

Finding Amelia:

the true story of the Earhart Electra

by Ric Gillespie

Chapter One: "The Twin-Engine Lockheed"

1932 - 1934

Sometimes the door of history swings on small hidden hinges. Were it not for the persistence of a precocious young engineer and the influence of a celebrity consultant, the reincarnation of a company that became and remains a giant of the aviation industry may have died with the failure of its first aircraft.

Interest in aviation had fairly exploded in the wake of Lindbergh's 1927 transatlantic triumph, but the general public's appetite for new records and new heroes did not translate into widespread use of air travel. And who could blame them? Lumbering 100 mph trimotors slogged through bumpy weather, their cabins reeking of vomit. Crashes were commonplace. When Herbert Hoover took office in 1928 there were forty-four separate carriers vying for a share of the market. Many were under-capitalized, skating by with antiquated airplanes that often flew with only the crew aboard. No airline could turn a profit without government-subsidized airmail contracts.

One bright spot in the otherwise bleak commercial aviation landscape was the Lockheed Aircraft Company. From 1927 to 1932, Lockheed, founded in 1912 by brothers Allan and Malcolm Loughhead (a Scottish name pronounced Lawkheed) built fast single-engine airplanes with sleek molded-plywood bodies and cantilevered wooden wings. Flown by customers with names like Post, Earhart, Lindbergh, and Kingsford-Smith, Lockheed aircraft set records of every description. The Model 9 Orion, a six passenger, 200 mph, single-engine airliner with retractable landing gear, was faster than the military fighters of its day.



Lockheed Model 9C Orion "Shelllightning" flown by Jimmy Doolittle.

Through no fault of its own, Lockheed's fortunes changed in the sky over Kansas on the last day of March 1931, when Transcontinental & Western Flight 599 shed a wing and plunged to the ground carrying legendary Notre Dame coach Knute Rockne and seven others to their deaths. When it was determined that moisture had weakened the wooden wing of the Fokker F10 trimotor, the public's faith in biodegradable airliners

followed Rockne to the grave. Almost overnight, an airline that did not operate all-metal equipment flew empty airplanes. Sales of new Lockheeds virtually ceased and by October the company was in receivership. On June 16, 1932 the Title Insurance and Trust Company of Los Angeles locked the doors of the Burbank factory.¹

Resurrection

The wooden-airplane Lockheed Aircraft Company was dead, but just five days later the company was reborn, its assets purchased for \$40,000 by a group of investors who saw a new day dawning for commercial aviation. The rise in demand for all-metal airplanes coincided with a revolution in aircraft design. Advances in materials and techniques meant that rather than fastening sheets of

corrugated aluminum to a supporting steel-tube framework, as in the Ford “Tin Goose” trimotor, an aircraft’s external covering, the aluminum “skin,” would carry the aerodynamic load. Semi-monocoque construction would mean tremendous savings in weight and reduction in aerodynamic drag resulting in a quantum leap in speed and payload.

A new Lockheed design team headed by Lloyd C. Stearman began sketching out a stressed-skin, all metal, low wing monoplane with retractable landing gear carrying two pilots and ten passengers. The proposed aircraft was basically an enlarged, metal Model 9 and, like the Orion and all previous Lockheeds, it was to have a single engine. To preserve the appearance of continuity with the former company, the new design was designated the Model 10 and, in keeping with the Lockheed tradition of naming its products after celestial bodies, it was named “Electra” after a star in the Pleiades Cluster of the constellation Taurus. The design was a logical, conservative step for the new company but Chairman and Treasurer Robert Ellsworth Gross saw a problem. Gross looked at the market place and became convinced that the future of commercial sales was in multi-engine aircraft. The design team agreed to add a second engine. It was a wise move. Two years later the U.S. Civil Aeronautics Authority banned the commercial use of single-engine aircraft on domestic routes at night and over rough terrain.

Betting the Farm

Lockheed Aircraft Corporation was a latecomer to the revolution. The company’s new airliner was still on the drawing board when the first of the new breed of commercial aircraft took to the air on February 8, 1933. The Boeing Model 247 was a ten-passenger, twin-engine monoplane of



Above: Boeing Model 247 Below: Douglas DC-1.



stressed-skin aluminum construction with retractable wheels that cruised at nearly twice the speed of existing airliners. The new airplane would be going to United Airlines, the Boeing company’s own airline. Not to be outdone, Transcontinental & Western Airlines (TWA), still recovering from the Rockne disaster, asked designer Donald Douglas to develop an airliner that could compete with the 247. The twelve-passenger Douglas DC-1 made its first flight on July 1, 1933. Only one was built, but the follow-on DC-2 was soon flying with a wide range of U.S. and international carriers. The Douglas design’s next iteration, the DC-3, would become a legend.

In deciding to accept the high development costs of the twin-engine aircraft with no sales orders in hand, Robert Gross was betting the farm on the success of an airplane that existed only on paper.

By March of 1933 the new design was ready for wind-tunnel analysis. Lockheed sent a scale model to Professor Edward Stalker, aerodynamicist at the University of Michigan’s Department of Aeronautics. The mock-up featured a single vertical fin and rudder, large wing fillets (graceful fairings that swept from the wing root to the fuselage), and a rearward sloping windshield. The young graduate student who ran the tests, Clarence “Kelly” Johnson, didn’t think much of the results. “It had very bad longitudinal stability and directional control problems.”² The student’s opinion was ignored and Professor Stalker, in consultation with Lloyd Stearman, decided the design was acceptable. The Lockheed directors decided to go ahead with construction of a prototype. What they needed now was a customer.

Northwest's Passage

In 1933, Northwest Airways in St. Paul, Minnesota was a small regional carrier with one 350-mile route between Minneapolis and Chicago, and a secondary route of similar length to Winnipeg, Manitoba, but the changing political climate promised opportunities for growth. On Sunday, March 4, Franklin Roosevelt had been sworn in as the 32nd Chief Executive of the United States, assuring a country wracked by unemployment and bank failures that “the only thing we have to fear is fear itself.” More to the point for Northwest Airways founder Col. Lewis Brittin, his airline need no longer fear the U.S. Post Office.

One of the new president’s first official acts had been to fire Postmaster General Walter F. Brown, ending the corruption and favoritism that awarded the lucrative intercontinental airmail contracts to giants United Airlines, Transcontinental & Western Airlines (TWA), American Airlines, and Eastern Air Transport while leaving regional carriers like Northwest to survive on the scraps. Lewis Brittin knew that Roosevelt’s victory heralded an opportunity for Northwest to bid the coveted airmail contract for the northern route from Minneapolis to Seattle. Also in play was a proposed federal appropriation of \$1.2 million dollars for airfield and facilities improvements along the 1,500 mile route. To land this windfall Northwest would need to make its case in Washington, and the airline’s general manager John Croil Hunter was courting just the person who might be able to help.

Enter Amelia

In January 1933 he invited Amelia Earhart to fly as a guest aboard a Northwest Airways Ford Trimotor on a portion of the northern route to “assess the desirability of flying the route in mid-winter.”³ The Northwest crew had far more experience than Earhart who had never flown for an airline. Amelia rode as a passenger in the frigid cabin. It is difficult to see her participation in the flight as anything more than a flattering, and successful, publicity stunt.

To service the hoped-for route, Northwest would need to upgrade its fleet of single engine, six passenger Hamilton H-47s and fifteen-passenger Ford 5AT Tri-motors. Later that spring, when Croil Hunter expressed interest in the new Lockheed ship, Robert Gross was quick to schedule a sales call. Before Gross arrived Hunter solicited Amelia’s opinion about what Northwest should be looking for if it chose to go with the twin-engine Lockheed, still in the design stage and a year from its first flight. Like the invitation to accompany the January survey flight, Hunter’s query appears to be primarily an effort to keep Earhart engaged. Amelia’s value to Northwest was not her technical expertise but the influence she might be able to exert in Washington to make Northwest’s need for new airplanes a reality.

Earhart sent her recommendations on March 9, 1933. She was glad that Gross was calling on Hunter. “I think you will like to do business with him and his gang.” She felt that Northwest should insist that the new Lockheed feature ten passenger seats, two pilots, 160 gallons of fuel and a 300 pound baggage compartment. When the 10A Electra first flew more than a year later it featured ten passenger seats, two pilots, 200 gallons of fuel and three baggage compartments. Earhart said the plane should cruise at 180 mph on 85% power. The landing speed, with flaps deployed, should not be more than 65 mph. The finished Model 10A cruised at 190 mph and landed, with full flaps, at 65 mph.

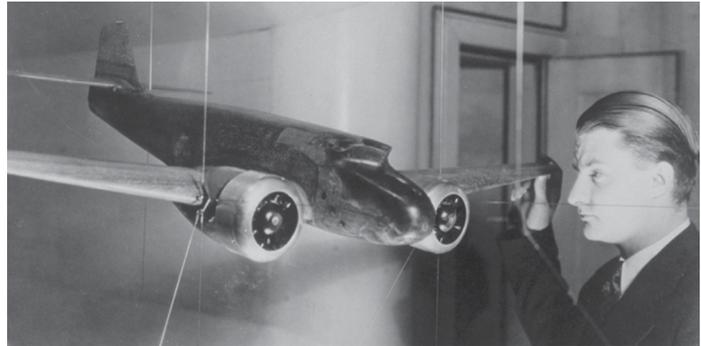


Northwest Airways survey flight crew with guest Amelia Earhart. Minnesota Historical Society, used by permission.

Amelia, who had never flown a multi-engine aircraft, wrote, “Two motors are only a nuisance unless altitude with full payload can be maintained at 4,000 ft. by means of one engine alone.” The Electra would ultimately meet that requirement.

Earhart was not at all sure that two-way radio was necessary. She felt that the ability to transmit was desirable in some instances but, “It may be that reception [*emphasis in the original*] of the beam and weather reports will be found all that is essential.” In light of later events, her rather casual attitude toward radio fairly drips with irony.

A few days after Hunter received Earhart’s letter, Brittin wrote to him, “Amelia Earhart had lunch last week at the White House and I think it is quite possible a meeting could be arranged when we could lay our problem ... directly before the new Administration.”⁴ Ultimately, Northwest got the airmail contract and Northwest ordered new airplanes that met or exceeded the performance standards Earhart had recommended that the airline demand. The thirteen Electras Northwest ordered saved the Lockheed company and launched a production run that eventually totaled 148 airplanes including the one in which Earhart would meet her fate.

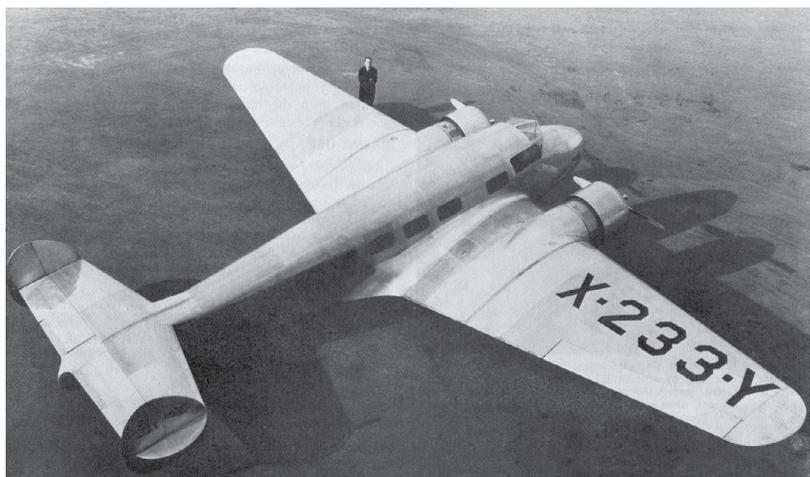


Lockheed Model 10 wind tunnel model with Clarence “Kelly” Johnson.

Fixing the Design

While Robert Gross was trying to find a buyer for his paper airplane, Kelly Johnson was trying to make sure that the final product would be worth selling. As a grad student at the University of Michigan, Johnson had found the design to be badly flawed and had disagreed with the university’s official wind-tunnel report. Upon receiving his Master of Science degree, he bought a used Chevy and drove to Burbank to ask Lockheed for a job. He was hired to work in tool design for \$83/month. “I think an important reason for my being hired was that I had run the wind-tunnel test on the company’s new plane.” Kelly Johnson was never known for his tact, and he wasted no time in telling his new employers that their new design was unstable. He persisted in his criticism until Lockheed Chief Engineer Hall Hibbard relented. “Why don’t you go back and see if you can do any better with the airplane?” Johnson headed back to Michigan with the wooden model in the back of the Chevy.⁵

It took Kelly Johnson seventy-two further wind-tunnel tests to isolate the problems with the Model 10 design and come up with solutions. The wing fillets and the inverted-slope windshield, although much in fashion, were disturbing the airflow and causing unnecessary drag. More seriously, the single vertical fin and rudder lacked sufficient authority to hold the aircraft straight in the event of an engine failure. Johnson returned to Burbank with his recommendation that the wing fillets be removed, the windshield be replaced with a conventional design, and the aircraft be given a twin tail. Hibbard was pleased with Johnson’s work and promoted him to full-fledged engineer. He agreed to change the tail but the fillets and reverse-slope windshield remained.



Prototype Model 10A with wing fillets and reverse-slope windshield.

The prototype Model 10A flew for the first time on February 23, 1934 with chief test pilot Marshall “Babe” Headle at the controls. The airplane performed well but Kelly Johnson had been right. The wing fillets and funky windshield would have to go. With those changes made, airworthiness certification trials were successfully completed that spring and constructor’s number (c/n) 1001 was delivered to Northwest Airways as NC233Y on June 29, 1934.⁶

Five versions of the Model 10 were ultimately offered:

- The Model 10A was powered by two 450 hp Pratt & Whitney R985 Wasp Jr. engines. A total of 101 10As were built representing over two-thirds of the total Electra production run.
- The Model 10B was powered by two 440 hp Wright R975-E3 Whirlwind engines. Eighteen customers preferred the Wright engine.
- The Model 10C was powered by two 450 hp Pratt & Whitney R1340 SC1 Wasp engines. The 10C was an accommodation for Pan American Airways. PanAm had a surplus of old SC1 Wasps and offered to become Lockheed’s second customer for the Electra if they could save money by providing their own engines. Eight 10Cs were built.
- The Model 10D was a proposed military version. In the mid-1930s, recognition that light, single-engine fighters would not have sufficient range to escort bombers to and from distant targets led to the development of long range, multi-engine “heavy fighters.” Lockheed’s offering was to have a crew of three and be armed with a 37 mm cannon and three .50 caliber machine guns. There were no takers and the Model D was never built.
- The Model 10E, introduced in December 1935, was powered by two 550 hp Pratt & Whitney R1340 S3H1 Wasp engines. When PanAm ran out of SC1 Wasps they asked Lockheed for Electras equipped with the new, more powerful S3H1 version of the R1340. Fifteen 10Es were eventually produced including two “10E Specials,” a modification that eliminated most of the cabin windows and replaced the ten passenger seats with fuel tanks for long-range, record setting flights. Earhart’s Electra was the first Model 10# Special.

Notes

- 1 R. J. Francillon, *Lockheed Aircraft Since 1913*, p. 13.
- 2 Clarence L. Johnson, Kelly: *More Than My Share Of it All*, p. 21.
- 3 Doris Rich, *Amelia Earhart: A Biography*, p. 170.
- 4 MHS, Earhart to Hunter, March 9, 1933.
- 5 Johnson, p. 23.
- 6 Francillon, p. 120.