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**P-51 Mustang:
The Plane That Saved the Combined Bomber Offensive**

By

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Abstract

The Combined Bomber Offensive (CBO) was almost cancelled in October 1943 for lack of an adequate long-range escort fighter. The P-51 Mustang combined the perfect mix of technological innovation, production, performance, and timing to save the CBO. From the inauspicious start as a reconnaissance aircraft to the mating of the Rolls-Royce Merlin engine, the Mustang was at the forefront of technological innovation. Its arrival into the European theater of Operations in large numbers in the spring of 1944 provided escort cover from their bases in England all the way to Berlin and back. This escort reduced bomber losses and increased Luftwaffe losses gaining air superiority over Germany. This air superiority allowed the CBO to carry out its mission effectively.

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“It is accepted that the ultimate escort fighter of World War Two was the P-51 Mustang...”¹

The interwar years between World War I and World War II brought about the doctrinal view that the bomber will always get through; the Luftwaffe crushed this belief in October of 1943. By the end of October, the Eighth Air Force in Europe had suffered such losses that the Combined Bomber Offensive (CBO) was in danger of being cancelled.² If it were not for the P-51 Mustang’s technological innovation, performance, and timing, the CBO would have stopped before enough damage could be done to the German war machine to enable a successful land invasion of France.

The CBO’s mission to bring Germany to its knees was a joint effort between the United States and Great Britain combining British carpet-bombing at night and American precision daylight bombing.³ The prevailing thought at the time by both air forces centered on the strategic bomber and its own defensive capabilities.⁴ The higher speeds and altitudes that the new bombers could operate at fostered a mindset in the 1930s that rendered the fighter aircraft of the day obsolete. The generals did not take into account changes in fighter technology that also allowed the new fighter aircraft to fly higher and faster and carry more armament as well. By 1943, fighter aircraft from the Luftwaffe combined with anti-aircraft artillery were exacting a terrible toll on the bombers during daylight raids. The Allies needed a fighter aircraft that could match the performance of the Luftwaffe with the range to escort the bombers to their targets and back. The use of the long-range escort was a major turning point in World War II.⁵

The P-51 Mustang had a less than auspicious beginning. In 1940 with war raging on the continent of Europe and in the skies over England, Britain was in need of more aircraft than she could produce. The British Purchasing Commission (BPC) arrived in the United States to buy

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completed aircraft and sign contracts for new aircraft. The Curtiss Aircraft Company was already producing as many aircraft as they could. As a result, the BPC approached North American Aviation Inc. (NAA) to produce a licensed copy of the Curtiss P-40 Kittyhawk.⁶ NAA decided that they could build a better aircraft than the P-40; they set upon the P-51. On 11 April 1940, the BPC signed a contract for 400 of the new aircraft.

Because the aircraft was a British project, the United States Army Air Forces (USAAF) did not desire it.⁷ The USAAF Material Command at the time tried to have the Mustang project cancelled. The main problem Material Command faced was Mustang production competed with B-25 production because both aircraft shared the same production plant.⁸ This led to a direct competition for the limited resources available. With the USAAF doctrine in the early years of the war based on the theory of strategic bombing and not on the use of fighter aircraft, this competition for production resources went to the B-25 bomber. This resulted in a belief that the Mustang was a British hindrance to the real war effort of bomber production.

NAA hired new young scientists from the California Institute of Technology to bring the latest science to aircraft design rather than stay with the older more accepted design methods. What they did was change the process of aircraft design.⁹ Studies indicated that the majority of drag on the aircraft came from thick “protuberances” in the first third of the airframe.¹⁰ NAA decided to eliminate all of these drag-inducing bulges in the first third of the Mustang’s body.¹¹ The design directly led to the placement of the radiator-cooling scoop in the center of the aircraft rather than under the nose.¹² The design allowed air to flow smoothly from the front of the aircraft to the back thereby decreasing drag.

The P-51 Mustang was a revolutionary aircraft from the design stage onward. The Mustang developed from idea to flight in only 117 days and was revolutionary mainly due to the

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laminar flow wing that was thinner than most wings of its day.¹³ The thinner wing resulted in less drag, which allowed the aircraft to fly farther and faster than other fighters did.¹⁴ Even with all the technological advancements, the Mustang suffered from poor high altitude performance that limited the top speed to approximately 350 miles per hour at 29,000 feet.¹⁵ However, its low altitude performance was outstanding and its range was nothing less than phenomenal. These characteristics led to the development of a low-altitude attack aircraft and a photoreconnaissance version.

Because of the outstanding low altitude performance and range, the Mustang fit perfectly as a reconnaissance platform for the Royal Air Force (RAF). It was in that role that the Mustang spent its years with the RAF. What the Mustang really needed was a superb engine to mate with the superb airframe to make it a superb long-range fighter. The problem was that NAA had only one liquid-cooled in-line engine to choose from, the Allison V-1710.¹⁶ The in-line engine was critical to reducing the bulges on the airframe thereby eliminating the excess drag. Because this was the only engine available, it was what NAA had to use. That was true until Major Thomas Hitchcock came up with idea of mating the British Rolls-Royce Merlin engine to the P-51 design to solve the poor high altitude performance thereby placing the P-51B on a greater than or equal footing with frontline Luftwaffe aircraft.¹⁷ While the British bought United States designed aircraft, the United States built British designed engines. The Packard Company built Rolls-Royce Merlin engines for the British under contract as an improved in-line engine to replace the Allison V-1710.¹⁸ North American Aviation discovered that the new Packard built Merlin engine fit into the Mustang body and only required the movement of the engine mount.¹⁹ This truly was a match made in heaven.

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The aerodynamic improvements were not the only innovations the Mustang had. The engine had a barometric sensing switch that automatically set the fuel mixture setting. This greatly reduced the strain and workload on the pilots allowing them to concentrate on their flying duties making them more effective.²⁰ The supercharger also activated automatically relieving pilot from having to turn it on and off when at the right altitudes.²¹ Pilots reported that they had only to move the throttle and the aircraft would respond with power no matter the altitude they were flying.²² This combined reduction in workload allowed the pilots to focus on their tasks of escorting bombers and destroying the Luftwaffe wherever they found them.

To address the issue of extended range, Colonel Mark Bradley, the top USAAF fighter test pilot, came up with the idea to add an 85-gallon auxiliary internal fuel tank. This added fuel increased the P-51Bs combat range to 700-850 miles using only internal fuel.²³ This range was twice that of the other major United States aircraft in the European theater, the P-47 Thunderbolt.²⁴ While it is true that externally mounted drop tanks were available at the time, popular thought was that they were too dangerous and posed an unnecessary fire hazard. As a result, the P-47 could only escort bombers to the German border.²⁵ On the second raid on Schweinfurt P-47s were assigned escort duties, but range limitations caused them to leave the bombers before reaching their targets.²⁶ This meant that Luftwaffe aircraft had only to position themselves outside the P-47's range and attack the bombers unmolested. It was clear that numbers and performance of the escort fighters had to be increased or the CBO would fail.²⁷ To put it in prospective, the P-47 with two 108-gallon external fuel tanks could escort bombers 475 miles, while a stock P-51 with no external fuel tanks could escort bombers the same distance.²⁸ No matter what technological innovations they applied to the P-47, it just could not get the combat radius of the P-51.

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The use of the P-51 Mustang came at a time when the Combined Bomber Offensive was at the verge of defeat. With the prohibitive losses from the second raid on the ball bearing factories at Schweinfurt Germany, approaching 20%, the Eighth Air Force could not continue to function.²⁹ Because of these losses, a change in targets or tactics would have to happen.³⁰ The United States Army Air Corps abandoned the idea that the unescorted “bomber would always get through” and changed tactics. It was time for long-range fighter escorts, but the United States had only two aircraft that could function as long-range escorts, the P-38 and the P-51. The P-38 encountered production problems that limited their number and the few that were in theater diverted to North Africa for Operation Torch.³¹ While Operation Torch occurred in 1942, the production issues continued to plague the P-38 into 1943. This left the P-51 as the only aircraft capable of providing long-range escort in significant numbers. After the Schweinfurt raid, P-51 production switched from the earlier reconnaissance versions to a long-range escort version highlighting the importance of escort fighters.³²

The change in production coupled with the immense industrial output of the United States allowed for the production of almost 8,000 P-51D variants.³³ Of the three American fighter aircraft in Europe during the war, the P-51 was not the most numerous of the fighters, but it was the best. There were over 10,000 P-38s produced³⁴ and over 15,000 P-47s.³⁵ The main problem with the P-47 was the majority of production was prior to 1943 and that meant that any upgrades would be postproduction modifications and not done at the factory.³⁶ Postproduction upgrades and modifications tend to take longer, cost more and do not always lead to the best product. The P-38s produced suffered from a lack of adequate heat and the engines did not function very well in the cold humid weather of Europe causing extreme pilot fatigue and flameouts. By February of 1944, the increased production led to four P-51 fighter groups in

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England escorting bombers all the way to Germany and back again.³⁷ Largely because of the P-51s, bomber losses fell to below 10% while Luftwaffe losses rose above 30% creating a lose rate that the Luftwaffe could not recover from.³⁸ This third and pivotal variant of the Mustang combined the extended range, high performance and excellent all around visibility that made this aircraft the best long-range escort of the war.

In February 1944, the Allies began “Big Week”. This was an all out attack on German aircraft production designed to get the air war back on track following a string of bad weather.³⁹ The Mustang really came into its own during “Big Week”. For each day of the campaign, over 600 escort fighters joined the bombers comprised of P-51s, P-47s, and P-38s. The vast majority, over 75 percent, were P-47s. However, what is really telling is that the P-51 shot down more Luftwaffe aircraft plane for plane than any other escort fighter did that week.⁴⁰ Table 1 shows the breakdown of escort type and percentage of Luftwaffe aircraft shot down by day. Mustang pilots claimed to have destroyed more than 5,000 enemy aircraft. That is more aircraft than either the P-47 or the P-38 destroyed.⁴¹

Table 1. Relationship of USAAF Escort Force Compared to Luftwaffe Loses

Date	Percentage of Escort Force			Luftwaffe Loses by		
	P-51	P-47 %	P-38	P-51	P-47 %	P-38
20 February	8.7	80.0	11.3	26.2	62.3	11.5 ⁴²
21 February	10	79.8	10.2	42.4	57.6	0.0 ⁴³
22 February	8.6	81.2	10.2	32.2	66.1	1.7 ⁴⁴
24 February	11.5	79.4	9.1	15.8	81.6	2.6 ⁴⁵
25 February	15.5	76.4	8.1	46.2	50	3.8 ⁴⁶

The effects of mass production and increased performance proved a winning combination for the Allies. When Colonel Doolittle took over Eighth Air Force, he changed the escort tactics freeing the fighters to range ahead of the bombers to strike the Luftwaffe in fighter on fighter

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combat. This change in tactics not only allowed the Mustangs to fight toe-to-toe with the Luftwaffe but had the effect of increased range as well. The fighters no longer had to weave above the bombers, which flew at a slower speed. With the change in escort doctrine, the P-51 arrived in theater in mass at the right time to swing the tide of battle in the Allies favor.⁴⁷ The P-51 Mustang was the pinnacle of fighter aircraft developed during World War II providing speed, altitude, maneuverability and range that decimated the Luftwaffe in early 1944. The Mustangs dealt the Luftwaffe a deathblow from which they would not recover.

The United States Army Air Corps was wedded to the concept of the invincible bomber since the end of World War I. They disregarded the technological advances of fighter aircraft throughout the 1930s while at the same time extolling the technological advances of bomber aircraft and entered the Second World War with a belief that the unescorted bomber will make it to its target no matter what. It took the sustained loss of 20% of the bomber force to open the eyes of the commanding generals in the CBO and change air doctrine allowing the technologically advanced P-51 Mustang to receive the support and backing it deserved. This support allowed the building of an unprecedented number of high performance aircraft at the pivotal time they were needed most

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¹ Ludwig, Paul A. *P-51 Mustang Development of The Long-Rang Escort Fighter*. Hershham, Surrey: Ian Allan Printing Ltd., 2003, 58

² Carey, Brian T. "Operations Pointblank: Evolution of the Allied air doctrine." *Cowles Magazine Inc* 13, no 4 (November 1998): [50-58], 1

³ Ibid., 4

⁴ Ibid., 1

⁵ Biddle, Tammy D. *Rhetoric and Reality in Air Warfare*. Princeton, NJ, Princeton University Press, 2002, 226

⁶ Ludwig, Paul A. *P-51 Mustang Development of The Long-Rang Escort Fighter*. Hershham, Surrey: Ian Allan Printing Ltd., 2003, 35

⁷ Ibid., 71

⁸ Ibid., 74

⁹ Ibid., 35

¹⁰ Ibid., 34

¹¹ Ibid., 34

¹² Ibid., 36

¹³ Hess, William N. *Fighting Mustang The Chronicle of The P-51*. Garden City, NY [or N.Y.]: Doubleday & Co., 1970., pg 2

¹⁴ Ibid., 2

¹⁵ U.S. Air Force Fact Sheet

¹⁶ Ludwig, Paul A. *P-51 Mustang Development of The Long-Rang Escort Fighter*. Hershham, Surrey: Ian Allan Printing Ltd., 2003, 41

¹⁷ Hess, William N. *Fighting Mustang The Chronicle of The P-51*. Garden City, NY [or N.Y.]: Doubleday & Co., 1970., pg 9

¹⁸ Ludwig, Paul A. *P-51 Mustang Development of The Long-Rang Escort Fighter*. Hershham, Surrey: Ian Allan Printing Ltd., 2003, 58

¹⁹ Ibid., 65

²⁰ Hess, William N. *Fighting Mustang*. Garden City, NY [or N.Y.]: Doubleday & Co., 1970., pg 151

²¹ Ibid., 151

²² Ibid., 151

²³ Ludwig, Paul A. *P-51 Mustang Development of The Long-Rang Escort Fighter*. Hershham, Surrey: Ian Allan Printing Ltd., 2003, 156

²⁴ Ibid., 137

²⁵ Carey, Brian T. "Operations Pointblank: Evolution of the Allied air doctrine." *Cowles Magazine Inc* 13, no 4 (November 1998): [50-58], 1

²⁶ Hess, William N., *Warbird History P-47 Thunderbolt*. Osceola, WI [or W.I.]: Motorbooks International Publishers and Wholesalers, pg 27-28

²⁷ Ibid., 428

²⁸ Davis, Richard G. *Carl A. Spaatz and the Air War in Europe*. Washington, D.C.: Center for Air Force History, 1993., 362-363

²⁹ Carey, Brian T. "Operations Pointblank: Evolution of the Allied air doctrine." *Cowles Magazine Inc* 13, no 4 (November 1998): [50-58], 1

³⁰ Biddle, Tammy D. *Rhetoric and Reality in Air Warfare*. Princeton, NJ, Princeton University Press, 2002, 225

³¹ Ibid., 226

³² Ibid., 227

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³³ U.S. Air Force Fact Sheet

³⁴ Christy, Joe and Ethell, Jeff. *P-38 Lightning at War* New York, NY [or N.Y.]: Charles Scriber's Sons, 142

³⁵ Hess, William N., *Warbird History P-47 Thunderbolt*. Osceola, WI [or W.I.]: Motorbooks International Publishers and Wholesalers, pg 15-16

³⁶ Hess, William N., *Warbird History P-47 Thunderbolt*. Osceola, WI [or W.I.]: Motorbooks International Publishers and Wholesalers, pg 139

³⁷ Hess, William N. *Fighting Mustang The Chronicle of The P-51*. Garden City, NY [or N.Y.]: Doubleday & Co., 1970., pg 4

³⁸ Carey, Brian T. "Operations Pointblank: Evolution of the Allied air doctrine." *Cowles Magazine Inc* 13, no 4 (November 1998): [50-58], 6

³⁹ Ludwig, Paul A. *P-51 Mustang Development of The Long-Rang Escort Fighter*. Hershham, Surrey: Ian Allan Printing Ltd., 2003, 204

⁴⁰Ibid., 204

⁴¹ Ethell, Jeffery. *P-51 Mustang*. Osceola, WI [or W.I.]: Motorbooks International Publishers and Wholesalers., 1993, 26

⁴²Ibid., 204

⁴³Ibid., 204

⁴⁴Ibid., 204

⁴⁵Ibid., 204

⁴⁶Ibid., 204

⁴⁷Ibid., 218

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