



# Plane Talk

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*The Newsletter of the War Eagles Air Museum*



## Featured Aircraft

If you were to ask people to name a product of the Bell Aircraft Company, chances are some would mention the little fishbowl-nosed Model 47 helicopter from the movie *M.A.S.H.* and the popular television series. Others may point to the P-39 *Airacobra*, or to America's first jet, the XP-59A *Airacomet*. Aviation enthusiasts might think of the X-1 rocket plane, in which Captain Charles E. "Chuck" Yeager first exceeded the speed of sound. Observers of the current aviation scene will know of the V-22 *Osprey* tiltrotor, built jointly by Bell and Boeing.

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▲ *The first aircraft designed by the brand-new Bell Aircraft Company in 1936 was the XFM-1 Airacuda, a big, twin-engined, heavily armed "bomber destroyer" of very unusual configuration. Full of innovations for its time, the Airacuda's mission vanished as air combat evolved. But it kept Bell in business in its early days, and elevated the company to the ranks of major aircraft manufacturers.*

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But probably very few people have any idea what the first aircraft was that rolled out of the Bell factory.

Lawrence Dale Bell was born in Mentone, Indiana, on April 5, 1894, the youngest of 10 children of lumber mill owner Isaac Bell and his schoolteacher wife Harriet. The Bells moved to California when Larry was 13. His passion for aviation developed after he saw an airplane for the first time, performing in an air show near Long Beach. His brother Grover soon got a job with the Glenn L. Martin Company in Santa Ana. In 1912, young Larry dropped out of high school and joined Grover as a mechanic on the air show circuit. He was devastated when Grover was killed practicing an air show routine, and for a while he vowed to have nothing more to do with airplanes. But he soon went to work for Martin as a stockroom clerk. By 1914, 20-year-old Larry Bell was not only Martin's shop superintendent, but also head salesman, purchasing agent, labor relations representative and contracts writer. By 1920, he had risen to Vice President and General Manager of the Glenn L. Martin Company.

But all was not well between Messrs. Bell and Martin. Bell felt he had earned ownership rights in the company. Martin disagreed. Matters came to a head in late 1924, when Bell presented Martin with an ultimatum—"Make me a part owner, or I quit." Martin didn't, and Bell did, at the beginning of 1925.<sup>1</sup>

Bell couldn't have picked a worse time to quit Martin. The economy was in bad shape and aviation jobs were hard to find. Three years passed before he finally landed a job at Consolidated Aircraft in Buffalo, New York. Soon after Bell hired on, Consolidated's owner Major Reuben



▲ Lawrence D. Bell, seen here in an undated photo, was a distinguished executive and a renowned champion of aviation.

H. Fleet, an ex-Army aviator and famed air mail pioneer, started another company called Fleet Aircraft in Fort Erie, Ontario, Canada, just over the Niagara River from Buffalo, and named Bell president. Then, on September 13, 1929, on his way back to Buffalo from a cross-country sales trip in a *Fleet* biplane, Fleet crashed in a field near West Lorne, Ontario. He was badly injured and his secretary/fiancée Laurretta Lederer was killed. When Fleet left the hospital, he appointed Bell General Manager of Consolidated.

Although he was devoted to Consolidated, Bell really wanted "his name on the door." He hoped one day to open his own company, but he knew he could not compete with Consolidated on his own. Fleet solved the problem in 1935, when, seeking a climate more suitable for year-round testing of the "flying boats" that were the company's main product, he moved Consolidated to San Diego, California. Bell stayed in Buffalo and finally struck out on his own, incorporating the Bell Aircraft Company on July 10, 1935.

Bell Aircraft started out in two small rented offices with one telephone, a secretary and a drafting board for Chief Engineer Robert J. Woods, whom Bell had earlier lured away from Lockheed. For a manufacturing facility, Bell rented part of

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<sup>1</sup> Larry Bell was only one of many aviation pioneers who once worked for the Glenn L. Martin Company. The tally includes William Boeing, Donald Douglas, James S. McDonnell, J.H. "Dutch" Kildeberger of North American Aviation and C. A. van Dusen of the Brewster Aeronautical Company. It is interesting to speculate what path America's aviation industry might have taken if all of these men had not had falling-outs with the difficult, hard-to-work-for Mr. Martin and left to form their own companies.



the former Consolidated plant. The new firm's first business was a contract from Consolidated to produce outer wing panels for PBY *Catalina* flying boats. By the end of January 1936, Bell Aircraft employed 167 workers and had expanded to 80,000 square feet of rented office space.

Making parts for other aircraft manufacturers was not Bell's long-term goal. His company needed to build its own aircraft if it wanted to compete with the likes of Boeing, Curtiss, Douglas, Grumman and Martin. The opportunity to do that soon arose, when the U.S. Army Air Corps decided it needed a long-range, multi-seat "bomber destroyer." The idea went back to 1933 and Brigadier General Henry H. "Hap" Arnold, Assistant Chief of Staff of the Air Corps. Arnold was dissatisfied with the effectiveness of the single-seaters such as the Curtiss P-1 *Hawk*, Boeing P-12 and Boeing P-26 *Peashooter* that made up most of the Air Corps' Pursuit aircraft inventory. He thought the service needed a big, long-range, heavily armed aircraft that could destroy an enemy bomber in a single pass. Although American involvement in World War II was still eight years away, some strategists agreed with Arnold in fearing surprise attacks on the Philippines, Alaska, Hawaii, U.S. coastal cities and the Panama Canal, and on the need for an aircraft to defend against them.

The formal requirement for what became the first aircraft designed and built entirely by the Bell Aircraft Company initially called for a top speed of 300 miles per hour, 10-hour endurance, armament

of two 37mm cannons and four machine guns, a bomb load of 600 pounds—and a structure strong enough to take the high G-loads of air-to-air dogfighting. That requirement made such an aircraft virtually impossible for any company to build. The Air Corps soon relaxed that requirement, thinking that a bomber destroyer did not have to be as maneuverable as a Pursuit. The concept thus became feasible, so, in June 1936, the Assistant Secretary of War authorized the Air Corps to proceed with procuring it under Specification X-604. The aircraft would have the designation "FM," for "Fighter, Multi-Place" (this was the Air Corps' first-ever use of "F" for "Fighter"). The service approached only Bell and the Lockheed Aircraft Company for proposals, since both companies had already done some preliminary work on the design. Bell's aircraft was designated the XFM-1 and Lockheed's the XFM-2. Bell named its first airplane *Airacuda*.

Before describing the radical aircraft that put Bell near the forefront of innovative aviation companies in one giant leap, let's take a look at Lockheed's entry. The XFM-2 was a modified Model 10D *Electra* with Allison engines, tricycle landing gear and heavy armament. Some sources say it was the first product of the famed "Skunk Works." It's hard to establish a definite timeline, but the "Skunk Works" name itself certainly did not appear until 1943. Possibly a small group of hand-picked, talented engineers and managers, the hallmark of "Skunk Works" operations, worked on the XFM-2. In any case, in the Air Corps evaluation of the preliminary engineering studies, the Lockheed aircraft came in 0.4 percentage points lower than Bell's design. By the rules of the competition, Lockheed was eliminated, and the XFM-2 was never built.



▲ This photo of the XFM-1 Airacuda at rollout shows some of the Bell employees who had important roles in the program. Larry Bell is third from the right, with Vice President Ray Whitman (the tall man) on Bell's left and Chief Engineer Bob Woods on the far right.

Now on to Bell's design. Few people would dispute that the *Airacuda*, the first aircraft conceived by the brand-new firm, was a bold, ambitious, state-of-the-art design. Known internally as the "Bell Model 1," it set exceptionally high standards for cutting-edge performance, technological ingenuity and superior craftsmanship—traits that became hallmarks of all future Bell products.

The prototype XFM-1 had tailwheel landing gear, a deep, narrow fuselage and twin manned nacelles on its low-mounted wing. Each nacelle carried a 37mm Colt T-9 cannon, two .50-calibre Browning M2 machine guns and an 1,150-horsepower, turbo-supercharged, 12-cylinder Allison V-1710-13 engine that drove a three-bladed pusher propeller through a 64-inch extension shaft. Emphasizing the importance of the XFM-1, the Air Corps assigned five of the first eight prototype service-test V-1710s to the program.

The *Airacuda*'s five-man crew consisted of pilot, co-pilot/navigator, a gunner in the fuselage and a gunner in each nacelle. The nacelle gunners could fire their weapons manually, but their main job was to feed ammunition to the cannons from 110-round boxes. A Sperry

Featured Aircraft (Continued on page 4)

| <b>Bell XFM-1 Airacuda<br/>General Characteristics</b> |   |
|--|---|
| Powerplants  | Two 1,150-hp liquid-cooled Allison V-1710 V-12 piston engines |
| Maximum speed  | 277 miles per hour  |
| Service Ceiling  | 30,500 feet   |
| Length   | 44 feet 10 inches   |
| Wingspan   | 69 feet 10 inches   |
| Range  | 2,600 miles   |
| Weight (empty)   | 13,630 pounds   |
| Weight (max.)  | 19,000 pounds   |



▲ The Airacuda looked a little ungainly on the ground, especially the tailwheel versions. This photo of the prototype XFM-1 shows several interesting design features. Note the cannons and machine guns, the air intake scoops atop each nacelle, the crew entry doors under the fuselage and in each nacelle, and the circular turbo-supercharger exhaust just behind the crewman leaning from the right nacelle with his arm on the canopy sill.

#### Featured Aircraft (Continued from page 3)

central fire-control system, operated by the fuselage gunner using an optical sight and a joystick, aimed and fired the guns by remote control. Defensive armament was two .50-calibre Browning machine guns in teardrop-shaped blisters in the aft fuselage (like those on Boeing's YB-17A *Flying Fortress*), a retractable top turret with a .30-calibre Browning, and another .30-calibre under the fuselage.

The whirling rear-mounted pusher propellers would have made bailing out a hazardous, if not inevitably fatal, proposition for hapless nacelle gunners. Bell solved this problem by incorporating narrow tunnels in the leading edges of the wing through which the nacelle gunners could crawl into the fuselage and bail out through the lower entry door, as did the other crewmembers.

Another *Airacuda* "innovation," and one that did not endear it to its pilots and crews, was its dependence on a working electrical system. Most aircraft then (and today) had reliable engine-driven generators to power their electrical systems. The *Airacuda* was the first aircraft to rely utterly on an independent Auxiliary Power Unit (APU) for its electrical needs, including running the engine fuel pumps! The complex and temperamental APU, consisting of a two-cylinder, 13.5-horsepower gasoline engine driving a 110-volt

generator, sat in the bottom of the fuselage and powered nine electric motors that ran many of the aircraft's systems. It was also very prone to failure. When the APU quit, the aircraft itself pretty much shut down with it, losing fuel pressure, vacuum, hydraulics, propeller pitch control, landing gear, flaps and even the engines.

On September 1, 1937, the XFM-1 flew for the first time from the Buffalo Municipal Airport, in the skilled

hands of Air Corps test pilot Lieutenant Benjamin S. Kelsey. He was the Project Officer for Fighters at Wright Field in Dayton, Ohio, from 1934 to 1943, and probably flew more new aircraft types during that period than any other service pilot. The first *Airacuda* flight of about 25 minutes was relatively uneventful except for a backfire in the left engine on takeoff that damaged the intercooler ducting and the engine accessories housing. The second flight, on September 24, did not go as well. The right turbo-supercharger failed just before landing, slinging turbine blades all over the place. Then the right main gear did not lock down properly and collapsed on touchdown. The aircraft skidded along the runway on two wheels and a wingtip. Repaired and fitted with upgraded engines and improved turbo-superchargers, the



▲ The Airacuda may have been ungainly on the ground, but there's no denying that it was attractive and graceful in the air.



▲ Bell modified the last three pre-production Airacudas into YFM-1As, with tricycle landing gear, revised canopies and nacelles and non-turbo-supercharged engines. Bell's experience with the YFM-1A aided the company in designing the renowned P-39 Airacobra, the world's first production aircraft with retractable tricycle landing gear.

XFM-1 flew 10 more times around Buffalo before it was ferried to Wright Field on October 21, 1937, for additional testing. On November 24, 1939, a cooling system plug blew out, dumping all the Prestone<sup>®</sup> coolant and forcing Captain Ernie Warburton to make an emergency landing. By its last flight, the XFM-1 had logged 103 flight hours in 42 months of testing—far more time than any of the other 13 *Airacudas*. But that was still not long enough for Bell to fully develop the aircraft's many innovative features.

With the XFM-1 still in flight test, the Air Corps ordered 13 service-test YFM-1s in May 1938<sup>2</sup>. The first 10 were specified to have tailwheel landing gear and improved V-1710-23 engines. The last three, designated YFM-1As, were to have tricycle gear rather than tailwheel. In October 1939, since the turbo-superchargers on the -13 engines still had operational, maintenance and control problems, the Air Corps told Bell to modify two YFM-1s on the production line to take the V-1710-41 "Altitude-Rated" engines, which were lighter than the -13s and did not have turbo-superchargers. These aircraft were called YFM-1Bs.

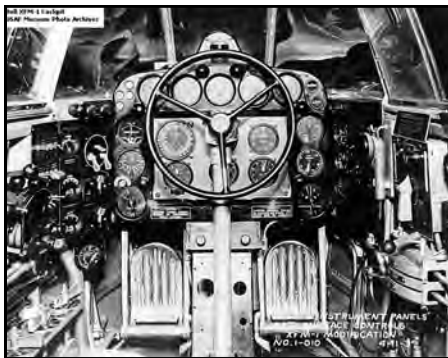
2. Air Corps practice was first to order "Experimental" or "X" models (e.g., XFM-1), which would verify the aircraft complied with the contract requirements. Then the service would order a batch of pre-production "Y" models (e.g., YFM-1), which would test the aircraft under realistic operational conditions.



Since the propeller slipstreams did not blow air through the engine oil and coolant radiators, which were in the leading edge of the wing, *Airacudas* could not taxi. Normal procedure called for the aircraft to be towed to the end of the runway before the pilot started the engines, after which he would wait only for fluid temperatures to reach their minimums before taking off. On landing, the pilot would shut down the engines as soon as the aircraft cleared the runway and wait for a tow back to the hangar.

Strangely, the *Airacuda's* flaps were electrically tied in with the landing gear, and always deployed fully when the gear lowered. Pilots did not like this at all—they quickly learned to pull circuit breakers to cut out one system or the other.

The 13 YFM-1s that Bell made did not fare very well. Six of them cracked up in one way or another, including one that crashed during a spin test before Bell even delivered it to the Air Corps. In just over two years of flight testing, the service-test aircraft accumulated only 539 hours of flight time combined, an average of a mere 41 hours each. The high-time YFM-1 had 68.3 hours on the clock, while the low-time one (not including the one that crashed before delivery) racked up just seven hours. All three tricycle-gear YFM-1As crashed, one of them with the only fatality of the program. On a ferry flight from Chanute Field, Illinois, to Keesler Field, Mississippi, where it was slated to become a ground-school trainer, the aircraft experienced severe vibrations that broke an engine oil line and



▲ The *Airacuda* had a fairly conventional cockpit and instrument panel layout, as seen here in an April 1939 photo of the XFM-1.



▲ This undated photo shows a YFM-1. Differences from the XFM-1 include flat panels in the cockpit canopy for less optical distortion, flush-mounted aft fuselage gun positions rather than teardrop blisters, no air intakes on the nacelle tops and no engine-driven turbo-superchargers—the dark “Z”-shaped stacks on the nacelles exhausted to plain turbos underneath the wing. The cannons and machine guns were not installed when this photo was taken.

started an in-flight fire, forcing the two-man crew to bail out. Tragically, the pilot, Lieutenant James G. Reed, was killed when his parachute did not open.

Flight testing of the YFM-1 was desultory at best. Interviewed after the War, then-General Kelsey remarked, “There was no rush to fly the *Airacuda*, primarily because of the psychological as well as physical hazard of the pusher props during a bailout. Consequently, no service test group of aircraft were [*sic*] probably ever flown as little as the 13 YFM-1s. This general lack of enthusiasm resulted in no suitable tactics being devised; nor did anyone become an advocate of this type.” Despite these issues, the Air Corps had one operational *Airacuda* squadron in the southern U.S. from 1938 to 1940. Then the Service dispersed the aircraft to bases in Alabama, California, Florida, Ohio and Virginia for pilot familiarization flights. There were reportedly few takers. An *Airacuda* was even displayed at the 1939 New York World’s Fair. But

ultimately the nine remaining YFM-1s ended up with the 10<sup>th</sup> Air Base Squadron at Chanute Field, where they served as ground-bound instructional airframes for mechanic training. By late 1942, all had been relegated to the scrap heap.

Assuming Bell could have solved its “teething troubles,” the *Airacuda* still had a huge problem—its performance lagged far behind that of newer aircraft. For example, Lockheed’s P-38 *Lightning*, which first flew on January 27, 1939, was over 100 miles per hour faster. And, while Bell was delivering the YFM-1s, the Battle of Britain was raging. Combat experience showed that “bomber destroyers,” such as the British Boulton-Paul *Defiant* and the German Messerschmitt Bf.110 *Zerstörer* (“*Destroyer*”), were ineffective compared with smaller, single-seat aircraft such as the Supermarine *Spitfire* and the Messerschmitt Bf.109E *Emil*. The Battle of Britain proved conclusively that speed and

*Featured Aircraft (Continued on page 8)*



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agility—the very features that the *Airacuda* lacked—were the most important factors in modern aerial combat.

Bell was also fully committed to producing the new P-39 *Airacobra*, a single-

seat, cannon-armed, high-performance interceptor of exactly the type that would be most useful in the air war. The company had no resources to develop and improve the *Airacuda*, an already-obsolete aircraft that no one in the Air Corps cared much about. The P-39 topped 390 miles

per hour during its first flight on April 6, 1938. Through 1944, Bell built more than 9,500 P-39s that flew in the air forces of eight nations. Lend-lease *Airacobras*, representing almost half of the total production run, were especially important to the Soviet air force as it fought to repel Hitler's attack on the Eastern Front.

Although the *Airacuda* failed as an operational aircraft, it played a key role in sustaining the Bell Aircraft Company in its early days. Without the *Airacuda*, the history of aviation might have been very different. Had the *Airacuda* not supported Bell in its infancy, other companies may well have made America's first jet and the world's first supersonic aircraft. The *Airacuda* assured that Bell's passion for designing bold, innovative, state-of-the-art aircraft did not vanish from the aviation scene—a worthy legacy indeed.

But, while Bell still prospers today, not a single trace remains anywhere of the bold, ahead-of-its-time *Airacuda*, a design that, in some ways, instead proved to be behind the times. ✪



▲ In this never-before-published circa-1940 photo, taken by Clarence E. Schurwan and provided to War Eagles Air Museum volunteer Cliff Bossie by Dr. Paul Webber, a YFM-1A sits on the Biggs Field ramp in El Paso, Texas, backed by the distinctive Franklin Mountains. Behind the North American AT-6 Texans is a Boeing Y1B-17 Flying Fortress, one of only 13 built.