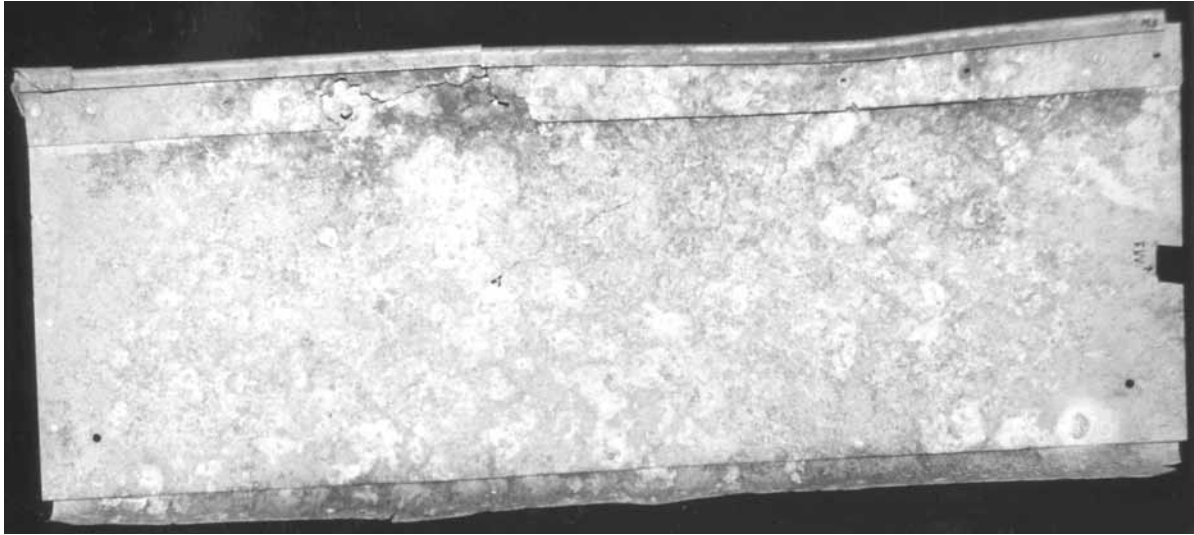


# DADOS GALORE



*Artifact 2-1-V-18, the dado recovered from Nikumaroro in 1989. The small rectangular cut-out on the extreme right was made in 1992 by the National Transportation Safety Board laboratory for materials analysis. TIGHAR photo by Frank C. Lombardo.*

TIGHAR'S first expedition to Nikumaroro in 1989 brought back an artifact we thought at the time might be a cover to some sort of aluminum box. It was originally assigned artifact number 2-18 and later, under an expanded cataloging system, became Artifact 2-1-V-18. The materials and the nature of the construction suggested an aviation origin but nobody we talked to recognized it as any known part of an airplane.

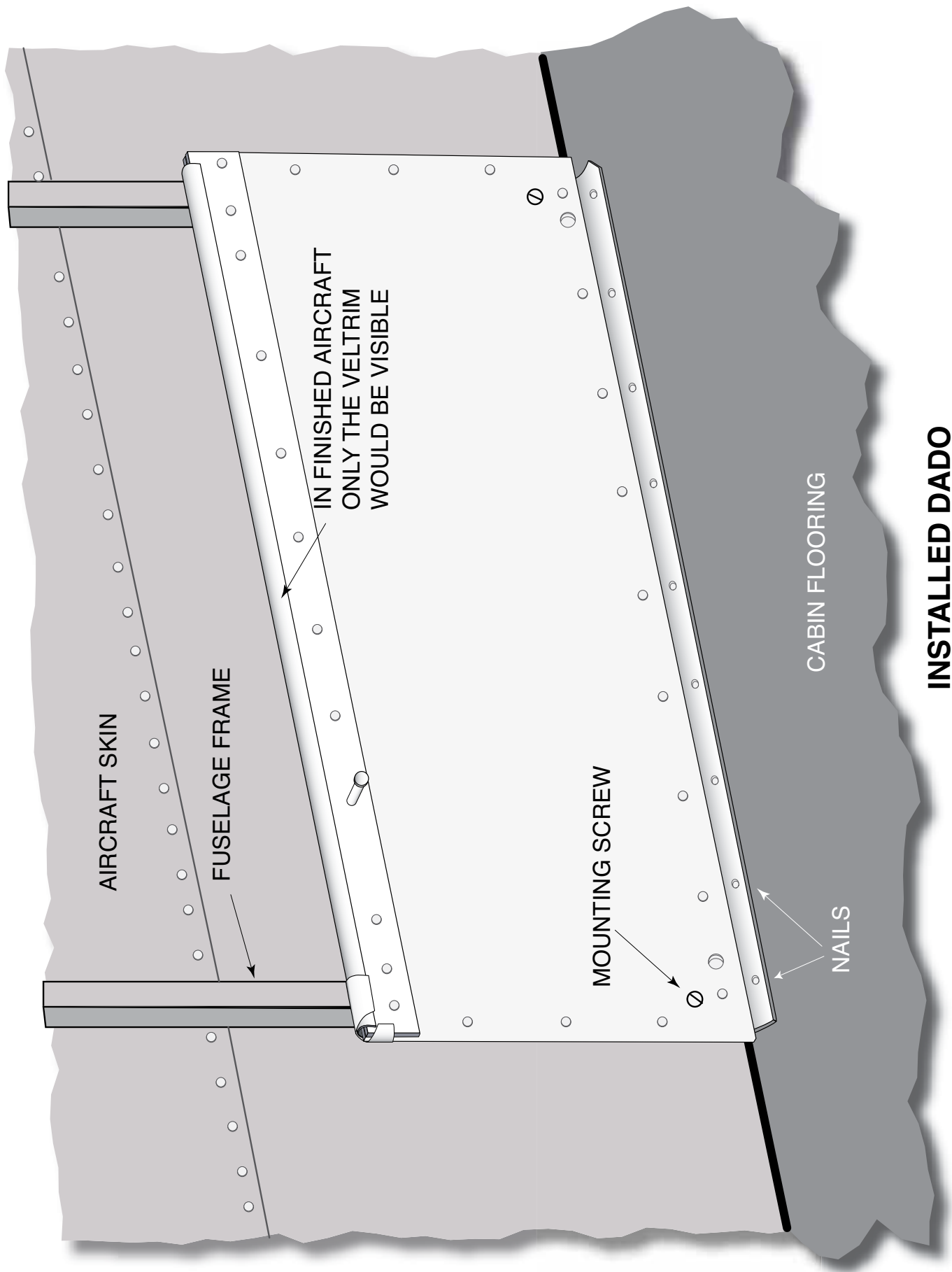
Especially interesting was the fact that we had the entire assembly rather than the cut-up scraps of aluminum we usually find in the village



*Lockheed Electra construction, Burbank, California; 1935. Photo courtesy Lockheed Aircraft Corp.*

– and there were no part numbers stamped into it anywhere. Virtually all WWII military aircraft assemblies were festooned with stamped-in part numbers because they were built in great quantity at diverse locations by a hastily trained and constantly changing work force. The pre-war Lockheed 10, by contrast, was built in small batches by a relatively stable group of employees in a single shop. There were some part numbers cast into major Electra components such as landing gear legs, and we've seen handwritten part numbers on some components, but no stamped-in numbers. The absence of part numbers on a complete assembly suggested that the assembly either wasn't an airplane part at all or that it came from an aircraft that predated the revolution in aircraft mass production that began in 1939.

Then in November of 1991 we showed it to some senior employees in the “completions shop” (the facility that tailors the interior furnishing of new business aircraft to a specific customer) at Atlantic Aviation here in Wilmington, Delaware. They immediately recognized the assembly as a “lower dado panel” – a baseboard-like non-structural component commonly used in a category of relatively small aircraft known as “cabin class twins,” two-engined airplanes



**INSTALLED DADO**

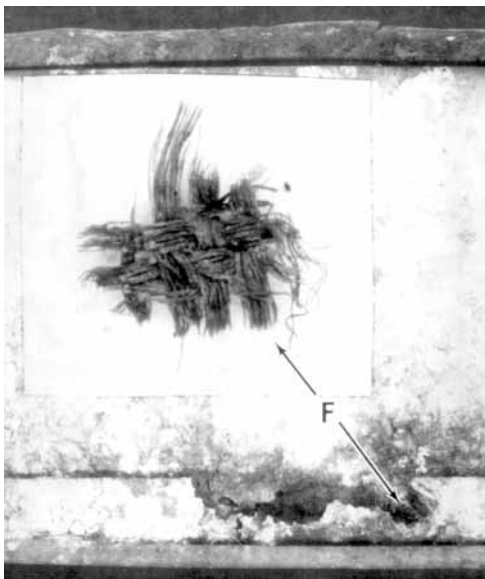
that typically carry between six and twelve passengers in a cabin that is entered via a door in the side.

A dado (pronounced DAY-doh) serves as a juncture between the floor and the fabric-covered interior wall of the cabin, providing protection against kicks and bumps. Artifact 2-1-V-18 was anchored to the floor by means of a right-angle flange. The holes in the flange are not a standard rivet size and the bottom of the flange exhibits what appear to be pry marks immediately adjacent to the holes, leading us to conclude that this particular dado was probably nailed to a wooden floor. The Lockheed Model 10 had a wooden floor.



*Apparent pry marks on bottom of right angle flange. TIGHAR photo by F. Lombardo*

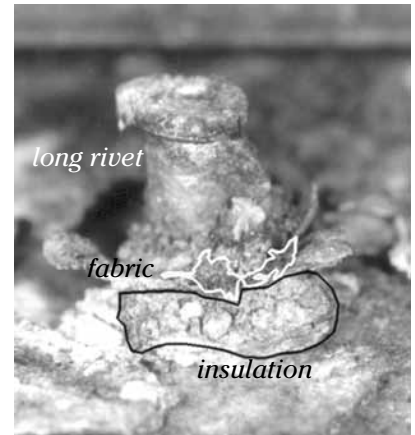
Along the top edge of Artifact 2-1-V-18 was an elongated rivet at the base of which was a small surviving fragment of the original insulation and woven fabric that once covered the entire surface that faced the interior of the cabin. The mottled appearance of the surface may have been caused by residue from the adhesive used



*Arrow "F" denotes the long rivet tail where the fabric remnants were found. Insert is magnified x20. Photo courtesy NTSB Materials Laboratory.*

to attach the insulation. The fragment of insulation was 1/4 inch thick. The woven fabric was blue. Unfortunately, we cannot perform tests to conclusively identify these materials because the fragments were lost by the National Transportation Safety Board (NTSB) laboratory while they were performing a materials identification analysis of TIGHAR artifacts in 1992. We do know, however, that Lockheed Electras were soundproofed with 1/4 inch "kapok felt" and a material called "Seapak." Further research should provide more details.

*This micro-photo clearly shows the remnants of blue fabric and insulation when seen in color; highlighting is provided to compensate for monochrome photo. TIGHAR photo by P. Thrasher*



On the type of dado recovered from Nikumaroro the insulation and fabric that covered the face was tucked up under a 1/4 inch 180° flange known as a "veltrim." When installed in a finished aircraft the only visible part of the dado is the thin line of the veltrim.

The metallurgical examinations performed by the NTSB showed that the several components of the dado assembly were made of two different kinds of aluminum.

- 2024 alloy – the standard aircraft structural alloy known in 1937 as "24ST"

and

- an alloy other than 2024

None of the components of the dado is "clad." Cladding is a corrosion-inhibiting process whereby the alloy is sandwiched between two thin layers of pure aluminum. Patented by the Alcoa company, this type of aluminum sheet was known as "Alclad." All of the structural aluminum sheet on the Lockheed 10 (and the vast majority of other American stressed-aluminum aircraft of the 1930s and '40s) was Alclad. A dado, of course, is not a structural component and can

be made out of less expensive aluminum but it is also much more susceptible to corrosion.

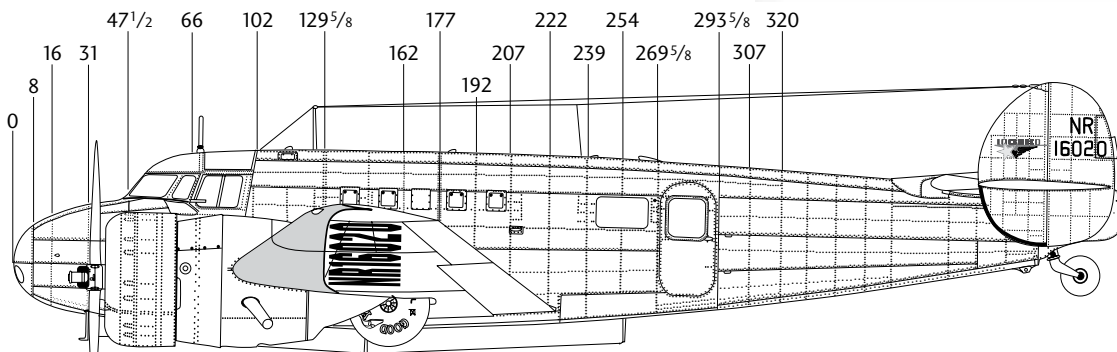
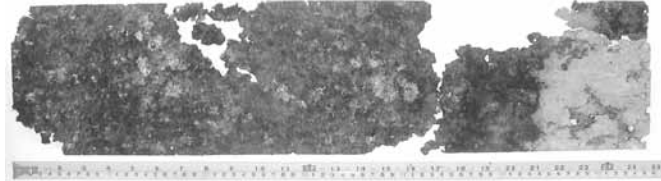
In 1994, TIGHAR member Frank Lombardo undertook a detailed examination of the dado. Frank was retired from a long career in aircraft radio installation and maintenance and was very familiar with aircraft interiors of the 1940s. His report on his findings and his speculations about the dado are on the TIGHAR website at [www.tighar.org/Projects/Earhart/Bulletins/09\\_15\\_03Bulletin/09\\_15\\_03.html](http://www.tighar.org/Projects/Earhart/Bulletins/09_15_03Bulletin/09_15_03.html).

One of the first things Frank noticed was that the dado had been attached to the underlying structure of whatever aircraft it came from by means of screws inserted through two mounting holes that are 15 inches apart. The spacing of circumferential frames and bulkheads in



*Artifact 2-7-V-1, Dado. TIGHAR photo by V. Hunn.*

*Artifact 2-7-V-2, Dado. TIGHAR photo by V. Hunn.*



*In the Lockheed Model 10, circumferential frames and bulkheads, known as “stations,” are numbered in inches rearward from the nose of the aircraft. Station #222, for example, is 222 inches from the tip of the nose. Note that most of the stations are 15 inches apart.*

stressed-aluminum aircraft is a matter of scale and strength. The smaller the aircraft, and the greater the required rigidity, the tighter the spacing. The nominal spacing of frames in the Lockheed Electra is 15 inches. That, of course, does not mean that the dado must have come from a Lockheed Electra, but it does suggest that it came from an aircraft of that general size, and it supports the earlier statement that dados were used in “cabin-class twins.”

Frank also believed that he had found something the NTSB missed. The laboratory report noted that the space between the riveted-together aluminum components was “filled with corrosion products.” Frank, after removing one of the components (something the NTSB did not do) believed that the “corrosion products” were in fact strips of thin ( $1/16$  inch) micarta, an industrial laminate developed by Westinghouse.

To our considerable frustration, we have been unable to find photographs that show the interior of the Earhart Electra after it was

repaired following the March 20, 1937 accident. A careful, but by no means exhaustive, search of the engineering drawings for the Model 10 (11 rolls of hard to read microfilm) failed to turn up anything helpful one way or the other.

That is where our dado research stood until the Niku Vp expedition team returned with what are, without a doubt, the remains of at least two more dados found very close to where Artifact 2-1-V-18 was found in 1989. That these artifacts – 2-7-V-1 and 2-7-V-2 – are dados is apparent from the identical rivet size and spacing along the edges, the  $3/4$  inch inset of the mounting holes, and the presence of a small surviving section of the veltrim. The identification was confirmed by TIGHAR with the help of x-rays taken by conservators at the Maryland Archaeological Conservation Laboratories at Jefferson Patterson Park in southern Maryland. The lab is also taking appropriate measures to conserve the artifacts. TIGHAR is deeply grateful for the generous assistance of the dedicated scientists

at this new state-of-the-art facility. You can learn more about the MAC lab at [www.jefpat.org/3arch-maclab.htm](http://www.jefpat.org/3arch-maclab.htm).

The “new” dados are in much poorer condition than the 1989 find. 2-7-V-1 has been disassembled, pieces cut out, and one edge folded over several times. Because we’re missing one finished edge we can’t be sure how long it originally was. 2-7-V-2 was mostly buried and is in several pieces. Luckily, it had not been cut up and the finished edges were intact. Through expert recovery technique and good in situ photos, we were able to establish its original dimensions.

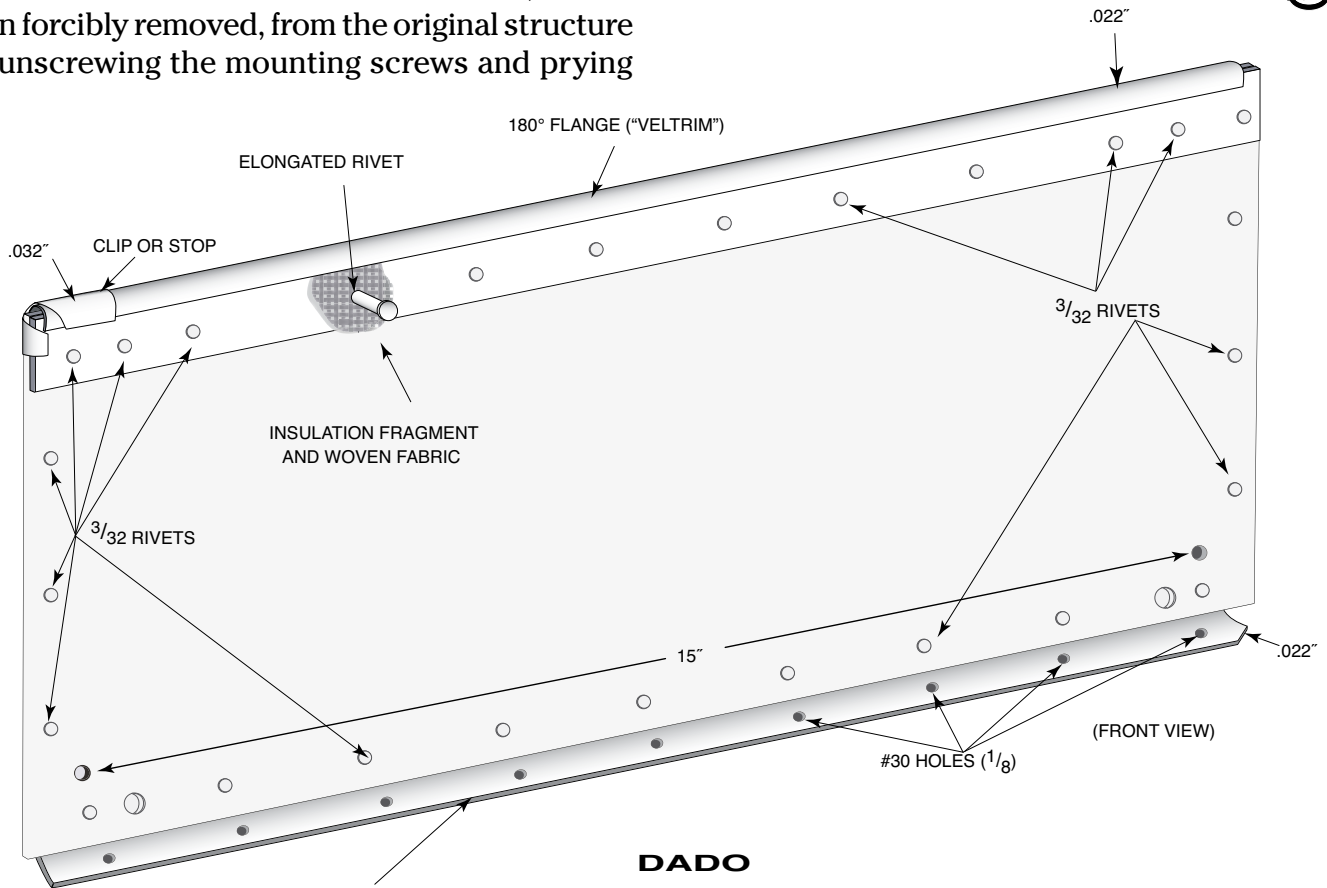
An added surprise came when we realized that another artifact collected in 1989, 2-1-V-2, is almost certainly a section of yet another dado. The NTSB had identified the material as non-clad 2024 aluminum of the same thickness (.032 inch) as the non-clad 2024 of 2-1-V-18, and it came from near where the original dado was found, but it wasn’t until we were faced with the fact that there were multiple dados there in various stages of deconstruction that we made the connection.

Aside from corrosion, all of the damage seen on the artifacts seems to have been caused by adaptive local use rather than by the force of an accident. The dados were disassembled, rather than forcibly removed, from the original structure by unscrewing the mounting screws and prying

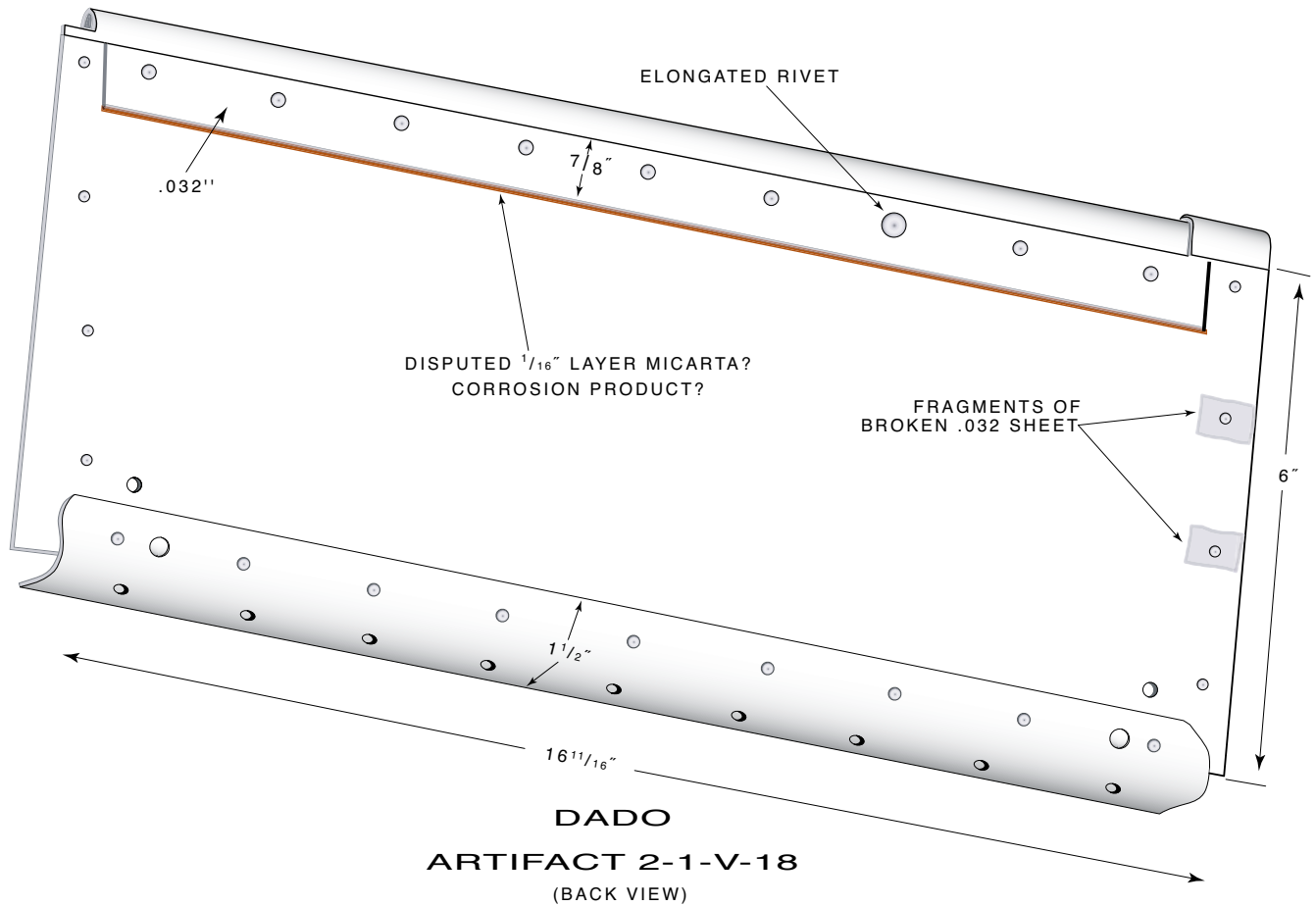
up the nails from the “back” side of the 90° flange. That is not possible unless the removal of the mounting screws enabled the outer structure to which it was attached to be discarded thus permitting access to the back of the dado. This would seem to suggest that the dados were removed from a section of wreckage rather than from an intact aircraft.

In summary, it appears that sometime between 1939 and 1963, a person or persons who lived and/or worked along the southern shore of the main lagoon passage on Nikumaroro had at least three, probably four, and possibly more dados that came from the wreckage of a relatively small civilian cabin class airplane that had a wooden floor.

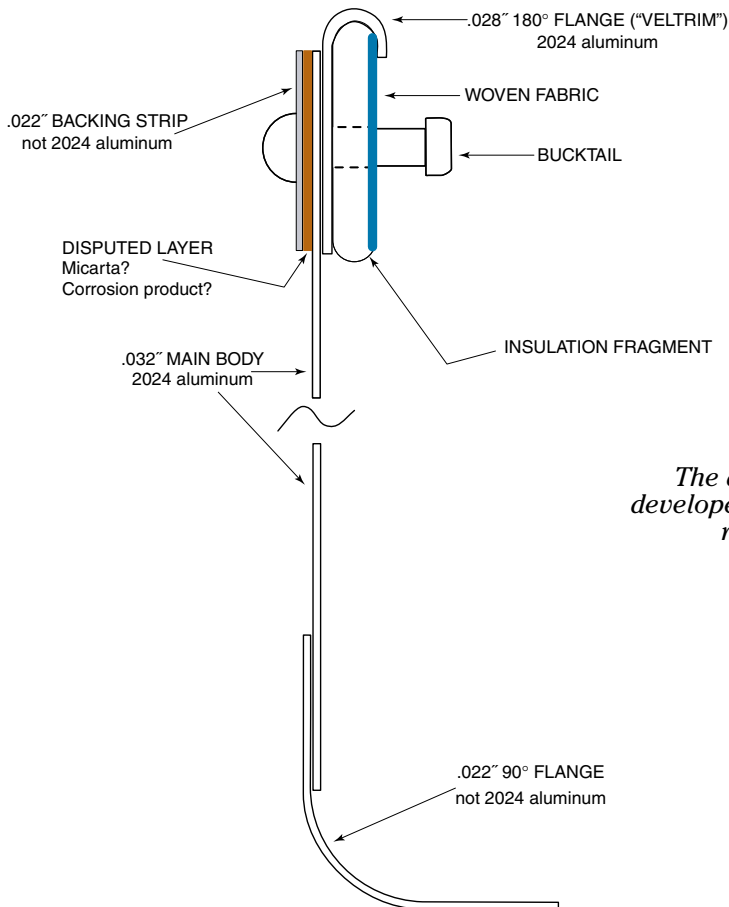
That’s the way it appears right now, but appearances can be deceiving and much more research is needed before we can say with certainty where these artifacts originally came from. That research is already well under way. A specialized TIGHAR research team has begun examining both archival records and surviving examples of Electras and other aircraft. Watch for progress reports on the TIGHAR website ([www.tighar.org](http://www.tighar.org)) and in upcoming issues of *TIGHAR Tracks*.







**CROSS-SECTION AT ELONGATED RIVET**



*The drawings on these pages and on page 4 were developed from drawings made by Frank Lombardo, and represent Dado 2-1-V-18 as found in 1989.*