



The Earhart Electra

Part One:

A Star is Born

The Way It Was

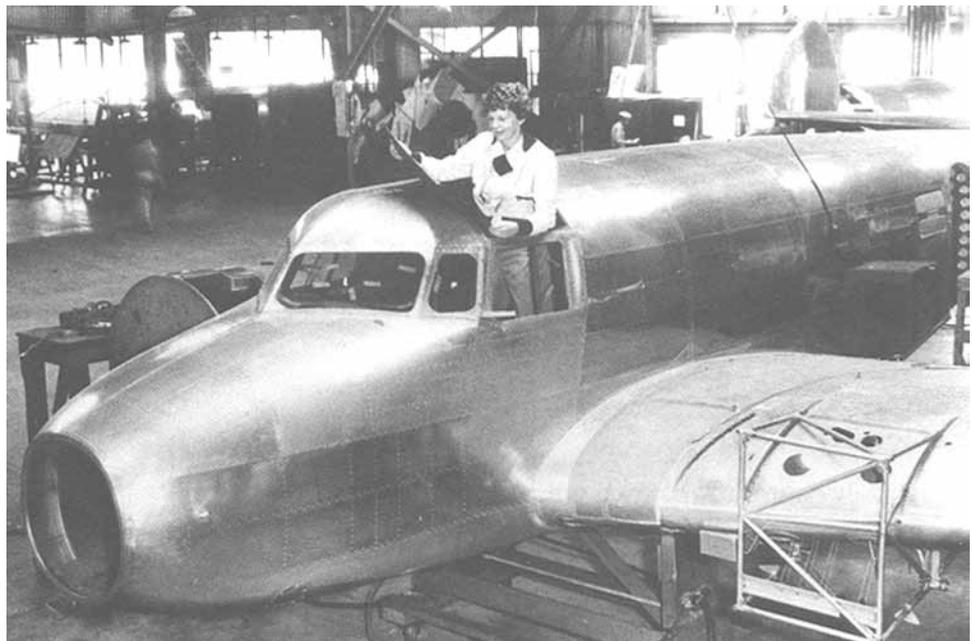
The known history of the world's most famous missing airplane spans almost exactly one year. First registered with the Bureau of Air Commerce on July 19, 1936, Amelia Earhart's Lockheed Electra vanished along with its owner and her navigator Fred Noonan on the morning of July 2, 1937. Solving the mystery of what happened requires an accurate understanding of the machine's fuel, navigational, and radio capabilities at the time it disappeared. The only way to acquire that understanding is to track the many modifications, equipment additions and deletions, and external marking changes which the airplane underwent during its brief but busy career. Fortunately, sufficient photographic and written documentation has survived to permit a reliable, if not yet complete, reconstruction of the airplane's evolution.

This first installment of TIGHAR's three-part history of the Earhart Electra traces the airplane from its initial construction through November, 1936. Part Two will chronicle the changes made for the first world flight attempt, the repairs and alterations made after the Luke Field crash, and the configuration of the Electra at the time of its disappearance. Part Three will trace the evolution of the airplane's cockpit instrumentation and radio equipment.

TIGHAR Collection

ON MARCH 16, 1936 GEORGE PUTNAM sent a "financial arrangements just completed..." telegram to Lockheed Aircraft Corporation's president Robert Gross and construction of airframe #1055 (the 55th example of the Model 10) as a "special 10E" soon commenced. Lockheed had introduced the Model 10A Electra in 1934. Powered by two Pratt & Whitney Wasp Jr. SB engines of 450 h.p., the type enjoyed widespread success as a ten-passenger airliner. Deliveries of the 10E variant, featuring the more powerful 550 h.p. Wasp S3H1, began in January 1936. Earhart's was the fifth airframe so equipped. The performance of the "big engine" version of the Electra, far from being secret, was widely

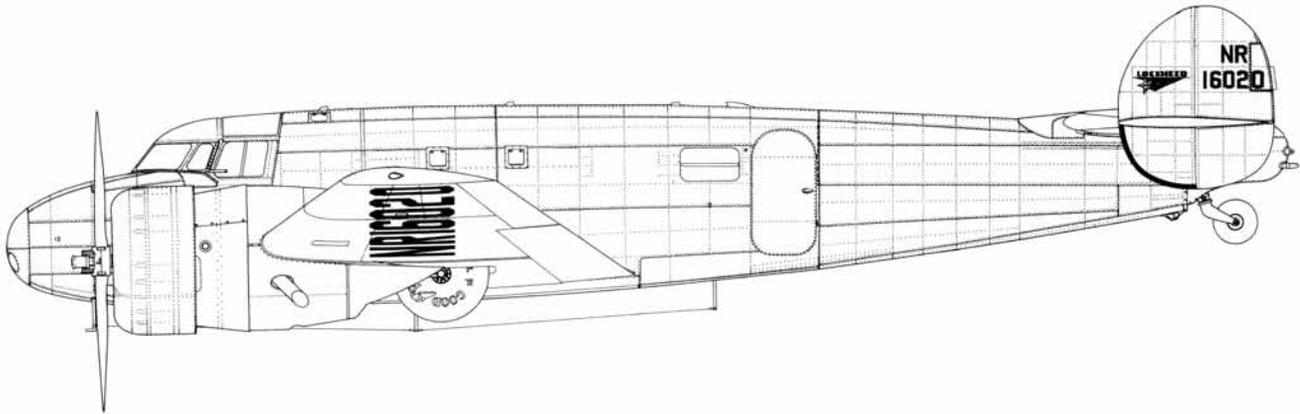
Airframe # 1055, April/May 1936



touted in Lockheed sales literature. Earhart's airplane was the first of two 10E Specials built specifically for long-range flying rather than passenger carrying, and it was the fuel system, rather than the engines, which made

it "special." The other 10E Special was airframe #1065. Delivered to Harold S. Vanderbilt on August 26, 1936, that airplane made the first transatlantic commercial flight in May 1937.

"... the realization of a dream" -- July/August 1936



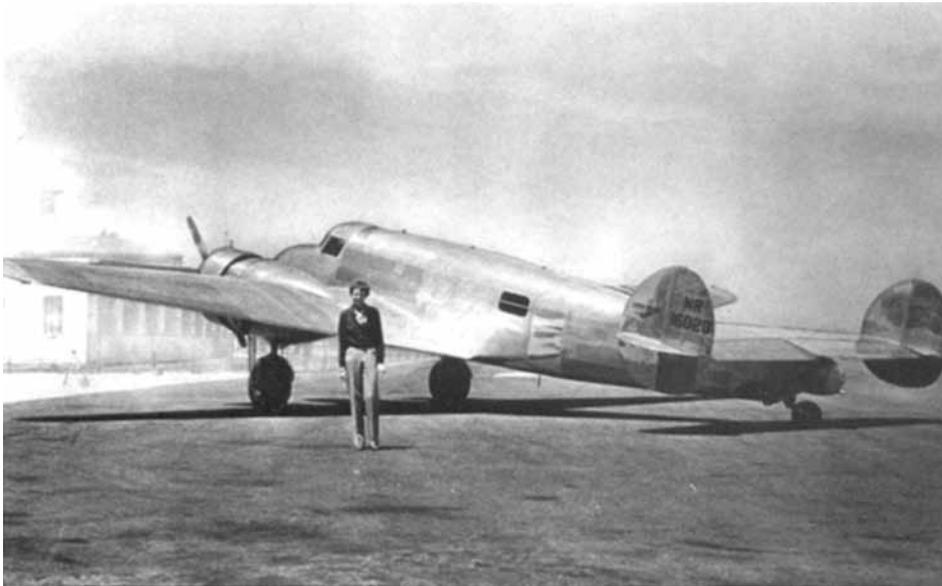
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WHEN THE PHOTO ON PAGE 17 WAS TAKEN IN April or May of 1936, #1055 already exhibited some of the features which set it apart from the standard Model 10. Most obvious is the absence of four of the usual five passenger windows on each side of the cabin. Note that the one aftmost window is bisected by a bar. Other features are standard, such as the pilot's hatchway in which Amelia is standing and the lightening holes in the aft bulkhead visible through the open cabin doorway. Also standard was the small round plate installed low on the nose. It covers the mouth of the tube for an "Elgin 3-Minute Electrically Operated Parachute Flare" (there's an identical installation on the other side of the nose) for use in night landing emergencies.

"This new Lockheed is the realization of a dream. It comes to me through Purdue University and is a real flying laboratory." That was how AE described her new airplane to the newsreel cameras shortly after

its official delivery on July 24, 1936 (AE's 39th birthday) but, aside from the window arrangement and fuel system, the machine at this time was little different from the standard Model 10E. Like most Electras, #1055 was delivered with a trailing wire radio antenna which was reeled out in flight, emerging from the extreme tip of the empennage. On the ground, its end is clearly visible as a white protrusion just below the tail navigation light. (This, by the way, was not the fabled trailing wire antenna removed just prior to the second world flight attempt. Patience.) On Earhart's airplane a fixed wire antenna also stretched from the starboard side pitot mast under the chin at Fuselage Station 37.5, to a ventral mast amidships at Sta. 147, and ending at a ventral mast just forward of the cabin door at Sta. 253.75.

Although clearly showing the airplane as it was originally delivered, a discrepancy concerning the registration number makes the exact date of the photograph above a



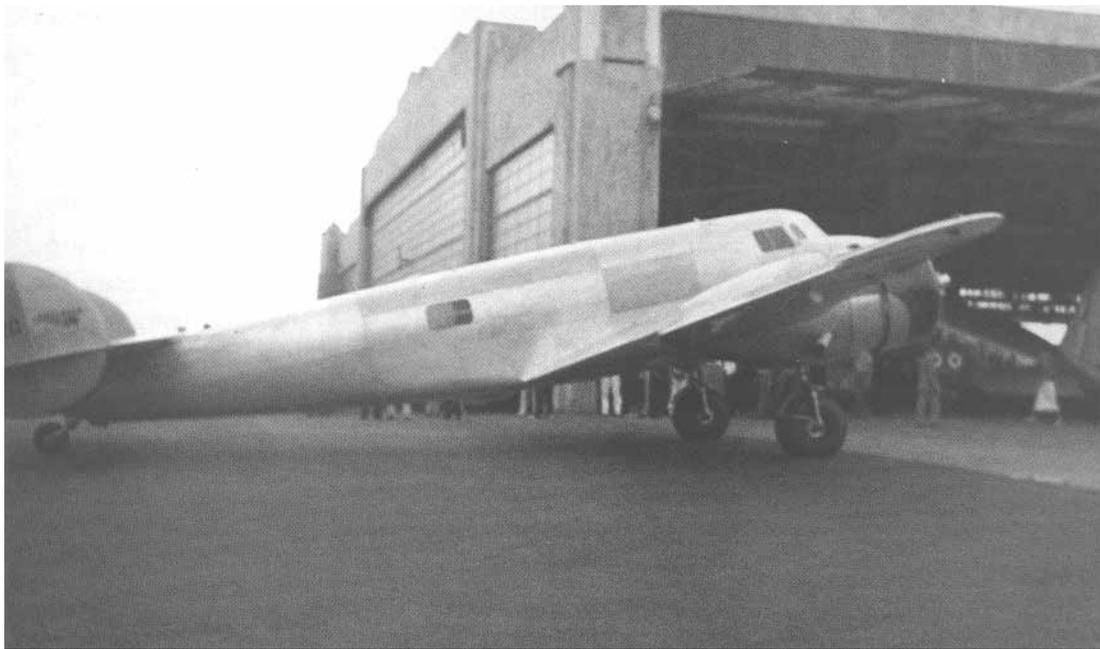
on August 6, 1936 asking only for the “R” designation. It was approved the next day.

As originally delivered, #1055 featured three non-standard fueling points on the fuselage: two on the port side of the cabin and one on the top just behind the pilot’s

puzzle. At no time when the airplane looked like this was it licensed to wear NR16020. The initial registration granted to Lockheed was X16020, an “experimental license” for “factory test work.” On July 27, 1936, three days after delivery, Earhart signed an application for the airplane to be licensed as NR16020, the “N” signifying approval for international flight and “R” meaning that the airplane was licensed in the Restricted category. The application states that the airplane was so painted at that time, but photos taken during a visit Earhart made to San Francisco on August 3rd show the Electra still (or perhaps again) wearing X16020. In any event, the “NR” was not approved and the application was cancelled. A new application was submitted

hatch. The photo below, apparently taken during the same session as the picture above (note AE’s outfit), provides an interior view of the cabin looking forward. Partially visible is the manifold system of filler necks for the seven fuselage tanks. Three additional tanks in each wing brought the total to thirteen with a combined capacity of 1198 gallons.





Bendix Races -- September 1936

MODIFICATIONS TO THE AIRPLANE BEGAN immediately, and it soon became a flying laboratory in fact as well as in name. The seven fuselage tanks were removed on July 28, 1936 but only six went back in, dropping the total gallonage to 1148. The manifold refueling system was abandoned in favor of each tank having its own filler neck. This caused three additional fueling points (two on the side and one on the top) to appear on the fuselage. On September 4, 1936 the Electra, now marked R16020, participated in the New York to Los Angeles Bendix Race. At this time, and for the only time in its career, the engine cowls are painted. This photograph appears to show a two-tone scheme but the actual colors are not known.

A good guess might be Purdue University's "old gold" and black. Otherwise, the aircraft featured a plain, bare metal finish from the time of its delivery until shortly before the first world flight attempt in March 1937. On September 21, 1936 the Bureau of Air Commerce finally approved

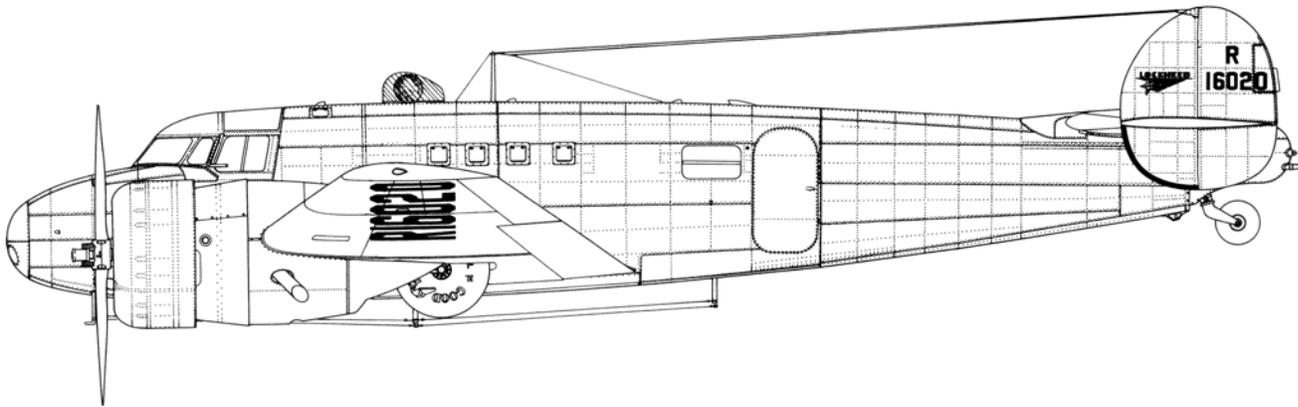
the "NR" registration, but the airplane continued to display R16020.

IN OCTOBER THE ELECTRA RECEIVED ONE OF FIVE prototype radio direction finders developed and patented by Frederick J. Hooven, Vice President and Chief Engineer of the newly formed Radio Products Division of the Bendix corporation. Hooven's device, also known as a radio compass, provided simplified, and yet superior performance compared to existing RDFs. The exterior components of this advanced system included a small loop mounted in a streamlined bubble on top of the fuselage and centered at Sta. 147. There was also a sepa-



rate “sense” antenna running along the belly parallel to the Electra’s other ventral wire. In November yet another antenna appeared on the airplane in the form of a dorsal mast

at Sta. 176.75 from which wires extended to the tip of each vertical fin forming a vee.



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"The Flying Laboratory" -- November 1936

Acknowledgements

Robert Dean (TIGHAR #1774), Frank Lombardo (TIGHAR #1806), Kenton Spading (TIGHAR #1382CE), Ray Stratton (TIGHAR #0793), and Thomas Thevenin provided important help in the compiling of this history. The meticulous profile views of the Earhart Electra were drawn by William Harney (TIGHAR #1309) who also contributed his extensive collection of photographs. Special funding for this project has been provided by Lockheed Aircraft Service Company, a division of Lockheed Martin Corporation. 🐾

For Part Two of “The Earhart Electra” we’re trying to pin down the nomenclature for the open loop antenna that was mounted over the cockpit in early March 1937, replacing the enclosed housing of the Hooven/Bendix Radio Compass antenna. Several authors have referred to it as an RCA RD2093D, and that would seem to agree with Fred Hooven’s contention that a more primitive but lighter RDF was substituted for his advanced system due to “bad advice from a competitor.” What we need is documentation in the form of paperwork relating to the equipment’s purchase and installation, or at least a contemporaneous advertisement or magazine article with sufficiently detailed photos.

There are also some unanswered questions about the fuel system. Particularly unclear is the role, if any, of Clarence M. Belinn, variously described as supervising or chief engineer for National Airways in Boston. Apparently Paul Mantz’s biographer Don Dwiggins (*Hollywood Pilot*, 1967) interviewed Belinn

who claimed to have designed the airplane’s original cross-feed system with “one master valve in the floor of the cockpit.” Other authors repeat the story as gospel, even though it has a central flaw. Belinn’s expertise supposedly derived from his experience with the Electras operated by National Airways. It is difficult to understand how he would have that expertise at the time Earhart’s airplane was being completed in July of 1936 considering that the airline’s two 10As (NC16055 & NC16056) were not delivered until the following October. Did Belinn modify Earhart’s fuel system later? Perhaps, but Lockheed blueprints of the system dated as late as March 10, 1937 (one week before the first world flight attempt) show no fewer than five fuel valves in the cockpit.

If anyone can shed further light on either point please contact TIGHAR’s Executive Director Richard Gillespie.

Research In Progress