In the annals of TIGHAR’s Earhart Project the year 2004 will be known as the Year of the Dado. Three expeditions were conducted to test the hypothesis that artifacts recovered on Nikumaroro in 1989 and 2003 were “dados” identical, or at least significantly similar, to those used in the construction of Lockheed Electras. As so often happens, the results of the tests did not support the original hypothesis but, instead, suggested a new and potentially more conclusive possibility.

Before we describe the expeditions and what we learned from them it will be helpful to briefly review what we knew, and what we thought we knew, when we began this year’s investigations.

The September 2003 issue of TIGHAR Tracks featured an article entitled “Dados Galore” which recounted how the first TIGHAR expedition to Nikumaroro in 1989 had collected a rectangular structure that we at first thought might be the cover of some kind of aluminum box. Materials analysis by the National Transportation Safety Board (NTSB) laboratory confirmed that the object was made with aircraft-grade aluminum and rivets. 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 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 to control cables or other components against kicks and bumps. The one we had appeared to have been 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 his particular dado was probably nailed to a wooden floor. The Lockheed Model 10 had a wooden floor.

Along the top edge of the artifact was an elongated rivet at the base of which was a small surviving fragment of the original insulation and woven fabric that once covered its surface. A short 180° flange along the top edge held the insulation in place and the mottled appearance of the metal surface may have been caused by residue from adhesive used to attach the insulation. The fragment of insulation was 1/4 inch thick. The woven fabric was blue. Unfortunately, the fragment of insulation and fabric were lost by the NTSB lab before we were able to perform tests to conclusively identify the materials. We do know, however, that Lockheed Electras were soundproofed with 1/4 inch “kapok felt” and a material called “Seapak.”

Two holes near the bottom edge of the artifact were thought to be “mounting holes” where the object had been fastened to the underlying aircraft structure. The fact that the holes are 15 inches apart was seen as possibly significant because the circumferential bulkheads of the Lockheed Model 10 are nominally 15 inches apart.

This drawing appeared in the September 2003 TIGHAR Tracks as an illustration of what we thought the dado would look like when installed in an aircraft.
The whole dado question became more pressing when the 2003 Niku Vp expedition team returned with two more dados that were discovered very close to the spot where the first one had been found in 1989. Rather than a single isolated artifact, we now had three identical objects of various lengths in assorted states of disassembly. It was now apparent that someone who lived on Niku at some time in the past had somehow acquired a number of these objects and had systematically taken them apart and cut them up for some local purpose – most likely fishing lures. With this new understanding we were able to identify another artifact recovered in 1989 as very likely the remnant of a fourth dado.

That there had been a number of these objects recovered and used by the people who lived on the island was an important revelation but the essential questions were whether Lockheed Electras, and specifically Earhart’s Electra, had dados and, if so, did they look like our dados? None are visible in photos of the interior of NR16020 but it is entirely possible for a dado to be installed behind the upholstering that covers the inside of the cabin walls and, besides, the only known photos of the Electra’s interior were taken before the extensive repairs and refitting that followed the Luke Field crash.

Electras in museums were of little help. If the interior of an aircraft has been refurbished or upgraded at some time in its career, chances are that features like dados have been replaced. Electras in museums have survived long service with many owners and most have had their cabins stripped and refurbished several times. It is also true that museums take a dim view of visitors slit opening the upholstering to see what is behind it.

We hoped that the Lockheed engineering drawings for the Model 10 on file at the Smithsonian’s Garber Facility archive would tell us whether dados were used and what they looked like. Days of peering at reel after reel of microfilm revealed some tantalizing hints but no drawings of dados. Close examination of old photos seemed to confirm the presence of dados in Electra cabins but there wasn’t enough detail visible to tell if they were made like the ones we found on Niku.

Somehow we had to find a Lockheed Electra with cabin furnishings that were still just the way Lockheed had installed them in the 1930s. We reasoned that our only hope was to find an airplane that had crashed early in its service life and had remained relatively undisturbed ever since. It was a tall order but as we went down the list of known Electra losses there were three that seemed like possibilities.

On May 7, 1942, a Lockheed 10A operated by Union Airways of New Zealand flew into Mt. Richmond, a 5,770 foot mountain in the northern part of South Island. Registered as ZK-AFE and named “Kereru,” the aircraft was built in 1937 and bore constructor’s number (c/n) 1103. The pilot, copilot and three passengers who died in the crash were New Zealand’s first airline fatalities. The airplane served its entire five-year career with the airline and almost certainly still had its original interior at the time of the crash.

People who had visited the site in the past few years reported that the wreck was still in remarkable condition, and although it had burned on impact, much of the debris was still there “looking like it crashed yesterday.” Photos of the wreckage confirmed the excellent condition of the metal so New Zealand TIGHAR member Howard Alldred – a veteran of the 2003 Niku Vp
In the early morning hours of December 18, 1936 Northwest Airlines Lockheed 10A NC14935, carrying mail from Missoula, Montana to Spokane, Washington crashed during a winter storm in heavily wooded mountainous terrain in northern Idaho. There were no passengers. The pilot and copilot were killed on impact. The wreck was located on December 26 and the bodies were recovered along with the seven of the sixteen mailbags that did not burn in the post-crash fire.

The 24th Electra built, c/n 1024 was delivered to Northwest on May 25, 1935. Because it had only one owner and was lost only about a year and half after it entered service it probably still had its original interior furnishings, including dados. Contemporary reports suggest that the post-crash fire was limited and there seemed to be a good chance that portions of the cabin were not burned. As far as we could determine, no one had intentionally visited the wreck since 1936 so we had hopes of a relatively undisturbed wreck.

On July 9, 2004, a team of seven TIGHAR expedition veterans, accompanied by three representatives from the U.S. Forest Service, located the crash site in a creek bed at essentially the exact position described in a 1936 newspaper account. Unfortunately the location was a little too easy to find because it immediately became clear that the wreck had been salvaged for aluminum – possibly during the scrap drives of the 1940s. There was very little aluminum left, while virtually all the ferrous material was still there.

As with the Mt. Richmond wreck, valuable information was gathered from the wreckage that remained but the search for dados was again frustrated.

Howard Alldred with debris from ZK-AFE.
On the evening of January 5, 1943, Lockheed 10B NC14915 owned by the Morrison-Knudsen Company (a construction firm) made a forced landing due to an engine failure in heavily wooded mountainous terrain approximately 30 miles east of Ketchikan, Alaska in what is now the Tongass National Forest. There were five passengers plus the pilot aboard. The descent into trees resulted in extensive damage to the aircraft and serious injuries to three of the passengers. There was no fire. The pilot, a well-known Alaskan bush pilot by the name of Harold Gillam, tried to walk out to get help but died of exposure in the attempt. One of the passengers died of her injuries after two days without medical attention. An extensive land, sea, and air search of the region by civilian and Coast Guard resources gave up after three weeks of hazardous but fruitless operations.

On February 3rd two of the four survivors hailed a Coast Guard patrol boat from the shore and led rescuers to the other two. The four had survived for an incredible 29 days in the Alaskan winter. For the story of the wreck and the rescue see “The Men Did Their Duty,” page 9.

NC14915 was Lockheed c/n 1021, the 21st Electra built. It was delivered to Northwest Airlines as a Model 10A on March 29, 1935 and was, in fact, part of the same batch of Northwest Electras as the wreck in Idaho. Northwest later sold the airplane to Boston & Maine Airlines who, in turn, sold it to National Airlines in Florida. It was subsequently sold to Star Airlines who converted it to 10B configuration (replaced the P&W R985 engines with Wright R975s of the same 450 hp) and finally to Morrison-Knudsen.

With eight years in service, four changes of ownership, and one major modification, the chances that the aircraft still had its original interior at the time of loss were poorer than with the Idaho wreck. However, Electra wrecks that were not consumed by post-crash fires are extremely rare and photos taken at the site in 1981 showed that the wreck was still relatively undisturbed at that time. The decision was made to try to send a TIGHAR team to the Ketchikan wreck.

An expedition into the mountains of the southwestern Alaskan wilderness was a rather different proposition than the New Zealand or Idaho investigations. Because the site is in the Misty Fjords Wilderness, motorized vehicles, including helicopters, are prohibited. The team would have to be landed on the shore by boat or floatplane and then proceed on foot. They would have to be prepared to deal with the weather, the terrain, and the bears. As in Idaho, the operation would require the approval and cooperation of the U.S. Forest Service.

Fortunately, USFS archaeologist John Autrey took an interest in the case and put together a team made up of himself, another Forest Service archaeologist by the name of Martin Stanford, and two experienced back-country Forest
Service Rangers, Chris Prew and Jeff Garnette. They were joined by a TIGHAR team led by Walt Holm (TIGHAR #0980CE) which included Bill Carter (TIGHAR #2313CE), Gary Quigg (TIGHAR #1025CE) and John Clauss (TIGHAR #0142CE) – all veterans of numerous TIGHAR expeditions.

On August 3, 2004 the joint TIGHAR/USFS team was inserted at the head of Badger Bay by two de Havilland Beaver floatplanes and began the five-mile trek to the site. Rain, steep boggy terrain, and thick undergrowth made the going extremely tough but after a nine hour trek the team reached the wreck site and found a time capsule of information.

Although much torn apart in the initial crash, the aircraft had suffered very little from salvage or looting and examples of many of the more fragile components in the cabin including wood flooring, linoleum, insulation, artificial leather, wood veneer – and dados – had survived. The dados were of very simple construction; just pieces of light-weight sheet aluminum fastened to underlying aircraft structure with screws and not at all like the artifacts that have been found on Nikumaroro.

It was also discovered that NC14915 had been modified by the addition of an auxiliary fuel tank installed in the cabin on the left hand side just aft of the main beam. The addition of this extra fuel reserve was probably prompted by the unusually long distances the aircraft flew in service to Morrison-Knudsen (see graphic next page).
But the most interesting discovery was the presence of heavy asbestos insulation that covered the cabin heater duct where it passed beside the auxiliary fuel tank.

As detailed in The Un-dados (page 34), the now-documented need to provide an insulating barrier between the heater duct and a fuel tank installed in an Electra cabin reinforces a new hypothesis that was already under discussion about the function of the structures found on Nikumaroro that we have been calling “dados.”

The pattern of this past year’s research is classic. Based on the best information available, we formulated a hypothesis that the objects we had found on Nikumaroro were dados from a Lockheed Electra. We tested the hypothesis by seeking out known examples of Lockheed Electra dados. It took three expeditions in various corners of the world but we were ultimately successful in answering the question. The results were negative and do not support the hypothesis. However, in eliminating one hypothesis we stumbled upon clues that support a new possibility which we will, in turn, attempt to test. This two-steps-forward-one-step-back process is how most scientific and historical discoveries are made. It’s slow and often frustrating, but it works.