 (c/n 12931), when fitted with an external supercharger
- 75K:** A study for a version to be powered by a 910hp Pratt & Whitney Twin Hornet engine
- 75L:** The P-36A to P-36F
- 75M:** Fixed-undercarriage development of H75H, some built in China
- H75N:** Export version sold to Thailand
- H75O:** Fixed-undercarriage export version sold to Argentina
- 75P:** Re-engined to become the XP-40, prototype for the P-40 Warhawk
- 75Q:** Two fixed-undercarriage demonstrators
- H75R:** The 75J with a different supercharger
- 75S:** Curtiss designation for the XP-42

## US ARMY DESIGNATIONS

- Y1P-36:** Three pre-production machines, Pratt & Whitney engines, one .30in and one .50in machine gun in the nose
- P-36A:** Main production version, similar to Y1P-36
- P-36B:** One aircraft used to test supercharger gearing
- P-36C:** The final 30 machines, built with two additional .30in machine guns in the wings
- XP-36D:** One aircraft with standard nose armament and four .30in wing guns
- XP-36E:** One aircraft with six 0.30in wing guns
- XP-36F:** One aircraft with two 23mm Madsen cannon carried under the wings
- P-36G:** Thirty H75A-8s taken over from Norwegian contract

The sole XP-42 on a test flight during 1943. NASA



## THE XP-42: WHAT MIGHT HAVE BEEN...

The fourth production P-36A (serial 38-004) became a development platform for a direct successor, designated as the XP-42 by the AAC. The most striking difference was a longer, streamlined nose cowl and a propeller mounted on a shaft, features that were added in an attempt to improve the aerodynamics of the air-cooled radial engine. The XP-42 therefore superficially resembled an aircraft equipped with an in-line liquid-cooled engine.

On its first flight in March 1939, the XP-42 proved faster than the P-36. However, the new cowl caused engine cooling problems which proved unresolvable, despite 12 different modifications. The XP-42 prototype was retained as a testbed and was later fitted with an all-moving tail, or 'stabilator', for research purposes. Operated by the National Advisory Committee for Aeronautics (NACA) from Langley Field, Virginia, it made its last flight in April 1947 and was scrapped that July.

constant-speed propeller. The airframe was of all-metal stressed-skin construction with fabric-covered control surfaces. It was intended to carry the standard AAC armament of one .50in (12.7mm) and one .30in (7.62mm) machine gun mounted in the forward fuselage, firing through the propeller disc. Further test flights revealed the Model 75 was able to reach a top speed of 281mph at an altitude of 10,000ft (3,000m).

Curtiss was not the only company trying to design the next-generation fighter. In 1935, the AAC announced a fly-off contest to determine which machine would be ordered. Seversky entered the fixed-undercarriage, two-seat SEV-2XD. The other entrants, the Curtiss Model 75 and the Northrop 3A, were both single-seaters equipped with retractable landing gear. The Model 75 was flown to Wright Field on 27 May 1935, but the Seversky entry had not yet arrived. While being ferried to

the Ohio airfield for the competition on 18 June 1935, the SEV-2XD was damaged in a landing mishap, with subsequent claims that the 'accident' was deliberate. Then, the Northrop 3A crashed into the sea on a test flight in California in July 1935, and the following month the AAC delayed the final fly-off until April 1936.

“ Even by 1938 the type was obsolescent, with a lower service ceiling, top speed and weaker armament than the Spitfire or Bf 109 ”

The delay allowed Seversky to change its entry to the single-seat SEV-1XP, which also had retractable landing gear; it was designated as the SEV-7 for the purposes of the competition. With the destruction of the Northrop 3A, Vought Aircraft purchased the rights to the design and submitted a rebuild of the prototype as the V-141. Additionally, Consolidated

Aircraft submitted a single-seat version of its PB-2A two-seat fighter, which had entered service in limited numbers in 1934 as the P-30. Curtiss had taken the time to modify the Model 75 with a new and more reliable Wright XR-1820-39 Cyclone engine of 950hp, with a more aerodynamically refined cowl and distinctive

scallops in the fuselage behind the cockpit to improve visibility to the rear. Unfortunately, the new engine failed to produce its rated power and the aircraft only reached 285mph (459km/h).

The Model 75 was the fastest of the competitors, but in April 1936 Seversky was announced as the winner of the contest, and an order was placed for 77 aircraft

designated as the P-35. This was in spite of it being more expensive than the Model 75. Curtiss was, however, awarded a contract in July for three Model 75Es, powered by a derated Pratt & Whitney R-1830-13 Twin Wasp radial providing 900hp, for test and evaluation, under the designation Y1P-36.

The three Y1P-36s were delivered in March 1937 and won that year's fighter competition. Curtiss came away with a contract for 210 P-36As, the largest US Army order for fighters since World War One. Unfortunately, even by 1938 the type was obsolescent, with a lower service ceiling, top speed and weaker armament than the Supermarine Spitfire or Messerschmitt Bf 109, which had been its design contemporaries in 1934. The P-36 was arguably at its peak, while both the British and German fighters were at the outset of their development.

# TECHNICAL DETAILS

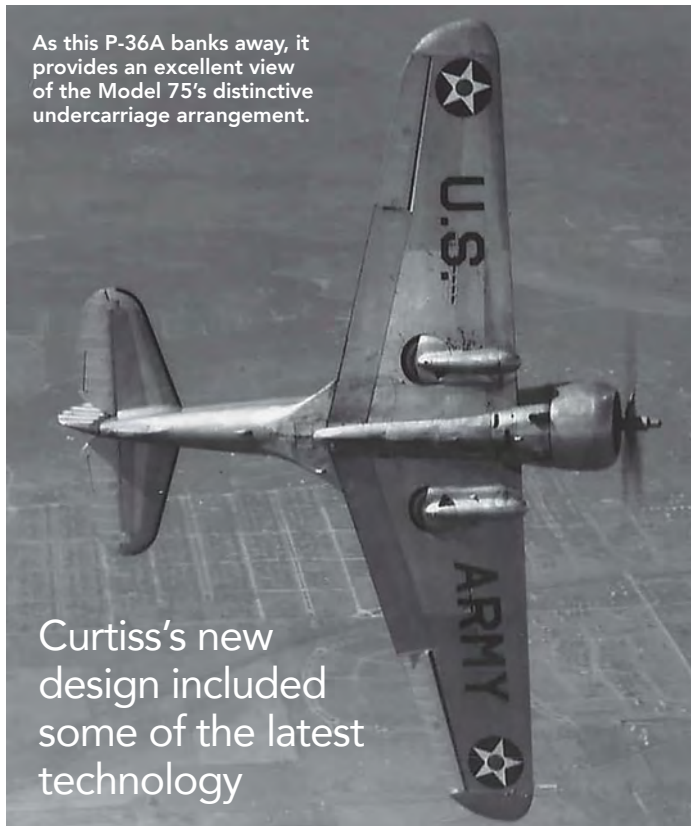


The P-36 was the first all-metal monoplane developed and manufactured by Curtiss-Wright. Throughout its service, the fighter was underpowered, due to the inability of American engine manufacturers to develop a reliable high-powered radial while the P-36/Hawk 75 was in production. As Finnish ace Kyösti Karhila recalled, "it wasn't fast enough". The Wright R-1820 Cyclone used in the H75A-4/A-8/Mohawk IV sub-type was troublesome and unreliable, with no two units putting out the same power, added to which were problems of oil loss in flight. The Pratt & Whitney R-1830, employed in the P-36 and the other H75 sub-types, was the superior engine; the Finns ultimately replaced the Wright engines in their H75A-8s with R-1830s obtained through the Germans from French spares, despite the fact that the Wright-powered aeroplane was slightly faster.

The fighter also suffered from its light armament, the AAC standard at the time being one .50in and one .30in machine gun, both firing through the propeller disc. This was increased in the last 35 aircraft, delivered as the P-36C, by the addition of one .30in weapon in each wing outboard of the main gear and firing outside the propeller disc. Hawk 75 models after the H75A-1 were armed with an additional .30in weapon in each wing for a total of six. Sgt Chuck Baisden, who worked as an armourer on both the P-36 in the air corps and the later P-40/Tomahawk II as a member of the American Volunteer Group, remembered that servicing the nose-mounted guns on the P-36 was difficult due to the radial engine, in comparison with the later liquid-cooled, in-line engine of the P-40/Tomahawk II. "You almost always busted a knuckle at least once servicing a P-36. That never happened with the P-40. That might sound like a minor detail, but it was important when it was your knuckle being busted."

In construction, the P-36 employed Northrop's multi-cell

As this P-36A banks away, it provides an excellent view of the Model 75's distinctive undercarriage arrangement.



design for the wing, with the Boeing-designed main gear that rotated 90° during retraction to lie flat in the wing. This was a considerable improvement over the retractable undercarriage used by contemporary Northrop designs and the Seversky P-35, in which the mainwheel remained vertical when retracted and was partially enclosed in a large nacelle on the lower wing surface. Northrop quickly exchanged this system, which it had used on the BT-1 dive-bomber, for inward-retracting gear that allowed the wheel to lie flat in the wing without needing the rotation system, when the A-17 and the Model 3 fighter were conceived.

Designer Don Berlin adopted Jack Northrop's philosophy that an aeroplane should be as light as possible, commensurate with the design strength necessary to accomplish the mission. Thus, the P-36/Hawk 75 had a very good power-to-weight ratio of 0.186hp/lb that allowed an excellent climb performance for the time, and was responsible for the aircraft's fine manoeuvrability. The

extremely low wing loading of just 23.9lb per square foot gave it outstanding turning performance. The P-36 also had extremely favourable high-speed handling. The ailerons were light and powerful, giving it the best roll rate and turning capability of

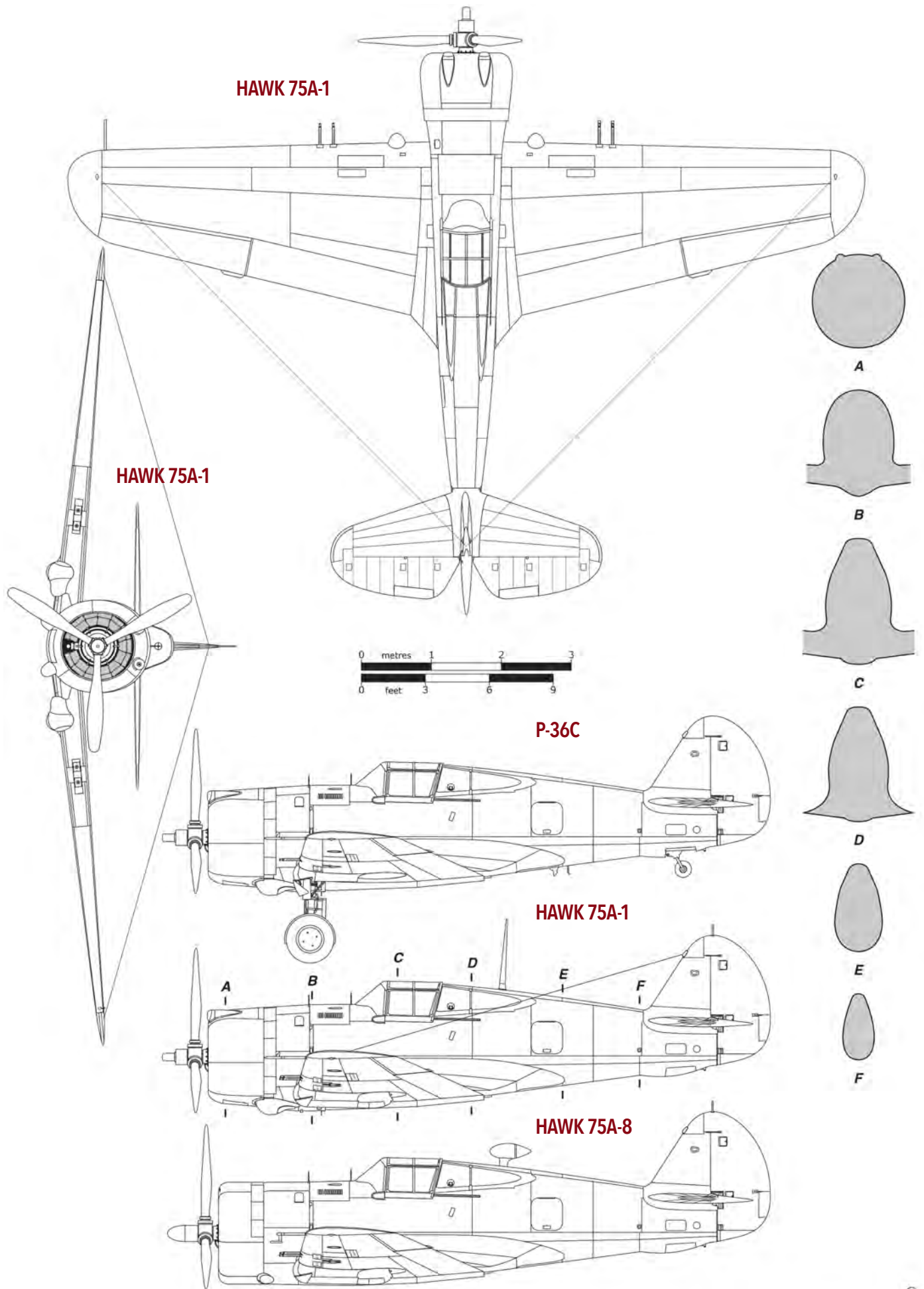
any of its design contemporaries. When the UK's Aeroplane and Armament Experimental Establishment tested a French Hawk 75 in the autumn of 1939, it found that the aircraft bettered the Spitfire I on every count other than top speed and weight of fire. Steve Hinton, the only modern pilot to have flown every sub-type of P-36, Hawk 75 and P-40 now in airworthy condition, stated that the P-36 has the best control lightness and manoeuvrability of any of the series.

However, it was underpowered, affecting its acceleration and top speed, and it did not accelerate in a dive as well as the later P-40 would. High-altitude performance was seriously handicapped by the lack of a two-stage supercharger.

But despite its limitations, given its record in the Battle of France, and in service with the Finns on the Eastern Front and the British in the China-Burma-India (CBI) theatre, the P-36/Hawk 75 is an aircraft deserving of better memory than the dismissiveness of earlier chroniclers. It was the first thoroughly modern US fighter design of its era, and it led the way to important aircraft that followed. ➤

## SPECIFICATIONS

	Model 75 (First prototype, initial configuration)	Y1P-36	P-36A
<b>POWERPLANT</b>			
	One Wright SCR-1670-G5, 900hp	One Pratt & Whitney R-1830-13, 1,050hp	One Pratt & Whitney R-1830-13 or -17, 1,050hp
<b>DIMENSIONS</b>			
Length:	28ft 3.5in	28ft 10in	28ft 6in
Span:	37ft 0in	36ft 3.5in	37ft 4in
Height:	9ft 1in	9ft 0in	9ft 0in
<b>WEIGHTS</b>			
Empty:	3,760lb	4,267lb	4,567lb
Gross:	4,843lb	5,414lb	5,470lb
<b>PERFORMANCE</b>			
Maximum speed:	281mph at 10,000ft	293mph at 10,000ft	313mph at 10,000ft
Cruising speed:	250mph	261mph	n/a
Service ceiling:	30,000ft	31,500ft	33,000ft
Range:	537 miles	790 miles	825 miles at 270mph and 10,000ft
<b>ARMAMENT</b>			
	Two machine guns	One 0.50in and one 0.30in machine gun	One .50in and one .30in machine guns in nose





An 18th PG P-36A flying near Oahu, Hawaii, on a sortie from its Wheeler Field base. USAF



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Although outmoded by the outbreak of war, the P-36/Hawk 75 family acquitted itself very well in combat

## US ARMY AIR CORPS

**P**-36s began arriving in AAC pursuit groups in 1938, replacing the ancient P-26 'Peashooter'. In 1939, the P-36 accounted for one quarter of the first-line strength of the air corps, an air force then ranked as the 13th most powerful in the world. The first unit to re-equip completely was the 20th Pursuit Group at Barksdale Field, Louisiana.

The type's initial service was marred by numerous teething problems with the engine exhaust, skin buckling above the landing gear, and weak points in the airframe that severely restricted the

performance envelope. By the time these were resolved, the P-36 was considered obsolete, being relegated to training units and overseas detachments at Albrook Field in the Panama Canal Zone, Elmendorf Field in Alaska, and Wheeler Field in Hawaii.

“In the 8th Pursuit Group, 2nd Lt Erik Shilling found the new fighter 'delightful' to fly with its excellent manoeuvrability”

In the 8th Pursuit Group, 1st Lt Hubert L. Zemke later remembered how much he liked the P-36, while 2nd Lt Erik Shilling found the new fighter "delightful" to fly with its excellent manoeuvrability. The 1st Pursuit Group at Selfridge

Field, Michigan had its 17th and 94th Pursuit Squadrons equipped with P-36s while the 71st squadron flew the P-35.

The 1st, 8th and 20th Pursuit Groups all used the P-36 in the United States until they began re-equipping with newer fighters in 1940-41. The 1st PG

its P-26s for the P-36 in 1940, and had re-equipped with the P-40C by December 1941. The 15th PG brought 31 P-36s to Hawaii in February 1941 aboard the carrier USS *Enterprise*, and in December was still equipped with some P-36s alongside more modern P-40Cs. The 16th and 32nd PGs both operated the P-36 in the Panama Canal Zone, while the 35th and 36th flew P-36s while they were training after being formed, but replaced them before moving overseas.

After Pearl Harbor, the P-36 rapidly went out of service. By the summer of 1942, VII Fighter Command on Hawaii had 28 P-36s, of which 22 were serviceable, as against 101 P-40s serviceable out of a total of 134. ➤

Some pilots who claimed victories at Pearl Harbor pose for the press on 8 December 1941 in front of the P-36 said to have been flown by 2nd Lt Harry Brown (left) to claim his two victories. Brown aside, they comprise, from left to right, P-36 pilots 1st Lt Lewis Sanders and 2nd Lt Philip Rasmussen, and 2nd Lts Kenneth Taylor and George Welch who had flown P-40s. USAF



## P-36s AT PEARL HARBOR

The only time US Army Air Forces — as the Army Air Corps was redesignated on 20 June 1941 — pilots flew the P-36 in combat was during the Japanese attack on Pearl Harbor, on 7 December 1941. At the time, the AAF fighter squadrons on Hawaii were in the process of re-equipping with the P-40C that had superseded the P-36, but there were still some P-36s on their strength.

That morning, 2nd Lt Philip M. ‘Phil’ Rasmussen of the 15th Pursuit Group’s 46th Pursuit Squadron was awakened in his barracks at Wheeler Field by the sound of aircraft flying low overhead. Going to his window, he saw a formation of Japanese aircraft dropping bombs on the airfield. He strapped his .45-calibre pistol to the outside of his pyjamas and ran to get an aeroplane.

When he got to the flightline, he found most of the aircraft had been destroyed, though

two P-36s and four P-40s had managed to take off at 08.35hrs. Rasmussen found an unscathed P-36A, still in its peacetime natural aluminium finish — one of the last not to have received camouflage. He started up and taxied it to a revetment where groundcrew loaded it with ammunition. At 08.50 Rasmussen, 1st Lt Lewis M. Sanders, 2nd Lt Gordon H. Sterling Jr, and another 46th squadron pilot managed to take off in their P-36s. They

became separated in the clouds. Sanders got behind one of the D3A ‘Val’ dive-bombers and shot it down. Rasmussen followed. When he charged his two guns, he found the .30-calibre gun was jammed while the .50-calibre weapon started firing on its own. A moment later, Sterling shot down a ‘Val’, but then was caught by the escorting Zeros and was shot down over the ocean. He got out of his aircraft but drowned.

“A small number of 47th Pursuit Squadron pilots were able to fly numerous sorties, alternating between the P-36A and P-40C”

were ordered to fly to Kaneohe Bay on the north-east side of the island. Rasmussen recalled, “We climbed to 9,000ft and spotted Japanese ‘Val’ dive-bombers”. There were 11 enemy aircraft including Zero fighter escorts. “We dived to attack them.”

Rasmussen, Sanders and Sterling attacked the enemy formation while the fourth pilot

While Rasmussen struggled to stop his faulty gun firing, a Zero flew in front of him, directly into a burst of gunfire, and exploded. Shaking off the two Zeros coming in on his tail, Rasmussen got his gun under control and raked another enemy aircraft with gunfire as it flashed past. Suddenly, he felt himself taking hits. “There was a lot of noise. He shot my

canopy off”. Zero pilot Iyozo Fujita then tried to ram him. Both aircraft survived the glancing hit and Fujita managed to return to his ship, the carrier *Sōryū*. Rasmussen lost control of his P-36 as it tumbled into the clouds that covered the mountain range below, its hydraulic lines severed and the tailwheel shot off. Emerging from the clouds at 5,000ft, just above the wooded mountains, Rasmussen managed to regain control of his P-36 and returned to Wheeler Field, where he landed with no brakes, rudder or tailwheel. Once down, the groundcrew counted more than 500 bullet holes in the wrecked P-36, including two 20mm cannon shells that had buried themselves in the bulky radio behind the pilot’s seat, saving Rasmussen’s life.

The 47th Pursuit Squadron — which had fortunately moved to Haleiwa airfield, some 15 miles from Wheeler Field, where it was not subject to attacks — was the 15th PG’s most successful unit on the day. A small number of its pilots, equipped with both P-36As and P-40Cs, were able to fly numerous sorties, often alternating between the different Curtiss fighters. Most successful were P-40 pilots George Welch, who shot down four attackers, and Ken Taylor, who got two. Once the attack was over the surviving P-36s took part in the unsuccessful attempts to locate the Japanese fleet.

The three enemy aircraft shot down by Rasmussen, Sanders and Sterling were the only victories ever scored by AAF pilots in the P-36. Visitors to the National Museum of the United States Air Force at Wright-Patterson AFB, Ohio, will find that the opening exhibit features a mannequin of a pyjama-clad pilot climbing into a P-36A in the markings of Rasmussen’s airplane. The exhibit (which is pictured on page 95) is informally titled ‘The Pyjama Pilot’.





The bright markings denote the fact that these two H75A-2s, serials 203 and 88, of GC I/5 are in Vichy French service. The unit was stationed in Morocco when this shot was taken in late 1942. VIA CHRISTIAN-JACQUES EHRENGARDT

## FRENCH AIR FORCE

Curtiss had always been known for maximising the export potential of its products, and the Hawk 75 was no exception. The largest export order went to the French Armée de l'Air just before the outbreak of the Second World War.

Numerically second only to the Morane-Saulnier MS406, the Hawk 75 equipped four Groupes de Chasse at the time of the German invasion on 10 May 1940. During the 'Phoney War' of 1939-40 and the Battle of France in May and June 1940, French pilots flying the H75A claimed 230 air-to-air victories of the total 1,009 notched up by the Armée de l'Air, with an additional 81 probable victories, against only 29 aircraft lost in aerial combat. While making up only 12.6 per cent of the French single-seat fighter force, the H75A accounted for almost a third of the air-to-air victories claimed during the Battle of France. Of the 11 French pilots to qualify as aces by the time of the surrender, seven flew the Hawk 75.

With the disappointing performance of the MS406 and Bloch MB150, and the superior

Dewoitine D520 a year from production, the Armée de l'Air was forced to consider the purchase of foreign fighters at the time of the Munich crisis. Even before the P-36A entered production, the French entered negotiations with Curtiss for

the delivery of 300 aircraft. The negotiations were very drawn-out, due to the high cost quoted for the fighters by Curtiss, which was double that of the MS406 and MB150, while the delivery schedule was deemed too slow. Additionally,

the AAC, unhappy with the rate of deliveries to that service and believing that fulfilling export orders would slow things down even more, actively opposed the sale to France. President Franklin Roosevelt was finally forced to intervene directly in order to give the French test pilot Michel Détrouy a chance to fly the Y1P-36.

To satisfy the AAC concerns, Curtiss convinced the French government to invest in a

“The Armée de l'Air's Hawk 75As accounted for almost a third of the air-to-air victories claimed during the Battle of France”



A pre-war colour view of H75A-1 serial 75 in service with GC I/4, possibly taken at Wez-Thuisy near Reims. VIA CHRISTIAN-JACQUES EHRENGARDT

second factory in Buffalo to ensure the promised delivery dates. While the prices quoted by Curtiss were nearly twice what the French thought the fighter was worth, it had the distinct benefit of being proven and available.

Détroyat's enthusiasm for the fighter once he flew it, the continuing unsuccessful attempts to deal with the problems of the MB150, and the pressure of expanded German rearmament finally forced France to purchase 100 aircraft and 173 engines. The first Hawk 75A-1 arrived in France in December 1938 and the rest began entering service in March 1939. A few months later, H75A-1 number 1 was part of Groupe de Chasse II/5 'La Fayette', heir of the American-manned Escadrille Lafayette that fought in France during World War One, with the famous Sioux head emblem on its fuselage.

After the first few complete aircraft were delivered, further airframes were delivered in pieces and assembled in France by the Société Nationale de Constructions Aéronautiques du Centre (SNCAC). Officially designated as the Curtiss H75-C1 ('C1'

## PORTUGAL

While Portugal was officially neutral during World War Two, the Allies were allowed to use or establish ports and airfields on various Portuguese territories. One result of these friendly relations was the transfer in 1941 by the British government of 12 Mohawk IV fighters to the Força Aérea Portuguesa (FAP), which assigned them to air defence duties in the Azores.

indicating '1 place chasse', or 'single-seat fighter'), the fighters were powered by Pratt & Whitney R-1830-SC-G engines of 900hp, with the instruments calibrated in metric, a seat modified for French dorsal parachutes, and a French-style throttle which

sub-types had an expanded armament of two guns in each wing for a total of six.

The H75A evolved through several modifications, the most significant change being the installation of the Wright R-1820 Cyclone engine in the H75A-4 variant. The

“Czech ace František Peřina remembered, 'It was not as fast as the Messerschmitt, but it could outmanoeuvre any German aircraft'”

operated in reverse from US and British aircraft, with full throttle to the rear rather than to the front. For the H75A-1, the armament was four 7.5mm FN-Browning machine guns — two in the nose and one in each wing — aimed with a French-supplied Baille-Lemaire gunsight. The H75A-2 and later

H75A-4-C1 saw no operational use by the Armée de l'Air due to its late delivery and the unreliability of the Wright radial engine. In all, 316 H75s were delivered to France between December 1938 and the French surrender in June 1940.

When the Germans invaded western Europe on 10 May

1940, the Armée de l'Air pilots immediately discovered that the H75 was inferior to the Bf 109E on all counts other than manoeuvrability and airframe strength. The Messerschmitt was able to break off combat at will due to its higher speed, though the Hawk proved able to take punishment and still return to base. Czech ace František Peřina, who flew the Hawk 75A-3 with GC I/5 during the Battle of France, remembered, "It was not as fast as the Messerschmitt, but it could outmanoeuvre any German aircraft. If one got on your tail, in one 360° turn you were behind him."

By November 1942, the H75A-3s of GC II/5 were among three Hawk 75 units based in Morocco, outside Rabat on the Atlantic coast, with Vichy French forces. On 8 November 1942, American forces invaded French Morocco, and the Hawks engaged in combat with US Navy Grumman F4F-4 Wildcats of VF-9 and VF-41 for two days. Fifteen H75s were lost in combat while the French shot down seven Wildcats. Following the armistice, the French units re-equipped with

## EDMOND MARIN LA MESLÉE: THE TOP HAWK 75 ACE

Lt Edmond Marin la Meslée of Groupe de Chasse I/5 was the French 'ace of aces' during the Battle of France. With 16 victories and four probables, he is the highest-scoring ace in the Curtiss Model 75 of any pilot in any air force.

Born in Valenciennes on 5 February 1912, Meslée entered law school in 1931 to please his family. Taking advantage of a government aviation programme, he learned to fly at the Morane-Saulnier flying school, obtaining his pilot's licence on 11 August 1931. Shortly thereafter, he volunteered for two years' service and entered the Armée de l'Air flight training school at Istres. After graduation, he was sent to the 2ème Régiment de Chasse in Strasbourg with the rank of second lieutenant. In 1934, with his enlistment about to expire, he re-enlisted for two more years, but had to take a reduction in rank to sergeant.

Meslée was admitted to the French Air Force Academy in October 1937, and promoted again to second lieutenant upon



Lt Edmond Marin la Meslée in his GC I/5 Hawk.

graduation in 1939. Assigned to GC I/5, commanding officer Cne Jacques Accart recognised his potential as a fighter pilot.

GC I/5 was based in northern France near the Belgian border, and thus did not see action as did the fighter units to the south-east based opposite the Siegfried Line. However, during the 'Phoney War' period, Meslée shot down a Dornier Do 17 on 11 January 1940.

Meslée next entered combat on 11 May, the day after the German attack in the west began, when he shot down three

German aircraft. He downed one aircraft each on 13, 15 and 16 May, three on 18 May, and six more by 10 June. On 11 June 1940, Accart was wounded in combat and Meslée took his place as the leader of the 1ère Escadrille.

GC I/5 remained in combat until 25 June, when the unit evacuated to North Africa. During the Battle of France, GC I/5 downed 117 German aircraft, losing only four pilots, one of whom died of blood poisoning while in hospital, and had the best record of any fighter unit in the Armée de l'Air.

more modern aircraft, GC II/5 exchanging its Hawk 75s for its descendant, the P-40F.

Some H75s found themselves back in metropolitan France, and back in Allied hands, during 1944 following the D-Day invasion. They were flown, presumably as 'hacks', by the commanders of fighter groups; others may have formed part of the Groupe Patrie, a unit that fought against German forces holding out in the so-called Atlantic Pockets. The last H75s remained in service as fighter trainers at Cazaux, with the 4ème Escadrille, until 1947.

## THE RAF'S MOHAWKS

Following the Franco-German armistice, almost all of the 200 Cyclone-powered H75A-4s on order for the French were taken on charge by the RAF, since they had not yet been delivered. While the previous H75s had been powered by the Pratt & Whitney R-1830 Twin Wasp, the H75A-4 used the Wright GR-1820 Cyclone 9. The Cyclone-powered H75 was the fastest of all, with a top speed of 323mph, though the Cyclone was a much more troublesome engine than the Twin Wasp, suffering constant problems with oil pressure. The H75A-1, A-2, A-3 and A-4 variants transferred to the UK were designated Mohawk I, II, III and IV respectively.

The 200 ex-French H75A-4s, along with 12 similar H75A-8s that were originally sold to Norway and 12 H75A-9s bought by Iran, were all known in the RAF as the Mohawk IV. After assembly in the UK, they were kept at maintenance units while there was the danger of a German invasion. Once this had passed, the Mohawks were sent overseas, beginning in late 1941.

Seventy-two Mohawk IVs were used as fighter trainers in South Africa, though at least one South African Air Force squadron used them for the air defence of Cape Town until 1943, when the likelihood of an Axis air attack was remote. ➔



Mohawk IV BJ456/OQ-O of No 5 Squadron at Akyab on 16 March 1942. This aircraft was lost a couple of months later, on 24 May, during a sortie to Fort Hertz. C. V. BARGH



No 155 Squadron Mohawk IVs BS798/B, BT470/F and AR661/V near Agartala, India, in August 1943. H. BISHOP

## CHINA

A Hawk 75H demonstrator for a low-cost, fixed-undercarriage Model 75 was sent to China in 1937 and purchased by the Chinese Nationalists for advisor Claire Chennault as his personal aircraft. It was flown in combat by Chennault and other volunteer pilots against Japanese forces until it was written off in May 1938. On the strength of the 75H's performance, 30 H75s were ordered, designated as the 75M, with further aircraft to be produced by the Central Aircraft Manufacturing Corporation (CAMCO). The 75Ms arrived in May 1938 and went into action in August over Hengyang with the 25th Pursuit Squadron. Attrition was high, with many lost in accidents, though at least two remained in 1942 and were used for scouting out landing sites for the 'Doolittle Raiders'.



Fixed-undercarriage Hawk 75H demonstrator NR1276 was the aircraft used by Claire Chennault during his time as an advisor to the Chinese Nationalists. KEY COLLECTION

The remaining Mohawk IVs were sent on to India, where No 5 Squadron, RAF began equipping with the fighter in December 1941, providing the sole air defence of north-east India until May 1942. In March that year, No 146 Squadron was equipped with Mohawks, while No 155 Squadron took them on in September. The three squadrons formed the Mohawk Wing.

The Mohawks were used for bomber escort, standing patrols and close support over the eastern India front and Burma. In January 1943, the squadrons began 'Rhubarb' operations, sending flights of two to four fighters free-ranging over enemy territory at low altitude in bad weather, strafing whatever enemy activity they came across. The type's manoeuvrability was put to good use on these operations, which frequently constituted the only offensive RAF sorties mounted during the monsoon season, beginning in May and lasting through October.

The Mohawk Wing was heavily engaged in ground support operations during the fighting following the Japanese invasion of Imphal in February-March 1943. No 5 Squadron turned in its Mohawks for Hurricanes in June 1943, followed by 146 that October. No 155 Squadron was the last to fly the fighter, exchanging its Mohawks for Spitfire VIIIIs in January 1944. At least six



A flight of H75A-7s from the Royal Netherlands East Indies Army Air Force.

Japanese Ki-43 fighters were shot down by Mohawks during escort and 'Rhubarb' missions, including two credited to the Mohawk IV named *Joe Soap II* (serial BS374), which was operated by No 155 Squadron.

## THE NETHERLANDS EAST INDIES

In October 1939, the Netherlands ordered 24 Hawk 75A-7s for the Dutch East Indies. These aircraft were powered by the Wright GR-1820 Cyclone 9. Factory armament was one .50in and one .303in machine gun in the

cowl with two .303in machine guns in the wings. After delivery, the .50 weapons were replaced with a .303 machine gun to standardise parts and ammunition.

The fighters were shipped in 1940 and almost rerouted to the Netherlands when Germany invaded. But as the mainland surrendered, the aircraft went to the colonies where they were used extensively against the Japanese attack on the far eastern part of the kingdom. By that time, the aircraft had flown so many hours that the engines were showing serious wear and tear.

Most Dutch Hawks were assigned to the 1e Jachtvliegtuig Afdeling — Vliegtuig Groep IV (1e JaVA — 1-VIG IV or 1st Fighter Squadron — Flying Group IV) of the Militaire Luchtvaart van het Koninklijk Nederlands-Indisch Leger (ML-KNIL, or Royal Netherlands East Indies Army Air Force), although some flew with 1-VIG V. These aircraft saw action over Malacca, Sumatra and Java, successfully bombing railways and intercepting bombers, and participated in dogfights over Surabaya in company with AAF and RAF fighters until the Dutch surrender in March 1942. Imperial Japanese Navy ace Saburō Sakai considered the Hawk easy prey.

## FINLAND'S FINEST FIGHTER?

At the end of the Winter War, Finland was in need of more modern equipment than the Fokker D.XXIs that had been its first-line fighter. Forty-four Brewster B-239s (F2A-1s) were obtained from the United States in the summer of 1940. Following the fall of France, the Germans had come into possession of a considerable number of H75As formerly operated by the French, and



Different pilots notched up 10 aerial victories in this Finnish Air Force H75A-3, CU-503, here being operated by LeLv 32 over the Olonets Isthmus in the summer of 1942. J. SARASTO



## HAWK 75 EXPORT VARIANTS

**Hawk 75A-1:** First production batch for France, four 7.5mm (0.295in) machine guns, R-1830-SC-G of 900hp; 100 delivered

**Hawk 75A-2:** Second production batch for France, either 900hp R-1830-SC-G or 1,050hp R-1830-SC3-G, six 7.5mm machine guns; 100 delivered

**Hawk 75A-3:** Third production batch for France, similar to Hawk 75A-2; 135 built, 133 delivered

**Hawk 75A-4:** Last production batch for France, Hawk 75A-2 with Wright R-1820-G205A Cyclone radial of 1,200hp; 285 built, 81 delivered to France; others to Great Britain as Mohawk IV

**Hawk 75A-5:** Similar to Hawk 75A-4. Built under licence in China (production later moved to India), absorbed into RAF as Mohawk IV

**Hawk 75A-6:** Produced for Norway; aircraft captured during the German invasion were eventually sold to Finland

**Hawk 75A-7:** Produced for Netherlands East Indies; 1,200hp Cyclone, one .50in (12.7mm) and one .303in (7.7mm) in cowling and two .303in guns in wings; later four .303in, two in nose, one in each wing, and six 50lb (23kg) bombs

Among 30 H75A-8 models flown by the Norwegian Army Air Service as advanced trainers at the 'Little Norway' facility in Canada was serial 447. CHRIS SANDHAM-BAILEY

**Hawk 75A-8:** Export version for Norway; 30 examples flown as advanced trainers at the so-called 'Little Norway' training facility at Toronto Island Airport in Ontario, Canada; later redesignated P-36G

**Hawk 75A-9:** Ten aircraft delivered to Persia, captured while still in crates and used by the RAF in India as Mohawk IV

**Hawk 75M:** Simplified version with fixed landing gear and Wright R-1820 Cyclone for China, built by both Curtiss and Central Aircraft Manufacturing Company in China

**Hawk 75N:** Simplified version for Siam (Thailand) with fixed landing gear and wheel spats

**Hawk 75O:** Simplified version for Argentina, 30 built and delivered by Curtiss with additional 200 to be built under licence locally by Fábrica Militar de Aviones; only 20 completed

**Hawk 75Q:** One or possibly two additional demonstrators for China; at least one reputed to have been given armament similar to that of the XP-36F and to have engaged in combat over Shanghai during the Japanese attacks in September 1937, reportedly shooting down several bombers before being brought down with the loss of the American pilot

they were willing to sell the fighters to the Finns as part of their campaign to strengthen ties with the country in preparation for the coming war with the Soviet Union. In October 1940, Germany agreed just such a deal.

These negotiations were almost as one-sided as had been the original talks by the French with Curtiss in 1938; the Germans sold the fighters to the Finns for an even higher unit price than the French had complained about. Forty-four captured aircraft of five sub-types were sold over three deliveries between 23 June 1941 and 5 January 1944. The

H75s included Twin Wasp-powered H75A-3s and Cyclone-engined H75A-4s. Additionally, some H75A-6s with Twin Wasps and H75A-8s using Cyclones that had initially been sold to Norway and were captured in their wooden

crates were acquired by Finland as part of the first purchase.

After originally being assigned to Lentolaivue (Fighter

Squadrons, or LeLv) 14 and 16 to be used for high-speed reconnaissance, the Hawks were eventually flown by Lentolaivue 32 throughout their wartime service and were popular with Finnish pilots,

“The secret of the Hawks’ success was the high standard of pilot training maintained throughout the war by the Finnish Air Force”

who called the type 'Sussu' ('Sweetheart'). After the 1944 armistice, the surviving Hawks remained in service with HLeLv 11, HLeLv 13 and the LeSK (Air Fighting School) until 1948.

While the Hawk 75 was considered obsolete by many before it first saw European combat in 1940, 58 Finnish pilots scored 190.33 victories on type between 16 July 1941 and 27 July 1944, for the loss

of 15 Hawks. The secret of their success was the high level of pilot training maintained throughout the war by the Finnish Air Force, a standard considered better than that of the pre-war Luftwaffe. While they were pitted in combat against poorly trained Soviet pilots, they were vastly outnumbered, which makes their achievement all the more impressive.

### THAILAND

A few fixed-gear Hawk 75Ns were used by Thailand during the Franco-Thai War. They also fought at the Battle of Prachuab Khiri Khan against Japanese forces during the Japanese invasion of Thailand. On 28 January 1941, the Royal Thai Air Force (RTAF) dispatched nine Mitsubishi Ki-30 bombers, escorted by three Hawk 75s, to bomb Pailin and Sisophon in French Indochina.



## What Finland's top-scoring Hawk 75 ace thought of the American mount



A flight of Ilmavoimat H75s, drawn from both LeLv 12 and 36, during a patrol on 18 October 1943. SA-KUVA

With 13.5 victories attained while flying the Hawk 75, Kyösti Karhila was the top-scoring Finnish Hawk pilot and the second highest-scoring Model 75 pilot of the war after France's Edmond Marin la Meslée (see page 90).

Karhila followed his father, who had fought during the Liberation War of 1918-19 that founded modern Finland, into the Finnish military. Aged 16 in 1937, he joined an aero club founded by the country's national aviation association and obtained his A and B glider licences over the course of a month. During the summer of 1939, he completed 35 hours of powered flight training and became a reservist in the Ilmavoimat, the Finnish Air Force, where he began advanced flight training that autumn, starting his military service on 6 December 1939, Finnish Independence Day. With 84 other students, he trained while the Winter War raged, completing his training and receiving his wings just too late to see combat service.

In April 1940, Karhila was posted to Lentolaivue 34, equipped with Fokker D.XXIs that had been handed down from Lentolaivue 24, the unit that had flown them in the

was sent home on 4 June 1941. Two weeks later, on 20 June, he was recalled to active service and posted to Lentolaivue 32. On 21 June, the squadron flew its Fokkers

“I always liked the way the Hawk flew. The Messerschmitt was faster and had heavier armament, but the Hawk was a better flyer”

Winter War, after that squadron re-equipped with Brewster B-239s. He completed his 18 months of compulsory service with a promotion to ensign and

to Hyvinkää, where they were assigned to the air defence of Helsinki and the Riihimäki railway crossing. Karhila recalled, “I did fly some



ABOVE: Pilots of LeLv 32, including Karhila and unit CO Capt Lauri Bremer, with an H75 at Nurmoila in July 1942. SA-KUVA

ABOVE RIGHT: Capt Kyösti Karhila in June 1942, in service with LeLv 32 on the Curtiss machine. SA-KUVA

interception missions, but I did not see a single enemy. Our task was to defend the town of Kotka and its harbour, and also the railway crossing at Kouvola. However, we found our Fokkers were totally obsolete. Our squadron leader, Maj Ehrnrooth, complained to the air force headquarters that our squadron could not fulfil our task”. In mid-July, Lentolaivue 32 traded its Fokker D.XXIs for the Curtiss Hawk 75s that had been flown by Lentolaivue 14 and 16.

Karhila had good memories of the Hawk 75. “The CU [the Ilmavoimat's abbreviation for the Curtiss type] was 50km/h faster than the Fokker, and had a retractable undercarriage, along with a better armament. Performance — agility, climb — was better than the Fokker and the CU was manoeuvrable. Technically, it was the state of the art in those days, in our opinion.”

Karhila finally saw combat on 31 July 1941. “Maj Ehrnrooth was going sightseeing and asked for a volunteer wingman and he selected me. We set off to the air base at Suur-Merijoki, which was now in enemy hands. When we crossed the front, we were shot at by heavy anti-aircraft fire, which was the first time for me. He was flying a Cyclone-powered aeroplane, and suddenly his oil temperature went up and he had to decrease power. We didn't have radios and I wondered why he flew so slowly. I kept a sharp look-out and spotted two dots behind us. I kept watching, and they were Russians — two ‘Chaikas’,



[Polikarpov] I-153s. Since our radios weren't working, I added power and went ahead of the major and signalled to him, 'follow me.'

"I turned against the enemy as they were diving on us from higher altitude. We turned against them head-on and fired. That is the most unpleasant situation, since neither pilot knows which direction to dodge. If you do not dodge, you will be rammed, but if you dodge too early, they will get a chance to shoot at you. My Russian did not dodge and the 'Chaika' nearly rammed me. We both banked around and came back at each other. After the third turn he was gaining on me and I knew I was going to be in trouble. At about 2,000m, I pushed over and dived. I looked behind to see that the 'Chaika' tried to follow, but he was left behind. Then I returned to find my leader.

"Maj Ehrnrooth had shot down the second 'Chaika'. I joined on his wing, thinking I was in trouble, that I had abandoned my leader in the face of the enemy. When we landed, I went to him and attempted to report. He slapped me on the shoulders, and said, 'That's the way! You saved us both!' He had no idea those Russians were near 'til I saw them, and he praised me to the heavens."

On 10 August 1941, flying Hawk CU-560 — which became 'his' aeroplane, and in which he scored eight of his 13.5 Hawk victories — Karhila remembered, "We met a two-plane patrol of [Polikarpov] I-16s. The leader opened fire as he turned toward us with 20mm cannon — the muzzle flashes were tremendous. We both turned for a second head-on pass, after which I got behind him. He dived vertically and I followed. I got off a burst and realised we were too low. I pulled the stick back so hard I passed out. When I came to, I didn't see the I-16 anywhere. It was likely he crashed, but I did not see that."

By early 1943, Karhila was an experienced flight leader. On 9 February, while based at



Andy Durston getting airborne from La Ferté Alais last year in The Fighter Collection's H75A-1, 82/G-CCVH. BEN DUNNELL



Steve Hinton puts TFC's gleaming P-36C, 38-210/G-CIXJ, through its paces over Duxford during 2015. BEN DUNNELL

## SURVIVORS

Two complete examples can be found on static display in museums. The first P-36A delivered to the Army Air Corps, 38-001, is on display at the National Museum of the US Air Force in Dayton, Ohio. The aircraft was donated to the museum by Edward S. Perkins of Anniston, Alabama, in April 1959, and is painted to represent the P-36A flown by 2nd Lt Philip Rasmussen during the Japanese attack on Pearl Harbor, on 7 December 1941. The Royal Thai Air Force Museum, meanwhile, has a fixed-gear Model 75N, sometimes quoted as c/n 12763.

Hawk 75A-1 number 82/G-CCVH is owned by The Fighter Collection at IWM Duxford. The aircraft was originally issued to the 1ère Escadrille, Groupe de Chasse II/5 'La Fayette' and was the personal aircraft of Cdt Murtin, CO of GC I/5 and II/5. After post-war service as a trainer, the aircraft was saved from scrapping in the 1950s and placed in storage in France until being acquired by TFC during 1995. Following restoration by Matt Nightingale at Fighter Rebuilders in Chino, California, the Hawk first flew in 2004 and made its UK debut in 2005.

P-36C 38-210 was the last P-36 off the production line, and was delivered to the 17th Pursuit Squadron at Selfridge Field, Michigan in May 1939. The aircraft participated in the 1939 Cleveland Air Races that September with

experimental camouflage, and in the War Games at Maxwell Field. After use for flight-testing at Wright Field in 1940 the aircraft served with several different squadrons on the US east coast. In 1942 the P-36 was designated obsolete and flown to Buckley Field, Colorado. A Pratt & Whitney technical instructor moved the P-36 to Canada until it was sold to a Florida collector who passed it on to The Fighter Collection. Chino-based Matt Nightingale supervised the restoration, which was completed in time for the P-36C's first public appearance at the 2015 Planes of Fame Airshow. It then moved to Duxford.



The 'Pyjama Pilot' exhibit in the National Museum of the USAF, featuring P-36A 38-001. USAF

Nurmoila west of Lake Ladoga, he took part in the ambush of a Petlyakov Pe-2 light bomber. The twin-engined Pe-2 was so fast that a Hawk 75 could only catch one if it had an altitude advantage sufficient to build up speed in a dive. "I managed to surprise the lone Pe-2. I hit a fuel line in the cockpit area, a fire broke out in

the cockpit and two men bailed out while the Pe-2 crashed in a bog."

In March 1943, Karhila was transferred to HLeLv 34, commanded by Maj Eino Luukkanen, and transitioned to the Bf 109G. At the end of June 1944, he was posted to command HLeLv 24 after 'Hasse' Wind was wounded.

By the time of the armistice on 27 July 1944, Karhila had scored 34 victories. After flying for Finnair until he retired in 1973, and as a charter pilot until he quit at age 65 in 1986, Karhila recalled, "I always liked the way the Hawk flew. The Messerschmitt was faster and had heavier armament, but the Hawk was a better flyer."