## THE BELL XP-39 AIRACOBRA



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## How America's Best Pre-War Single Engine Fighter Was Ruined By The Air Corps

The story of the Bell P-39 is one that causes you to stop and think of what might have been, as opposed to what actually was. Having gone down in aviation history as the "Iron Dog", the Airacobra had from its inception, the potential to be the world's finest fighter aircraft at the beginning of America's involvement in WWII. That it instead became one of the wars most loathsome fighters, easily conceals the real potential the prototype.

Bell's XP-39 prototype was rolled out for the world to see on April 6, 1939 at Wright Field. Essentially designed around the new Oldsmobile 37mm cannon (not unlike the A-10 Warthog), the XP-39 was the second design which incorporated the 37mm to come from Bell. Their original concept had placed the cannon behind a front mounted engine, pushing the cockpit too far to the rear of the fuselage to be practical.

Bell's chief engineer, Robert Woods, went back to work and conceived an aircraft with a mid engine location, which allowed the plane's nose to be dedicated to a very heavy (by late 1930's standards) battery of weapons. This rather unusual engine placement was not unique. A mid-engine concept had been tried by Koolhoven of Holland with limited success due to a poor choice of powerplant and inadequate technology. Their FK-55 fighter did not live up to expectations. The general concept, however, was not without merit.

Woods' design employed the new Allison V1710 engine, rated at 1,150 hp with the new B-5 turbosupercharger. Installation of the Turbosupercharged Allison promised excellent high altitude performance. This provided for a critical altitude of 20,000 feet, about the same as the XP-38. Expectations were fully met and justified when, on April 6, the XP-39 attained a speed of 390 mph. Later flights produced speeds that flirted with 400 mph (398 mph was reported). Bell's little fighter also displayed a remarkable rate of climb, reaching 20,000 feet in 5 minutes flat! This odd looking aircraft created no small stir in the aviation community. Nothing flying in Europe could match the overall level of performance displayed by the XP-39. At least nothing having the potential for

production. It should be noted that the prototype was unarmed and was not fitted with armor plate nor self-sealing fuel tanks (the last two items were not part of the USAAC specification).

Despite the superlative performance of the new Bell fighter, there were design flaws. An undersized vertical stabilizer led to problems with directional stability. Woods' also made a poor choice in airfoil section for the wing. These problems could have been overcome, and in fact, the vertical stabilizer was later redesigned to resemble that of the Curtiss P-36/P-40. Airfoil section design was not addressed until the P-63 Kingcobra, where a laminar flow wing was employed.

After the initial test flight, the XP-39 was turned over to the engineers at Wright Field. And here is where the P-39 was generally undone.

At the time the Bell was being evaluated, the AAF was deep into "streamlining" as a way to improve aircraft performance. This is somewhat understandable, due to the relatively low powered aircraft engines of the 1930's. By reducing drag, especially parasite drag, the engineering minds at Wright Field found that significant increases in performance could be attained. This was all well and good. Unfortunately, they carried it too far as it related to the XP-39. NACA engineers decided that the Bell's turbosupercharger inlet created too much drag. Certainly the inlet generated no greater drag than did the Prestone inlets on the Lockheed XP-38. Nonetheless, they were insistent, the inlet scoop had to go. They reduced the height of the canopy, chopped 2 feet off the wing span and lengthened the fuselage by over a foot. A less powerful Allison with only a single stage mechanical supercharger replaced the turbosupercharged engine. This effectively eliminated decent high altitude performance. Thanks to these changes, the Airacobra had it's center of gravity shifted further aft, exacerbating its already marginal stability. All said and done, the people at Wright Field had reversed the old cliche, and created a sow's ear out of a silk purse.

Certainly Larry Bell and Bob Woods were outraged at the butchered result. Unfortunately, there was very little they could afford to do about it. Bell Aircraft was at the edge of bankruptcy. Having only produced 15 total flyable aircraft, of any type, Bell was deep in debt. Neither Bell nor Woods were willing to go to the mat for their beautiful fighter. To preserve the company's financial viability, they would have to take it on the chin. Their pressing need was to get an order and establish some inward cash flow.

Fortunately, Bell sold the French on the P-39 and received 2 million dollars in advance on an eleven million dollar order. Later that same year (1940), Bell received orders for just under 1,000 P-39Cs and Ds from the USAAF. These were equipped with self-sealing fuel tanks and additional armor, the weight of which, only further degraded performance. Without the turbosupercharger, or even a gear driven two speed, two stage supercharger, the Airacobra was not capable of taking on modern fighter aircraft at anything above 10,000 feet. It should also be noted that the early versions of the Allison V1710 engine never produced anything close to their advertised power rating without a turbosupercharger pressurizing the intake system.

Overall handling had degraded to a point where some claimed (without a grain of truth) that if the pilot simply sneezed, the plane would spin. Some Brits flat out refused to fly the plane, one pilot saying it was more dangerous to RAF pilots than the Luftwaffe. Such extreme examples of exaggeration followed the P-39 throughout its service life.

Adding to the general unhappiness with the airplane, the 37mm Colt M4 cannon frequently jammed after only firing a few rounds. The balance of the guns, 2 .50 cal. M2 and 4 .30 cal. Brownings were inadequate by 1942 standards. One of the problems pointed out by the British was the cockpit being filled with cordite fumes after firing the guns. They also found that firing the guns would knock the

magnetic compass out of whack. The RAF did admit that at low level they found the Airacobra to be a match for the Bf-109E. Unfortunately, the RAF needed a high altitude fighter. Besides, the Luftwaffe was now getting newer and far better performing fighters.



Because the Russians were seemingly satisfied with the P-39 is not indicative of the aircraft's performance as much as the Russian's desperate need for combat aircraft. Moreover, the air war on the eastern front was fought largely below 20,000 feet, and more often than not, well below that. At these heights, the P-39 possessed some marginal level of capability. Credit must be given to those Soviet pilots who, despite the severe limits of the aircraft, used them very effectively against the Luftwaffe's superior Bf 109s and Focke Wulf 190s.

Bell P-39s served in North Africa and Italy with the USAAF and several other Allies including the Free French and Italians. Airacobra service in the Pacific has been the subject of many books and articles. In a single sentence; the "Iron Dog" was replaced as quickly as possible.

Taken as a whole, the P-39 was a dismal failure of the AAF's engineering and procurement establishment to identify and develop the better attributes of an advanced and promising fighter aircraft. This was the same establishment that prevented Lockheed from installing Merlin engines in the P-38 as early as 1941. Had the USAAC (Air Corps) not stripped the turbosupercharger from the XP-39, the United States may have entered the war with a competitive single engine fighter plane already in service. Indeed, it was not until the advent of the Bell P-63 that the level of performance finally matched that of the Bell XP-39 of 1939. Of course, by that time, the P-63 was already outclassed by the P-38, P-47 and P-51. Indeed, the P-63 was too little too late. In large part, it was the Air Corps myopic vision of the future of aerial warfare that caused it to be so.

## **RESOURCES:**

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