

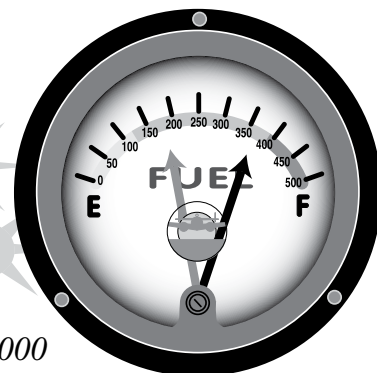
# TIGHAR TRACKS



Volume 17 #1 February 2001



## Gettin' There

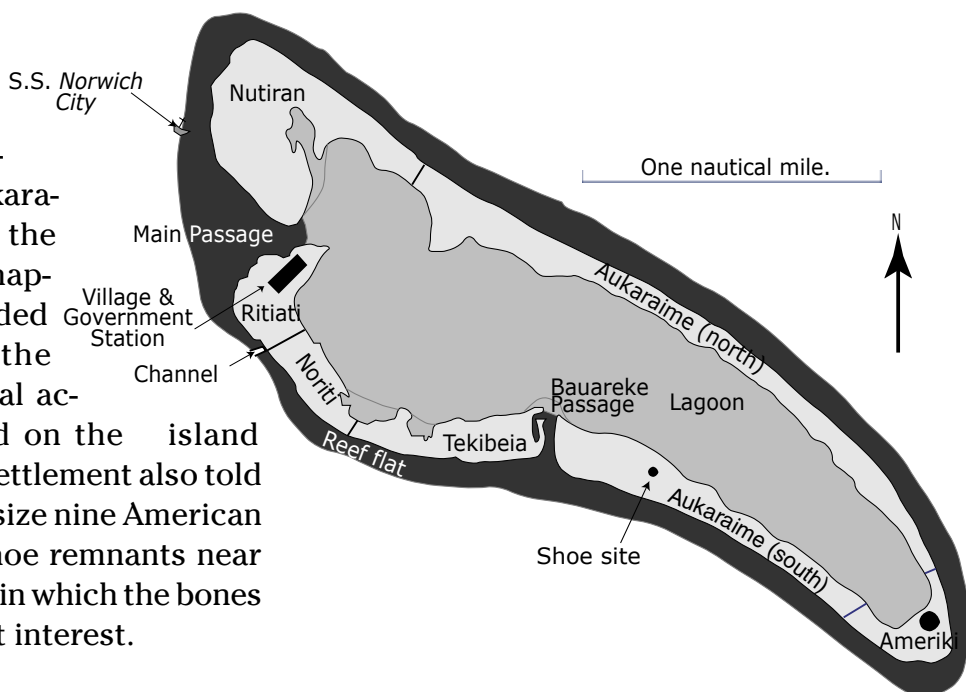


Total Pledges, February 15, 2001      \$365,000  
Total Cash in Hand, February 15, 2001      \$177,470

## A Shoe Fetish

Among the most interesting artifacts found by TIGHAR on Nikumaroro is a shoe which appears to have been similar in many respects to the shoes Earhart was wearing when she disappeared. But is it Amelia's shoe? This is Part One of a detailed review of what was found and what it may mean. Part Two will appear in March's issue of *TIGHAR Tracks*.

**D**uring the Niku II Expedition in 1991, while excavating a small grave in the Aukaraimo district of Nikumaroro, the TIGHAR team accidentally happened upon the much-degraded remains of one shoe and the heel of another. An anecdotal account of bones being found on the island during the early years of its settlement also told of the discovery of women's size nine American shoes, so the presence of shoe remnants near what we hoped was the grave in which the bones had been buried was of great interest.



Much later in TIGHAR's investigation, documentation would come to light which would reveal that the anecdotes were rooted in fact, but at the time of the 1991 expedition it was all still rumor. That the grave turned out to contain the skeleton of a very small, possibly stillborn, infant did not add to our confidence that there was any truth to the tale.



TIGHAR photo by P. Thrasher.

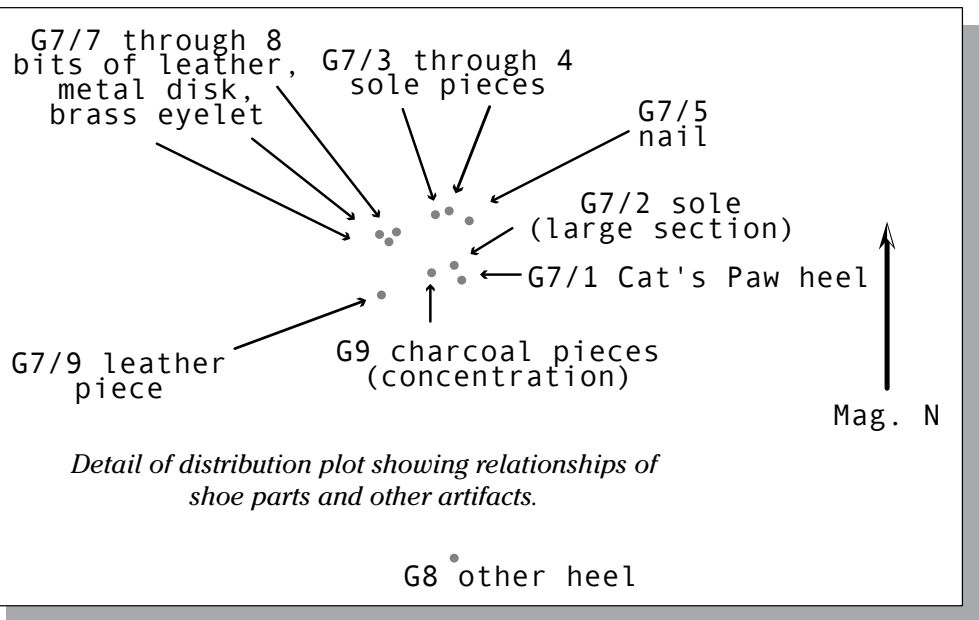
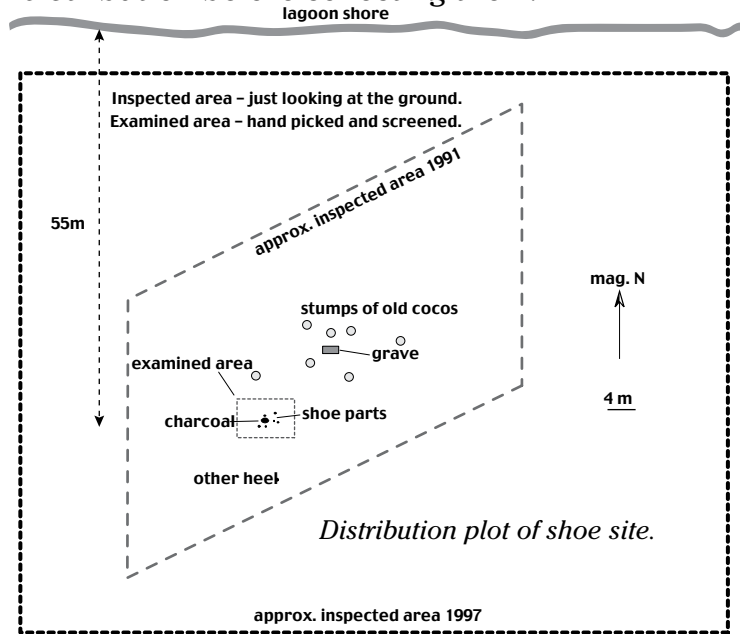
Aukeraime South is the name given to the strip of land on the southern side of the atoll east of the small lagoon outlet known as Bauareke Passage. Originally covered with scrub and small trees, a portion of the area near the passage was cleared and planted to coconuts by the island's settlers in 1941. Today the area is covered with a fairly dense mix of second and third generation coconut palms mixed with other trees. The stumps of some of the original cocos can still be found.

The photo above was taken at the grave site in 1991 as we were preparing to begin the excavation. The grave itself can be seen at far right. In the center of the photo is a small tree with gear piled on the ground in the shade at its base. A few days later, on October 16, 1991, during the excavation, Dr. Tommy Love (seen at the far left in this photo) was sitting under that tree changing his boots when a crab scuttled by. As Tommy watched, the crab knocked aside a leaf revealing a small

black object on the ground. Tommy looked closer and called to expedition leader Ric Gillespie (in the white hat in this photo), "Hey! There's an old shoe heel on the ground over here."

We cordoned off an area around the heel and began to methodically remove all the organic material on the surface of the ground, being careful not to disturb any of the other shoe remnants which soon began to appear. These consisted of broken fragments of a rubber sole and a few scraps of leather. We also noted a small concentration of charcoal.

Once the area had been cleaned of all leaves and sticks and other surface detritus we photographed the artifacts in situ and mapped their distribution before collecting them.



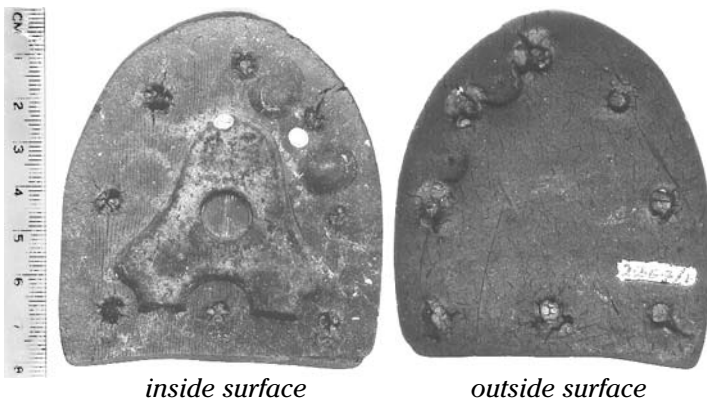
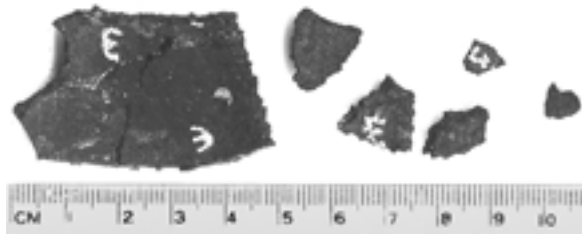
The area was then swept thoroughly with a metal detector. By this method we found a small rusted metal disc about the size of a nickel and the tiny broken end of a shoe nail.

We also collected and screened the first three cm of soil. This process took two days but resulted in the discovery of a few more scraps of what appears to be leather and a small brass eyelet.

The artifacts were cataloged as follows:

**Artifact 2-2-G-7/1, heel embossed "Cat's Paw Rubber Co. USA."**

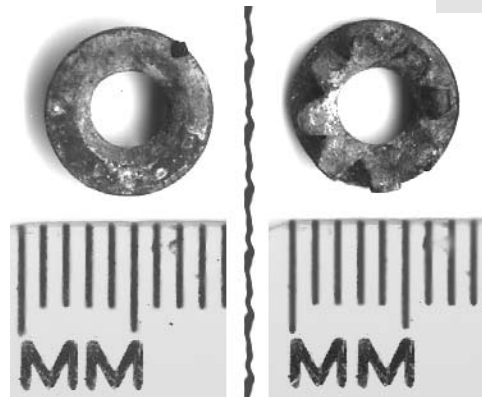
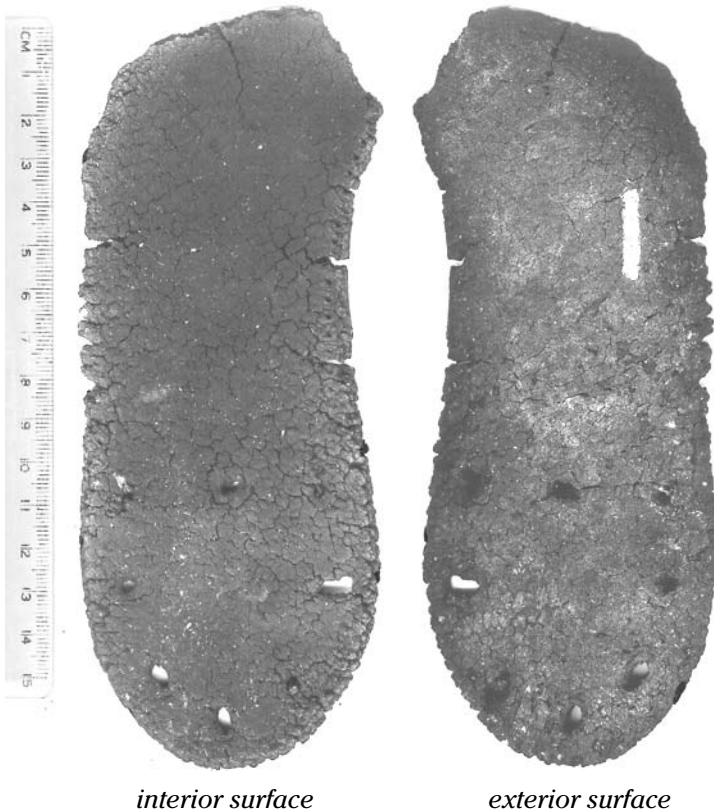
**Artifact 2-2-G-7/2, section of rubber shoe sole from back of heel to just behind ball of foot.**



**Artifact 2-2-G-7/5, broken shoe nail.**



**Artifact 2-2-G-7/3, fragments of rubber shoe sole.**  
**Artifact 2-2-G-7/4, fragments of rubber shoe sole.**

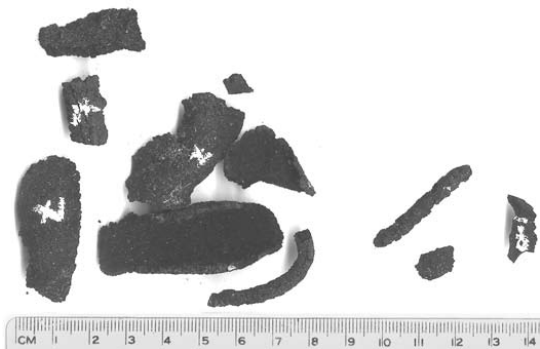


**Artifact 2-2-G-7/6, brass eyelet.**

**Artifact 2-2-G-7/7 metal disc.**

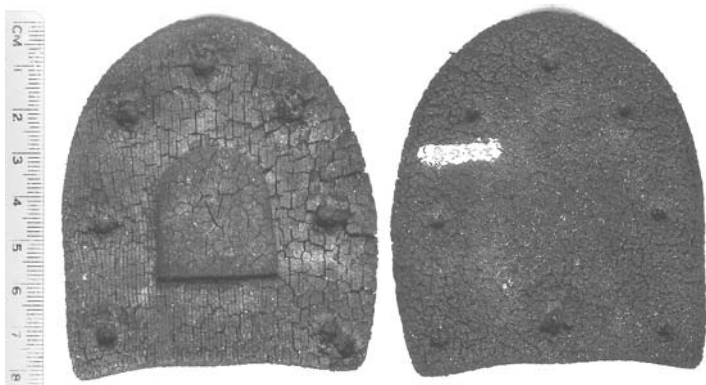


**Artifacts 2-2-G-7,8,9 scraps of leather.**



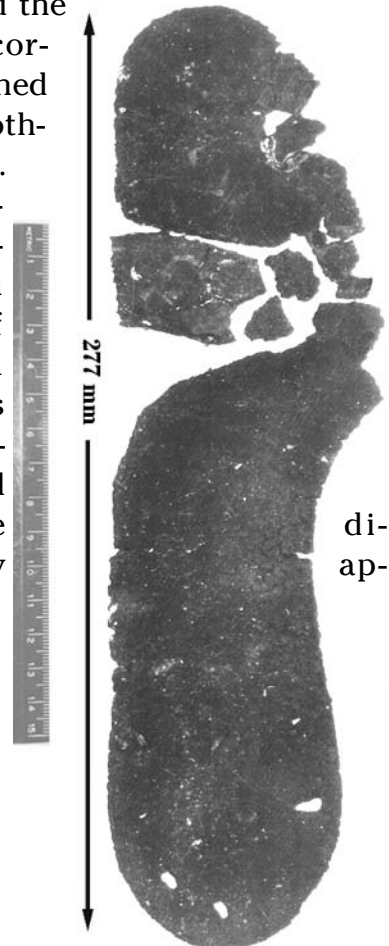
Just outside the cordoned-off area, Frank Fournier, the LIFE magazine photographer accompanying the expedition, noticed a second shoe heel on the ground. This one bore no manufacturer's label and was cataloged as:

**Artifact 2-2-G-9**

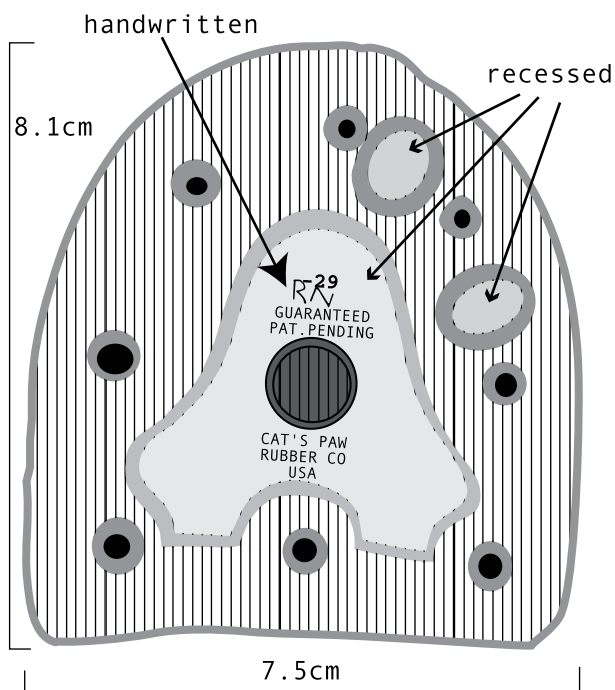


The area around the second heel was cordoned off and searched accordingly but nothing more was found.

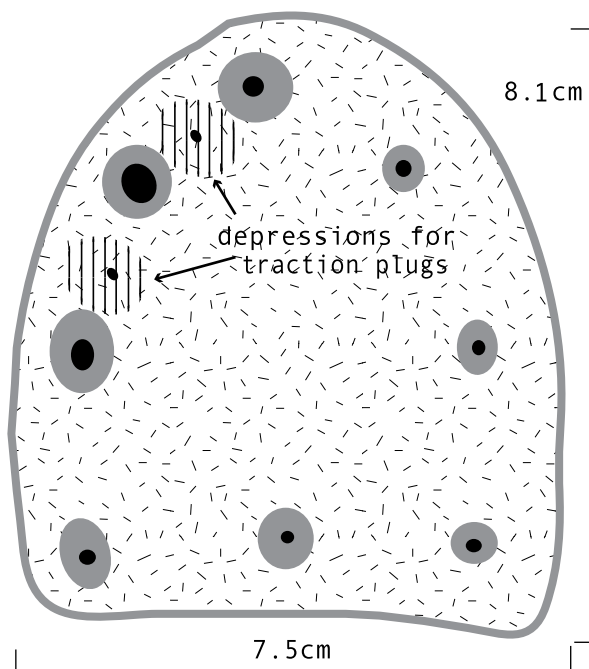
The sole fragments were re-assembled into an approximation of their original form and measured as shown here. Obviously, without all of the pieces, the dimensions are only approximate.



The Cat's Paw heel was examined and found to have the markings shown below molded into the structure and the handwritten letters "RN" on the inside of the heel.



**Interior**

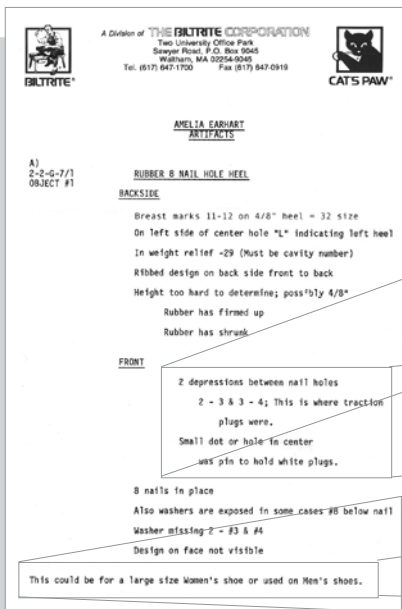
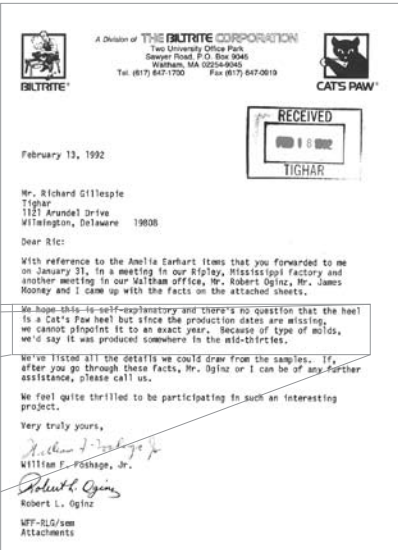


**Exterior**

# Identification of the Artifacts

The Cat's Paw company is now owned by the Biltrite Corporation of Waltham, Massachusetts. On January 30, 1992 the recovered shoe parts were sent to Biltrite where they were examined by experts at both the Waltham facility and the company's factory in Ripley, Michigan. Photos of Earhart wearing the shoes she was wearing on the Lae/Howland flight were also examined by Biltrite.

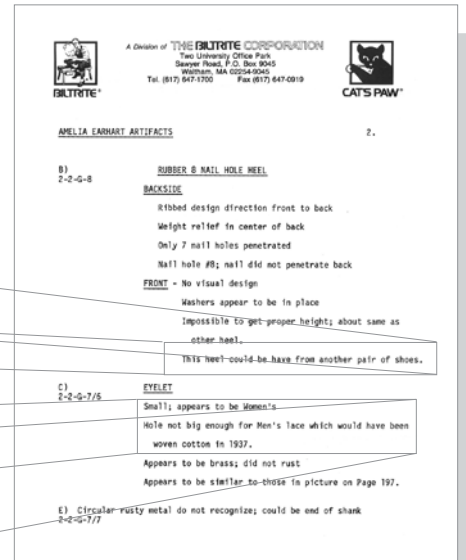
We hope this is self-explanatory and there's no question that the heel is a Cat's Paw heel but since the production dates are missing, we cannot pinpoint it to an exact year. Because of type of molds, we'd say it was produced somewhere in the mid-thirties.



The cover letter expressed their opinion that the heel mold dated from the thirties. They were not able to be more precise than that. The report that followed the letter described the artifacts carefully and then drew conclusions from the visible features of each piece.

2 depressions between nail holes 2 - 3 & 3 - 4; This is where traction plugs were.  
Small dot or hole in center was pin to hold white plugs.

This could be for a large size Women's shoe or used on Men's shoes.



Of the second heel, the report concluded:

This heel could have been from another pair of shoes.

And of the eyelet:

Small; appears to be Women's  
Hole not big enough for Men's lace which would have been woven cotton in 1937.

The section of the report dealing with the large portion of sole describes the stitching holes as very close together and fine. In telephone conversations, documented in notes

taken at the time by Richard Gillespie, Foshage and Ogintz also expressed their opinion that the "fine and close" stitching marks on the recovered sole were indicative of a woman's shoe.

BiltRite identified the shoe Earhart was wearing in the photo as a “blucher oxford.”

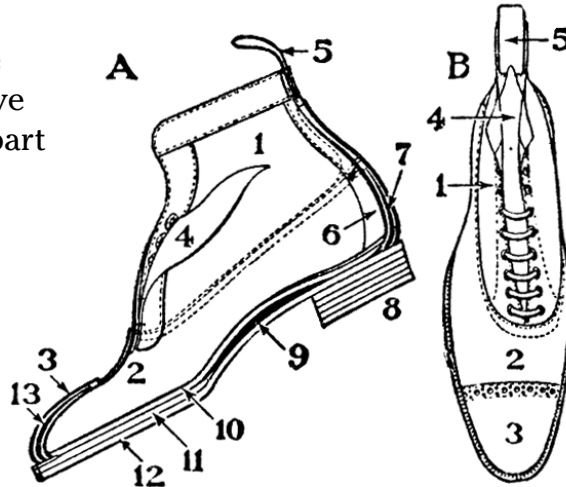
An “oxford” is any lace-up shoe.

The term “blucher” refers to a shoe style in which a portion of the “upper” (the part of the shoe above the sole) laps over the “vamp” (the part covering the instep and toe).

**blu'cher** (blōō'chěr; -kěr), *n.* **1. a** A kind of half boot, named from the Prussian general Blücher. **b** A shoe in which the quarters extend forward to the throat of the vamp, their inner edges being loose and lacing across the tongue.



Blucher Shoe.



Shoe, 1. *A* Section, and *B* Front View of a Modern Shoe. 1 Top; 2 Vamp; 3 Cap; 4 Tongue; 5 Pull Strap; 6 Backstay; 7 Counter; 8 Heel; 9 Shank; 10 Insole; 11 Slipsole; 12 Outsole; 13 Toe Box.

*Illustrations from Webster's Second International Unabridged Dictionary.*

## Further Discoveries

During the Niku III expedition in 1997, another more intensive search was made of the entire site using close visual inspection, and White's Electronics pulse induction metal detectors. An electromagnetic survey of the site was also made using a Geonics EM-38 ground conductivity meter. Two artifacts were found.

Artifact 2-4-A-2 was a small rusted washer, but we are not completely sure we did not ourselves deposit it during previous searches.

Artifact 2-4-A-3 was a partially burned paper label recovered from a concentration of ash and charcoal found within 5 cm of the surface where the charcoal pieces had been found in 1991.

Analysis of the label later revealed the pres-

ence of a bar code thus dating the label and the fire that burned it to not earlier than the 1970s.



Can label. Note fragment of bar code.

## Coming in March...

... Part Two of *Shoe Fetish*, where we'll tackle the complex problem of comparing what was found to what we can determine about the shoes that Amelia wore.

# Could Betty Have Heard Amelia Earhart on a Harmonic?

*This report is excerpted and condensed from a long technical report done for TIGHAR by Bob Brandenburg, TIGHAR #2286. The entire report will soon be posted on the TIGHAR website as a Project Bulletin ([www.tighar.org](http://www.tighar.org)).*

In 1937 a fifteen year old girl in St. Petersburg, Florida, heard a shortwave radio transmission from a person who identified herself as Amelia Earhart, and attempted to communicate coordinates and information that would help rescuers find her. Fascinated by this, Betty grabbed an old school notebook and jotted down what she could hear and understand of the transmissions, which continued for well over an hour.

Last October, through a friend of Betty's, TIGHAR received the original notebook, and a firestorm was ignited. The radio experts conferred and agreed that there was no possible way for a shortwave receiver in St. Petersburg to get signals during the daytime from a transmitter in the Pacific on either 3105 or 6210kHz, the two frequencies which Earhart used.

But Betty's notebook was too credible to be dismissed out of hand, so it was decided to consider alternative explanations. During that process, Mike Everette (TIGHAR #2194) and the author concurrently and independently recognized the possibility that Betty heard Amelia on a harmonic of 3105 or 6210.

The radio on which Betty heard the transmissions was a Zenith Model 1000Z, sold by Zenith during 1935-1938, and was a very capable radio with extensive shortwave coverage. This radio clearly had the sensitivity and tuning range needed for receiving signals from Gardner Island.

The required signal-to-noise ratio was set at 3 decibels for the purposes of this analysis. This SNR is half the standard 6dB level specified for just-usable operator-to-operator communication, and approximates the marginal conditions described by Betty. She recalls that the signals

were "scratchy," and that she couldn't always make out complete phrases. She compares the quality of the signals to marginal signals heard on a police scanner, breaking in through the static and then fading out.

Feasible frequencies were identified by computing the probability of achieving the required SNR on all harmonics of the crystal frequencies, and harmonics of 3105 and 6210 kHz, up to the maximum usable frequency (approximately 27MHz) over the propagation path from Gardner Island to St. Petersburg during the periods of interest. Based on power requirements and other considerations, the following four frequencies were focused on as feasible:

**15525 kHz** (5 x 3105 kHz)

**18630 kHz** (6 x 3105 kHz and 3 x 6210 kHz)

**21735 kHz** (7 x 3105 kHz)

**24840 kHz** (8 x 3105 kHz and 4 x 6210 kHz)

If Amelia transmitted on 3105 kHz, all four frequencies could be generated as harmonics of 3105 kHz in the transmitter's final power amplifier.

It is interesting to note that the final four feasible frequencies generally agree with Betty's recollection of where the tuning pointer was positioned on her radio dial.

The results of the analysis show that Betty could have heard Amelia on a harmonic. We calculated the probabilities based on the number of days and the sunspot number. As an example of the results:

For 24840 kHz on July 6 during the 1600 hour, at an assumed power level of 1 watt, there was a 16% probability that the required SNR would occur on one day out of 20. On the next day,

the probability is 1%; the sunspot number had increased from 108 to 143, indicating a higher degree of ionization in the ionosphere, with correspondingly higher signal absorption losses.

## ***Conclusions***

We were able to draw the following conclusions based on the analysis of the four frequencies above:

- 1) Betty could have heard signals from Amelia at Gardner Island on one or more harmonics, provided that the power level at the output of Amelia's transmitter was 0.1 watt or higher.
- 2) Betty's recollection of where her radio was tuned, in the general area of 18MHz to 25MHz, is consistent with the frequencies on which she could have heard Amelia.
- 3) The low probabilities of achieving the required SNR are consistent with Betty's description of the fragmentary signals that she heard.

*Go to the TIGHAR website, [www.tighar.org](http://www.tighar.org), for the full text of this report and the tables Bob generated for July 2 through July 9, detailing the analysis.*

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## ***TIGHAR In Space***

TIGHAR has contracted with Space Imaging, Inc. of Thornton, Colorado for dedicated satellite imagery of Nikumaroro to be acquired this spring by the company's Lockheed/Martin IKONOS satellite. Two photographs of the island will be taken from space:

- A black and white image with one meter resolution (meaning that we should be able to pick out objects as small as one meter across).
- A natural color image with four meter resolution.

We're hoping that this imagery will allow us to focus the work of the Niku III expedition more efficiently and increase our chances of making a conclusive find. Space Imaging will guarantee that cloud cover in the photos is no more than 20% of the total image and they'll keep trying until they get acceptable cover-

age. However, there is always the chance that "Murphy's Cloud" will be sitting right over a part of the island we want to see. If that happens we'll have spent a lot of money to get nice pictures of blue water.

Acquiring the imagery will cost \$6,000, payable upon delivery of the photos which, if the first pass is successful, should be sometime in late April. That money is not in the Niku III budget but we felt that it was a chance well worth taking and are hoping that the TIGHAR membership agrees with us and will help support this mission. In appreciation for helping us meet this extra expense, we'll send an 8x10 copy of the color satellite photo of Nikumaroro to everyone who kicks in \$100. Just use the enclosed Niku III contribution card and jot a note that you want your donation to go toward the satellite photos.