# PART NUMBER 40552

An irregularly shaped piece of transparent plastic, cataloged as TIGHAR Artifact 2-3-V-2, is object found on Nikumaroro to which a standard Lockheed Model 10 part number can be Here's a review of the investigative process by which that determination was made

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#### DISCOVERY

On the afternoon of the fourth day of the NIKU III Preliminary Expedition, team member Veryl Fenlason (#0053CE) noticed an object lying on the jungle floor in the "old village" and thought it might be a piece of Plexiglas.

### **ON-SITE CONSIDERATION**

Veryl brought the artifact to the attention of the expedition leader and other team members in the area and it was discussed as a candidate for collection. It was clear that this was part of a larger object made of fairly sophisticated 20th century material from which pieces had been crudely cut and broken. Its surface exhibited a slight but uniform curvature. No source of such material had been encountered elswhere in the village and the location was too far inland for it to have washed in from the sea. Other debris in the same location exhibited similar evidence of having been cut apart, suggesting that whoever lived here was something of a craftsman or tinkerer. A further search of the spot turned up another smaller shard of the same material which fit a break in the first piece. Because known aircraft parts had been found in the vicinity it seemed reasonable to speculate that this might indeed be plexiglas and to have come from an aircraft. The expedition leader made the decision to collect the two pieces for testing and cleared their recovery with the Kiribati government representative as Artifact 2-3-V-2 (see photo p. 10).

#### **INITIAL TESTING**

Upon our return to the United States the first step was to conclusively identify the material. This was accomplished by contracting with a reputable conservation laboratory for a compositional analysis. A series of tests confirmed that the material is polymethyl methacrylate (PMMA), also known by the trade name Plexiglas. So far so good, but that didn't make it an airplane component, much less part of the Electra.

We next contacted Rohm & Haas, the company which produced Plexiglas in the U.S., and got some history the product. Polymethyl methacrylate wasfirst pro in Germany by the Rohm company in 1927. In 1936, & Haas began producing it in the U.S. under the name "Plexiglas." DuPont also made PMMA and ca "Lucite," while in Britain, ICI Ltd offered the same pa under the name "Perspex." The new material w superior to earlier cellulose-based products (Pyral Plasticele) used in airplanes where a curved trans surface was needed, and by 1937 aviation mainte manuals included instruction on how to work plexiglas. Because it was relatively expensive, p use of PMMA was limited to aviation applications a manufacture of jukeboxes. During and immediatel the war it was almost exclusively an aviation produ didn't come into common civilian use until the earl Because the "old village" on Nikumaroro was aban in 1949 and (as far as we know) had no jukebo concluded that the artifact had probably come fr airplane. But what airplane?

## MATCHING THE WINDOWS

All of the airplane parts found on Nikumaroro seem to fall into two categories, B-24 and Lockheed E Since both aircraft could have had Plexiglas windo next step was to look at the artifact's curvature and ness. Plexiglas, to be formed, must be heated to a 90°C—a far higher temperature than could be rejust lying on the ground (even on Nikumaroro), curvature of the artifact is almost certainly origin see if it is the same curvature as a Lockheed Electra window we asked our friends at the New Engla Museum in Windsor Locks, Connecticut to send from their under-restoration Electra c/n 1052 (Ea was c/n 1055). The exterior surface curve of the a and the window appeared to be identical. The glas 1052, however, was tinted and twice as thick as the a (1/4 inch versus 1/8 inch). Early photos of 1052 show

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was not delivered with tinted windows so this must be a later replacement. The real question, of course, was how thick were the windows in Earhart's airplane?

# BACK TO THE DRAWING BOARD

A search of microfilmed engineering drawings for the Lockheed Model 10 at the National Air & Space Museum's Garber Facility in Suitland, Maryland, proved revealing. The drawing for "Part Number 40552—Window Glass, Fuselage, Cabin" shows that a number of changes were made to the material and thickness specifications over the production-life of the design (1934 to 1941). Of particular interest is a change specified for January 15, 1937 at which time the window thickness was reduced from 5/32 to <sup>1</sup>/8 inch. The date is significant because it was just at that time that the cabin windows in Earhart's airplane were replaced and additional special windows were installed as part of her world flight preparations. The curvature and thickness of the Plexiglas found on Nikumaroro exactly matches Lockheed's specifications for Electra cabin windows at exactly the time Earhart's new windows were installed.

But what about the B-24? A search of engineering drawings for the Consolidated Model 32 show that the fuselage windows of the Liberator (Part No. 32B1198) were 1/10 inch thick and had no curvature at all. The Plexiglas used in the nose and turrets was, of course, much thicker.

Our conclusion is that Artifact 2-3-V-2 is consistent in all known respects to Lockheed Part Number 40552 and is not consistent with the only other known source of airplane parts found on Nikumaroro, the Consolidated B-24.

GRIND EDGES SHATTER PROOF 1251/64 - 1/16 GLASS The drawing on this page is a facsimile of the microfilm copy of the original Lockheed engineering drawing.