



THROUGH THE FLAK

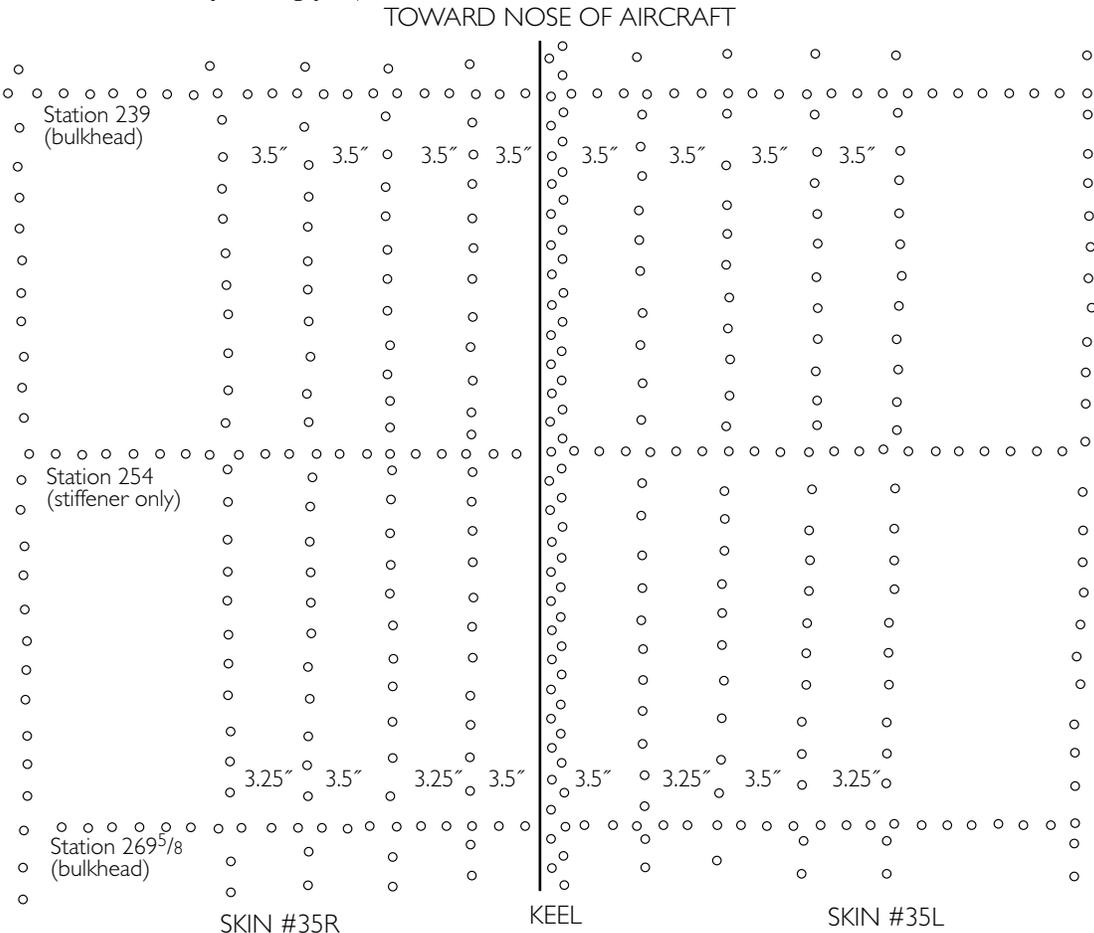
We said it would be thick, and it is. Following TIGHAR's March 16 announcement that the Amelia Earhart mystery is solved, the various Earhart-theorist camps put up a veritable barrage of criticism and a battle for public opinion has been raging ever since. As in every battle, confusion reigns supreme, so to help you make your own objective judgement about the evidence we've addressed some of the most common criticisms.

A RIVETING QUESTION

You've seen the allegations. The airplane skin TIGHAR found on Nikumaroro could not have come from Earhart's aircraft. The rivet pattern "is not even close" to that on a Lockheed 10. The repairs made to Earhart's Electra could not have resulted in the rivet pattern present on TIGHAR's artifact. And so on. Here are the facts. Judge for yourself.

THE RIVET PATTERN

The area in question is a .032" section of 24ST Alclad attached with AN455 AD 3/3 rivets on the belly of the Electra between Fuselage Stations 239 and 269⁷/₈. As it came from the factory, that section of the belly of a Lockheed 10 looked like this (imagine the airplane standing on its tail with the belly facing you):



The two skins overlap at the keel and are attached with a double row of rivets. The vertical (nose to tail) rivets have a pitch (space between individual rivets) of 1.5 inches and attach to stringers, four on each side of the keel, which taper together slightly as they go aft (because the fuselage tapers). The horizontal rivets are spaced one inch apart and are attached to bulkheads at Stations 239 and 269⁷/₈. At Station 254, however, the rivets attach only to stiffeners on the interior surface of the skin. There is no bulkhead at that location.

The section of airplane skin found on Nikumaroro looks like the illustration on the next page. It also is a .032" section of 24ST Alclad that was attached with AN455 AD 3/3 rivets (one rivet survives). Four rows of rivets indicate attachment to stringers which taper together at the same rate as those on a Lockheed 10, and the skin bears the same pre-war labeling present on existing Lockheed 10s. Some details of rivet spacing on the artifact are different from the standard pattern shown below (as was also true of Earhart's aircraft). The underlying structure evidenced by the rivet pattern is, however, identical to that on the belly of the Lockheed 10, i.e. four closely spaced stringers which taper at a specific rate. Where rivets are absent (those associated with the stiffener at Station 254, and the double row at the keel) there are corresponding increases

in the strength of the structure (nose to tail rivets have a pitch of 1" rather than 1.5" and rivet size at the keel is increased from ³/₃₂" to ⁵/₃₂" diameter). The ⁵/₃₂" rivets have the standard 1.5" pitch except where an anomaly in the spacing indicates the installation of an external feature which reinforced the skin at that point. When the skin failed, that reinforcement left the "tab" seen on the artifact. This distinctive feature corresponds to the position of the aft antenna mast on the belly of Earhart's aircraft which is further

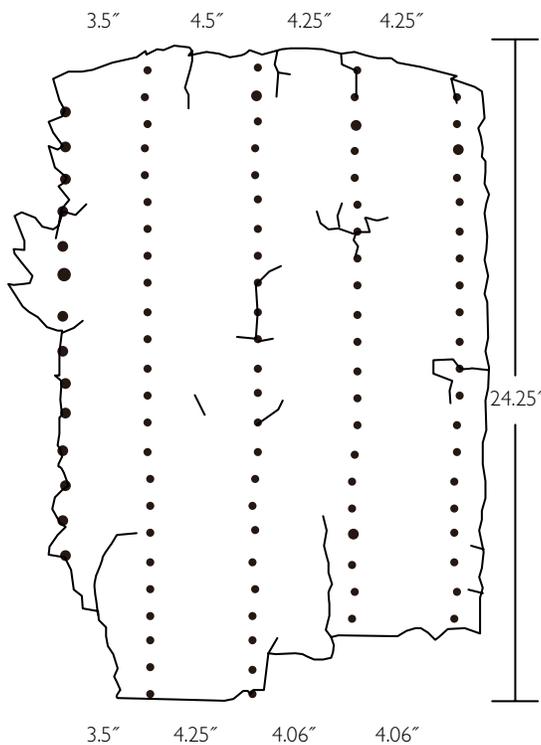
30.60"

indicated by the presence of 1930s aviation antenna lead wire found entangled on the artifact.

All of the variations from the standard pattern are entirely consistent with the Lockheed Engineering Repair Orders which describe the repairs made to Earhart's aircraft in April/May of 1937. Understanding those repairs and the historical context in which they were carried out is essential to an intelligent evaluation of the aircraft skin found on Nikumaroro.

THE LUKE FIELD CRASH

At 5:45 a.m. on March 20, 1937, Earhart's first attempt to fly around the world came to an abrupt end when the aircraft ground-looped on take-off from Luke Field, Hawaii. Early in the take-off run, according to the official U.S. Army Air Corps report of the accident, the aircraft swung



slightly to the right. Earhart corrected by reducing power on the left engine. The aircraft then swerved sharply to the left, tilting right wing low so that it ran along for "50 or 60 feet" supported only on the right main gear. The right gear collapsed under the excessive load, followed quick-

ly by the left gear, and the aircraft "spun sharply to the left on its belly ... amid a shower of sparks from the mat ... coming to rest headed about 200 degrees from its initial course." The mat referred to was the pierced steel matting which comprised the runway surface at Luke Field. Some fifty square feet of the mat was torn up and had to be replaced. The aircraft fared worse.

THE DAMAGE

Amelia had cut the switches when she saw that a crash was imminent so that, although both props were bent, there appears to have been no serious damage to the engines. The right wing, however, was a total loss as was the entire right-hand underside of the belly where it had scraped and spun along the torn steel matting. In addition, eight inches of the left-hand side of the belly would have to be rebuilt. Earhart and company did not stick around for the accident investigation but sailed for California at noon that same day aboard the S.S. *Malolo*. The airplane followed a week later, on March 27, 1937 aboard the S.S. *Lurline* and by early April was back at Lockheed in Burbank for repairs.

THE SHOP

It is important to understand the historical context in which the repairs to the Earhart aircraft were made. At that time, Lockheed employed about 200 people at Burbank building the Model 10 Electra and the Model 12 Electra Junior. The Model 10 had been in production since 1934 and the plant normally produced two or three aircraft per month. But the situation at Lockheed in April and May 1937 was far from normal. Company records confirm that during the two months NR16020 was under repair the company delivered 14 new airplanes, more than twice as many units as at any other time in the type's production history.

Another factor was Amelia herself. During the time the aircraft was under repair AE was a frequent visitor to the shop. Robert Tallman, who worked in the sheet metal shop at the time, recently wrote to TIGHAR to say, "Amelia was one impatient woman while waiting for repairs to her Electra. She shortcut through our department from the front office to her airplane."

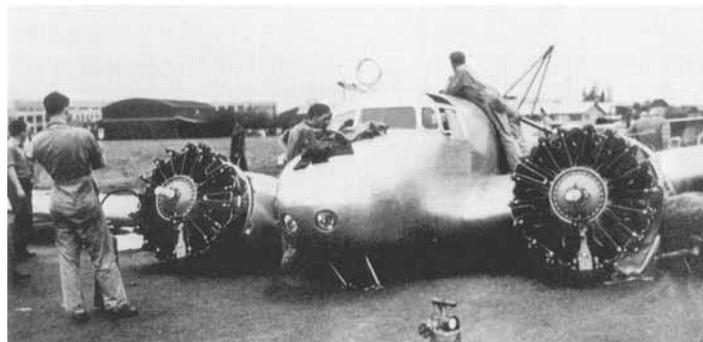
THE REPAIRS

Upon arrival at Burbank the airplane was evaluated and Engineering Repair Orders providing a general narrative description of the work to be performed were written by James Gerschler, Assistant Chief Engineer.

Although the damage required an almost complete rebuild of the belly, returning the aircraft to the original construction jig was not an option. Not only was the jig occupied with new aircraft, but it could not accommodate an airframe once it had been mated with the center section. Consequently, the Earhart aircraft was repaired propped up on sawhorses (see photo below). The repairs were effected according to Lockheed Standard Design Handbooks which contained a wide selection of pre-approved repair techniques which could be selected at the discretion of the



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Luke Field, Hawaii, March 20, 1937



NR16020 under repair at Lockheed Burbank, April/May 1937.



TIGHAR photo by P. Thrasher.

Lockheed 10A Electra N38BB at Oakland's Western Aerospace Museum, used for artifact comparison by TIGHAR's critics.

men doing the work. These provided for substitutions in rivet size, pitch and spacing which would result in the same or greater structural integrity as the original design but afford more flexibility in a repair situation. Surviving official correspondence documents that substantial changes were made requiring new engineering drawings approved by the Bureau of Air Commerce on April 29, 1937. Unfortunately, none of these drawings of how the rivet pattern looked after the repairs were completed are known to survive. All that can be said for certain is that it did not look like the pattern on a standard Lockheed 10.

The work was completed and signed off on May 19. Earhart embarked upon her second world flight attempt the next day.

THE CRITICS

So if all the knowable features of the skin (material, size, thickness, rivet type, labeling, stringer orientation, taper, etc.) match TIGHAR's artifact exactly, and no one really knows just what the rivet pattern on Earhart's airplane looked like, and nobody can find any other possible source for this piece of skin, what's behind all the criticism? The answer is simple – money. All the criticisms regarding the rivet pattern were orchestrated by one individual whose efforts to raise money to investigate his own theory are threatened by TIGHAR's success.

Two former Lockheed employees, recruited by the same person, have made highly publicized statements about how Lockheed would have repaired Earhart's airplane. However, neither of these individuals was involved in those repairs. Their remarks are entirely speculative and have been contradicted by equally qualified sources. None of these people has ever personally examined the artifact in question. The aircraft they used for a comparison with TIGHAR's artifact (or rather, with a plastic template based on photographs) is a standard Lockheed 10A. Of course, it didn't fit. Nor should it.

YOUR FEETS TOO BIG

TIGHAR's discovery of the remains of a size nine woman's shoe of the same type worn by Earhart has attracted another round of fire. Allegations have been made that Amelia Earhart did not wear a size nine shoe. Instead, it is said, she wore a size six. The proof offered is that a museum in Atchison, Kansas supposedly has a size six shoe which is known to have belonged to Earhart. Here's the truth.

The County Historical Society Museum in Atchison has a pair of brocade dancing slippers which once belonged to Amelia. They are labeled size 6½. No one knows when in her life Amelia wore them. TIGHAR has a pair of medium



Earhart's modified and repaired Lockheed 10E Special NR16020 at Singapore on June 20, 1937.

heeled shoes loaned by the daughter of Amelia's secretary. They were purchased by AE in Ireland in 1932 and were made in France. The Sterling Last Corporation has examined them and thinks they are about a size seven, AA or AAA. Amelia gave them to her secretary because they hurt her feet.

These discussions, while interesting, are not relevant to the question of what size shoe AE was wearing at the time she disappeared. Fortunately, that question is easily answered. An accurate measurement of the blucher-style Oxfords AE was wearing is readily obtainable from a photograph which shows her standing on the wing of the Electra in Bandoeng, Java on June 22, 1937 (see *TIGHAR Tracks*, Vol. 8, No. 1/2). Features of known dimension in the same plane of perspective with the shoe make it easy to determine its length. That measurement has been done independently by Bilrite Footwear, by Sterling Last, and by TIGHAR. We all come up with 278mm. That's a size 8½ or 9 (depending on the manufacturer). The sole of the shoe found on Nikumaroro was reassembled before this information became available. It measures 278mm.

DEBUNKING THE DEBUNKERS

TIGHAR undertook the Earhart Project not only to find Amelia Earhart but to set an example in sound, thorough historical research. The criticisms of TIGHAR's findings are, predictably, the result of just the kind of speculative and insufficient research that kept Earhart lost for 55 years. Space does not permit, and reason does not merit, a rebuttal of every half-thought-out and often downright screwy objection that has been raised. But if you've read something that bothers you, drop us a line. We haven't seen any criticism yet that stands up to documented fact.

ONWARD

Meanwhile, the work continues. There are some very interesting artifacts from Nikumaroro still under analysis which could turn out to be every bit as significant as those we've already identified (see "Help Wanted," page 6). TIGHAR researchers are also turning up new historical data that are helping to fill in the picture of what happened in 1937. And, as a result of all the publicity, we're constantly hearing from people who have information, expertise or equipment to contribute. The monumental task of planning, staffing and funding the 1993 expedition is well underway. Some new developments in transportation, technology, and search capability should mean a bigger team, more time on site, and greatly increased ability to uncover the rest of the story.

