

Air and Space this Week

Item of the Week

THE P-63 Kingcobra

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The 1930s were a time of rapid development in aviation and aeronautics, in spite of the global economic downturn. A number of aircraft manufacturing companies were competing to build fighters, bombers, and other airplanes for the military market. Boeing, Lockheed, and Grumman were becoming well-known names back then, but this story is about the product of another, the Bell Aircraft Company. Their fighter aircraft, the P-39 "Airacobra," was one of the principal fighter aircraft in the AAF arsenal at the start of WWII. It proved to be inadequate as a fighter but it excelled at ground support. Its updated version, the P-63 "Kingcobra," was a better aircraft, but found limited use in the AAF. The later variants of the P-39 and almost all of the P-63s ended up in the USSR, flying support for Russian operations. A Kingcobra was in the news lately, and not in a good way. It crashed into a B-17 at an airshow in Dallas last Memorial Day, destroying both planes and killing all six aboard.

DESIGN REQUIREMENTS

The U.S. Army Air Corps released *Circular Proposal X-609* in 1937, seeking manufacturing bids for a single-engine high-altitude interceptor aircraft. The proposal specified armament, engine, and the use of a tricycle landing gear (previous fighters/interceptors had been "tail draggers"), and also specified minimum performance characteristics. The desired aircraft was not for dogfighting, it was for knocking down larger aircraft at longer-ranges, and to be able to function as a light bomber, too.

Bell engineers quickly prepared a bid. They had learned a lot from their first foray into military aircraft design, the Bell YFM-1 "Airacuda," an aircraft with innovative features and numerous flaws. It was a twin-engine mid-wing monoplane, with forward-firing 37mm cannons (and a loader!) in each engine nacelle (the engines had "pusher" props). It was definitely not a fighter – it had a crew of five – and the few made were out of service by 1940.

The Airacuda was an ineffective airplane. It was supposed to have turbocharged engines, but they weren't forthcoming, so the aircraft was grossly underpowered. Further, the engines were prone to overheating, since their props were behind them. The cannon loaders were in a tough spot if they needed to bail out; the props would have to be feathered if the loader were to survive. There was a provision for explosive bolts to be used to blow the props off *in extremis*, but that's not exactly a feature one might want on a combat aircraft. Test pilots found that the

Airacuda was almost impossible to control with one engine out, and its quirky electrical system was flat-out ridiculous, relying on an unreliable single generator for both fuel pumps and electrical system.

One the other hand, the Airacuda gave Bell engineers insight into the Allison engine, larger airborne cannons, and the tricycle landing gear specified for the new aircraft.

The Bell engineers used their experience and creativity to come up with ...

P-39 AIRACOBRA

The requirement for the new interceptor aircraft to carry a 37mm cannon posed significant engineering problems. This would be the first time that aircraft design would be driven more by the requirements of its weapons than by aerodynamic performance. Mounting that large and heavy a weapon on the wings, or slinging one below, was essentially impossible given the power of the provided engine. The additional weight also had to be balanced carefully to allow meeting the performance specifications. The cannon's long barrel was a problem, too.

Bell engineers posed an innovative solution. They mounted the engine in the middle of the aircraft, ran the drive shaft through the cockpit, and built the propellor transmission around the cannon, which was mounted forward of the pilot. The cannon fired through the propellor hub. The weight concentration in the middle gave the aircraft pretty good maneuverability, and a smoother aerodynamic shape.

I somehow think that the Bell guys didn't ask prospective pilots what they thought about having to go into combat literally astride a rapidly-spinning shaft with a heavy engine directly behind them. However, there was no recorded accidents with the drive shaft and that engine made a pretty good, if temporary, shield against attack from the rear.

The resulting fighter entered service as the P-39 Airacobra (Bell had a penchant for Air-a-whatever) names. An export version, the P-400, was similar, with a smaller (20mm) but more reliable cannon. The RAF hated them.

The P-39 prototype Bell built made its first flight on April 6, 1938. It proved to be underpowered at altitude. The problem was two-fold: the engine HAD to have a turbo-supercharger and the aircraft design needed to be tweaked a bit to reduce drag. NACA was brought in for wind-tunnel testing, and the recommendations they made did reduce drag significantly, but the changes really constricted the room needed for the full turbo and its drag-producing air scoop. So Bell made the mistake of dropping the turbo. A number of additional prototypes were built with superchargers only, which severely curtailed the aircraft's high-altitude performance. The AAF placed an order for 80 aircraft, now the P-39C variant, on August 10, 1939. Bell began construction of 20 of them.

The air war in Europe had been raging for months by this time, and two things became very clearly apparent from the experience of the RAF: fighter aircraft had to have pilot armor and self-sealing fuel tanks if they were to survive combat for long. The remaining 60 P-39Cs to be

constructed were fitted thusly, which added over 2000 pounds to the gross aircraft weight, seriously hampering both service ceiling and maneuverability.

P-39s were the most common front-line fighter in the AAF by the time of Pearl Harbor. A lot of the fighting in the six months after that involved the U.S. Navy and their Grumman Wildcat fighter, but the P-39 would get its chance at Guadalcanal six months later. P-39s were sent to base at the newly-built Henderson Field in late 1943, both to project power and to defend the Marine beachhead against attacks by Zero-escorted bombers from the Japanese base at Rabaul.

The P-39 jockeys couldn't even reach the altitude where combat was taking place.

However, the P-39 did pack a pretty good punch (at least when the cannon wasn't jammed) and were a very stable gun platform down low, so the U.S. forces on Guadalcanal quickly adjusted and used the P-39s they had, along with some P-400s picked up along the way, for supporting ground operations. Our guys liked the more-primitive P-400s more, because their smaller cannon was quite reliable and could still wreak havoc on ground personnel and supplies.

The Japanese infantry came to respect the aircraft they called the "long-nose fighter."

And the 67th Pursuit Squadron guys who had been flying the P-400, looking up, far up, to the Zero, were delighted when they returned to Guadalcanal in November in P-38s!

Later variants made the P-39 a better fighter, but nothing was going to give it any kind of altitude capability. The AAF wanted a better fighter, as did the RAF, so Bell made a lot of Airacobras for our Soviet allies, where they were very popular.

P-63 KINGCOBRA

The AAF remained interested in the basic design of the P-39 Airacobra, in spite of its shortcomings. Bell was asked to make a larger version, with room for a big turbo-supercharger, a laminar flow wing (newly developed by NACA), and other important improvements. They wanted the same Merlin engine that would make the P-51 Mustang such a world beater, but there weren't enough to go around, so they used the latest Allison, instead. They called it the "Kingcobra," designated the P-63.

Deliveries of the P-63 began in October, 1943. The Kingcobra was quite fast, and the turbo really helped with altitude, but the AAF felt, justly, that the P-51 was significantly superior, and declined to order the Kingcobra in quantity.

The only significant role the P-63 played in the AAF was an odd one. A few P-63s were retained, but highly-modified for a special mission, dubbed "Operation Pinball." The bombing campaign in Europe was growing rapidly, making training of new crews of paramount importance. One of the most important skills for a bomber crew to master is the effective use of its flexible guns in defending against attacking planes, especially those coming in from astern. Many gunners understood "deflection," or leading the target so that bullet had time to get to the desired spot, at least for targets approaching. But the deflection necessary for defending against an attacker

on a pursuit curve from the rear was somewhat counter-intuitive; one had to aim between the attacker and one's own tail. An effective technique for training gunners for tail defense was badly needed.

Enter the P-63. These particular aircraft had their regular weapons and armor removed, and had over a ton of stout sheathing installed. An electrical system was rigged that would flash a light on the propeller hub when the sheathing was rapped (like the lights on a vintage pinball machine). A "frangible" .50 cal. bullet was developed, made of compressed powder. When it hit something, it blew into dust, giving a stout rap but without causing real damage. Now gunners could train under actual operating conditions, and receive immediate visual feedback of their success! Improving defensive gunnery for bombers was enormously important, so the P-63 really did perform an important service in the AAF, too.

The Russians loved the P-39, and they really wanted the Kingcobra. The U.S. was happy to support their efforts by providing it under Lend-Lease. The Soviets even sent one of their best test pilots to Bell to assist in the final design process. Bell didn't want the foreign help at first, but the test guy was really good, proving himself in important and dangerous tests of the P-63 airframe. After that, he was welcome, and played an important role in further development. Bell's marketing department was no slouch either; they knew working closely with Stalin's guy would result in large sales, and it did.

Now another problem arose. The P-39s and P-63s had to get to Russia to be useful. Cargo ships on the Murmansk run from European ports were already nearly maxed out. So the logistics folks got creative and came up with a fly-them-to-the-USSR scheme. Air Transport Command, including many WASPs, picked up the planes at Bell's manufacturing plant in Buffalo, New York, then flew them in stages from there to Great Falls, Montana, then through Canada and Alaska to Ladd Field, at Fairbanks.

[I have a set of *Impact* magazines, the AAF's in-house newsletter for officers. One of them has a brief article on the dances held during the plane exchange, since many of the transport pilots, theirs and ours, were women. The article touted it as an excellent example of allied support.]

Soviet inspectors would examine the aircraft arriving at Ladd, and their pilots and crews would take them from there. The fighters, P-39s and P-63s, would make a fueling stop at Nome, but the longer-ranged A-20s and B-25s in the Lend-Lease program flew directly to Russian airspace. Thousands of aircraft used the ALSIB route from the US to the USSR.

A total of 3,303 P-63s were produced; 2,672 went to the Soviets, almost all of them via ALSIB. Similarly, a total of 4,719 P-39s (nearly half of the total produced) were also sent to the USSR.

Russian pilots flew the Kingcobra to good effect. We didn't want the P-63, with its technological improvements, to fall into German hands, so we asked the Soviets to use their P-39s against targets in Germany and their P-63s against Japanese targets in Russian territory, a request that was more-or-less-but-not-completely honored.

Contrary to common misperception, the Soviets used the P-63 primarily as an interceptor, and it was quite effective against the Ju-47 Stuka bomber and Ju-88s, especially after the Soviets

developed the appropriate group tactics. The Kingcobra was also used for some ground attack, but it was not a “tank buster” as claimed in some places. Most of the P-63s they had were armed with a better version of the 37mm cannon and two .50 caliber machine guns, which were synchronized to fire through the propeller, so it made for a stable, easy-to-aim gun platform regardless of target.

The Soviets lost a lot of P-63s in combat, and downed a lot of Germans with the P-39 (and some P-63s), but many Kingcobras survived the War and stayed on with the Soviet military well into the 1950s. There were so many of them that NATO actually gave them a code name: “Fred!”

AFTER THE WAR

Very few AAF Kingcobras survived long after the War. A few went to the USAF after it separated from the Army, and were used briefly in training and testing before being permanently retired. A few of the latest model P-39Q Airacobras were modified and raced. Bell test pilots Tex Jonston and Jack Woolems bought two, put in modified 2000 hp engines, used the P-63’s paddle-wheel prop, and named them *Cobra I* and *Cobra II*. Tex flew the *Cobra II* in the 1946 Thompson air race and beat out a modified Mustang, but Jack had been killed two days earlier when *Cobra I* crashed in Lake Ontario. *Cobra II* finished third in the 1947 Thompson, dropping out with engine problems. *Cobra II* was resurrected in the 1960s by pilot Mike Carroll, who wanted to use it to set the world piston-engine speed record. However, in a pre-race test flight, Carroll crashed and died.

Bell Aircraft Company [continued to build](#) important aircraft after the War, notably the Bell X-1 aircraft that “broke the sound barrier,” the Bell P-59A (the first operational US jet aircraft – barely), the X-2 (built as a test plane for Mach 1-2 speeds), the X-5 swing-wing, the X-14 (VTOL test), the X-22 (VSTOL ducted fans test), and others. They also produced a number of spacecraft components for NASA.

Bell Aircraft Company is now a wholly-owned subsidiary of Textron, headquartered in Ft. Worth, Texas. They [announced](#) on December 5, 2022, that they have been awarded the development contract for the U.S. Army’s Future Long-Range Assault Aircraft, their V-280 Valor tiltrotor, which will replace the venerable Black Hawk.

THE ACCIDENT IN DALLAS

You saw the news last month, and probably saw the film footage. A tragic accident occurred at the Wings Over Dallas air show on November 12, 2022, when a P-63 Kingcobra collided with a B-17 bomber, cutting it in two. All five aboard the B-17 and the P-63 pilot were killed instantly.

The aircraft were among several involved in an overflight of the show. The P-63 was last of three fighters escorting five vintage bombers. The air boss had instructed the three fighters to take the lead of the bomber flight as they turned to return to the designated performance area. The P-63 was banking left as it overtook the B-17, leading the bomber flight. Its pilot could not see the B-17 “beneath” him and drifted into the turning B-17, whose pilot could not see it

approaching from “above” and behind. The Kingcobra hit just abaft the B-17’s wing, cutting the bomber in two. What a tragic loss.

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Bell Aircraft Company: https://en.wikipedia.org/wiki/Bell_Aircraft

Bell Textron: <https://www.bellflight.com>

Bell Aircraft: <https://www.ranker.com/list/bell-aircraft-aircraft-and-jets-and-planes/reference>

P-39

Wikipedia: https://en.wikipedia.org/wiki/Bell_P-39_Airacobra (very thorough)

NASM has a P-39Q, not on display: https://airandspace.si.edu/collection-objects/bell-p-39q-15-be-airacobra-galloping-gertie/nasm_A19560019000

P-39 (P-400) combat at Guadalcanal is described in a number of books, including:

Miller, Thomas G., 1969, *The Cactus Air Force*, New York, Harper & Row; Bantam paperback edition (1981), ISBN 0-553-14766-8

Hammel, Eric, 1987, *Guadalcanal: Starvation Island*, New York, Crown Publishing, ISBN 0-517-56417-3

Racing the Cobra II at Modeler.com: <https://imodeler.com/2020/07/cobra-ii-p-39-air-racer-1946-thompson-trophy-winner>

P-63

Military Wiki: https://military-history.fandom.com/wiki/Bell_P-63_Kingcobra

NASM does not have a P-63 in their collection, but [they do have](#) the 37mm M4E3 cannon from the P-63A-10-BE “Edyth Louise”

Operation Pinball: http://p63kingcobra.com/p63_operation_pinball.html

The Airshow Crash

Summary: <https://generalaviationnews.com/2022/12/02/ntsb-releases-preliminary-report-on-fatal-dallas-mid-air-collision>

FAA: <https://www.wfaa.com/article/news/local/ntsb-releases-preliminary-report-deadly-air-show-plane-crash/287-af80ced7-0347-4f0b-ab5d-b763391506b4>

FlyingMag: <https://www.flyingmag.com/ntsb-releases-preliminary-report-on-fatal-texas-midair-collision> and <https://www.flyingmag.com/remembering-texas-raiders>

The NTSB has released a Preliminary report, linked to in the above references, but the final report has not been released at this time.

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