

## P-51 development

In late 1939, with the likelihood of full scale war in Europe a major concern, the British Royal Air Force was looking seriously at methods of quickly increasing its fighter strength. In April 1940, the British Air Purchasing Commission approached North American Aviation with the intent of having them build [P-40's](#) for the RAF. Since the P-40 design went back to 1933, James H. "Dutch" Kendelberger, the president of North American offered to build an entirely new advanced fighter using the same [Allison V-1710-39](#) engine, used on the P-40. It was said that "Dutch" got his inspiration for the P-51 after a 1938 tour of aircraft industries in Great Britain and Germany.<sup>1</sup> North American's only previous fighter experience was with the **NA-50A**, but Dutch collaborated with J.L. "Lee" Atwood<sup>2</sup> to formulate an outline for the project. The British agreed on the new type, NA-73X, only on the stipulation that a prototype be on hand within 120 days. North American designers Raymond Rice and Edgar Schmued, the latter had worked for Fokker and Messerschmitt in 1925,<sup>3</sup> immediately set about meeting the requirements. A prototype was finished in 117 days minus the engine. Wheels also had to be borrowed from an [AT-6](#) trainer. Six weeks later, and after several modifications, the aircraft took to the air October 26, 1940.<sup>4</sup>

With Vance Breese at the controls, who was one of the most famous test pilots in his day, the XP-51 reached 382 mph, exceeding the [P-40's](#) top speed by 25 mph.<sup>5</sup> The P-51 was an immediate success and it even outperformed the [Spitfire](#).<sup>6</sup> Unique to the P-51 was the laminar flow wing design which was developed by the US National Advisory Committee for Aeronautics (NACA). Contemporary aircraft wings featured a wing cross-section with maximum thickness about a fifth of the way across the wing from the leading edge, with most of the camber on the top of the wing. The laminar flow wing, in contrast, has its maximum thickness well aft from the leading edge, and has almost as much camber on top as on the bottom. This feature reduced turbulent flow across the wing, thereby, reducing drag and increasing speed and range. Drag was also reduced by positioning a ventral radiator underneath the rear of the fuselage, to present the smallest possible fuselage cross section. The British Purchasing Commission was enthusiastic about the plane, and confirmed a production order for 320 Mustang Is. This was later increased by 300 for NA-83s, which differed only in minor details; the British designation was Mustang IA.<sup>7</sup> Powered by the 1,100 hp [Allison V-1710-39](#) (F3R) engine, the airplanes performance was only impressive up to 15,000 ft. However, performance would be dramatically improved once the airframe was matched with the [Rolls Royce Merlin](#) engine. This is not to say that the Allison wasn't a good engine as it performed very well on the [Lockheed P-38](#). The problem with the Allison had more to do with the USAAF's heavy reliance on turbosupercharging. This requirement was impossible to meet for all aircraft, due to a shortage of metal alloys, such as tungsten. There was some experimentation with turbosupercharged [P-40s](#) by designer Donaldson R. Berlin and these planes outperformed the [Spitfire](#) and [Messerschmitt Bf 109](#).<sup>8</sup>

During the design stage, on May 4, 1940, the US Army released the design for export with the condition that two of the planes be delivered to them for evaluation. At this time the NA-73 was assigned the XP-51 designation. The first and tenth airframes were sent to the Army for testing; these were given the serial numbers 41-38 and -39. An order for 150 P-51s followed which was to satisfy the RAF request as part of the Lend Lease legislation. After Pearl Harbor, 53 of these were kept back as reconnaissance aircraft. Initially, the P-51 was named "Apache" for a short time, but the name "Mustang" was later adopted. The British designation would be Mustang I. Most of the first 20 Mustangs to arrive in England were

used for test and evaluation.

It wasn't until 1942 that the USAAF decided to order 310 P-51As and 300 ground attack/bomber A-36A Mustangs. The reason for the delay in procurement of the type was for somewhat murky reasons, uncovered during an inquiry known as the Truman Report.<sup>9</sup> The demand for kick-backs was refused by Dutch Kindelberger in order to get a production award. "Ultimately, even those who sought to block the procurement could not sustain their position, because of the obvious qualities of the airplane."<sup>10</sup> The P-51A had an [Allison V-1710-81](#) (F20R) engine which developed 1,200 hp for takeoff and increased maximum speed to 390 mph. The British designation for the P-51A was the Mustang II and fifty were delivered late in 1942.

With the limitations for fighter duties due to the [Allison](#) engine, nevertheless, the Mustang had good ground attack potential, and its high speed at low altitude, made it ideal for tactical reconnaissance. To enhance altitude capabilities, a mockup was devised in England to use the [Rolls Royce Merlin](#) engine in the P-51 airframe. One concept was to locate the new engine behind the cockpit, but this idea was rejected and the Merlin was mounted in the conventional position in the nose. Four airframes were adapted in England to take the **Merlin** engine. These four planes known as Mustang Xs had deep intakes below the engine for carburetor air. The results of the British tests were passed on to North American. In the meantime, North American had undertaken a similar conversion project and was building two Packard Merlin-powered Mustangs. Level speed improvement was increased 51 mph, to 441 mph. The airframes were strengthened to accommodate the extra power, the ventral radiator was deepened, and the carburetor intake was moved from above the nose to below, to accommodate the Merlin updraft induction system.<sup>11</sup> Even before the Army's Merlin powered Mustangs had flown, The US Army ordered 2,200 of the more powerful fighters. For a short time, this model was designated P-78, then redesignated as P-51B. 25 P-51Bs and 275 P-51Cs were given the British designation Mustang III. The California Mustangs were known as the P-51B-NA and the Dallas, Texas facility produced the P-51C-NT.<sup>12</sup> The **Merlin**-powered P-51B and its Dallas-built twin, the P-51C, began operations in December 1943.

A further improvement to the Mustang was introduced when a graceful teardrop canopy was installed to eliminate the dangerous blind area created by the faired cockpit. First tested on two P-51Bs, they became standard on the P-51D and all later models. 280 P-51Ds were given the RAF designation Mustang IV. The P-51D became the version produced in the greatest quantities, 7,954 being completed. The P-51D model carried six .50 cal. machine guns instead of the four mounted in the P-51Bs. Other refinements, such as moving the wing forward slightly and providing for rocket launchers, were included. The first P-51Ds types were delivered without dorsal fins, but this feature was added to compensate for keel-loss when the bubble canopy was adopted.

Later developments to the P-51 series included the final production type, the P-51H with several changes which made it the fastest production variant with a maximum speed of 487 mph at 25,000 feet. Five hundred fifty-five P-51H's were delivered before VJ Day out of an original order for 1,445 machines.<sup>13</sup>

The P-51 D with the dorsal fin, represents the most typical Mustang configuration. It had a 37-foot wingspan with an area of 233 square feet and was 32 feet 3 inches long. Height was

13 feet 8 inches. The [Packard-built Merlin V-1650-7](#) was capable of delivering 1,695 hp which provided a speed of 437 mph at 25,000 feet. Weights were 7,125 lbs. empty and 10,100 lbs. normal gross, but an additional 2,000 lbs. could be carried. Internal fuel capacity was 105 gallons, giving a range of 950 miles at 362 miles per hour at 25,000 feet. Armament was six .50 cal. wing-mounted machine guns with 1,880 total rounds.

To say the **Merlin** Mustangs were successful would be an understatement. The P-51 became one of the aviation world's elite. The total number of 14,819 Mustangs of all types were built for the Army. American Mustangs destroyed 4,950 enemy aircraft in Europe to make them the highest scoring US fighter in the theater. They were used as dive-bombers, bomber escorts, ground-attackers, interceptors, for photo-recon missions, trainers, transports (with a jump-seat), and after the war, high performance racers.

<b>Specifications:</b>			
<b>North American P-51 Mustang</b>			
<b>Dimensions:</b>			
	P-51A	P-51B	P-51D
<b>Wing span:</b>	37 ft (11.27 m)	37 ft (11.27 m)	37 ft (11.27 m)
<b>Length:</b>	32 ft 3 in (9.82 m)	32 ft 3 in (9.82 m)	32 ft 3 in (9.82 m)
<b>Height:</b>	12 ft 2 in (3.70 m)	13 ft 8 in (4.16 m)	13 ft 8 in (4.16 m)
<b>Weights:</b>			
<b>Empty:</b>	6,433 lb. (2,918 kg)	6,985 lb. (3,168 kg)	7,125 lb. (3,232 kg)
<b>Gross:</b>	8,600 lb (3,901 kg)	9,800 lb (4,445 kg)	10,100 lb (4,581 kg)
<b>Max T/O:</b>	9,000 lb (4,082 kg)	11,800 lb (5,352 kg)	11,600 lb (5,262 kg)
<b>Performance:</b>			
<b>Max Speed:</b>	390 mph (628 km/h)	440 mph (708 km/h)	437 mph (703 km/h)
<b>Ceiling:</b>	31,350 ft. (9,555 m)	42,000 ft. (12,802 m)	41,900 ft. (12,771 m)
<b>Range:</b>	350 miles (563 km)	1,300 miles (2,092 km)	950 miles (1,529 km)
<b>Max Range:</b>	2,550 miles (4,104 km)	2,080 miles (3,347 km)	2,300 miles (3,701 km)
<b>Powerplant:</b>			
P-51A	P-51B	P-51D	
<b>Allison V-1710-81</b> 1,200 hp, 12 cylinder V engine.	<b>Packard Merlin V-1650-3/7</b> 1,380/1,420 hp, two-staged supercharged, 12 cyl. V engine.	<b>Packard Merlin V-1650-7</b> 1,695 hp, two-staged supercharged, 12 cyl. V engine.	
<b>Armament:</b>			
Four .50 caliber machine guns, external bomb load of 1,000 lbs. (453 kg.)	Four .50 caliber machine guns, external bomb load of 2,000 lbs. (907 kg.) or drop tanks.	Six .50 caliber machine guns, external bomb load of 2,000 lbs. (907 kg.) or four .5 inch rockets.	

