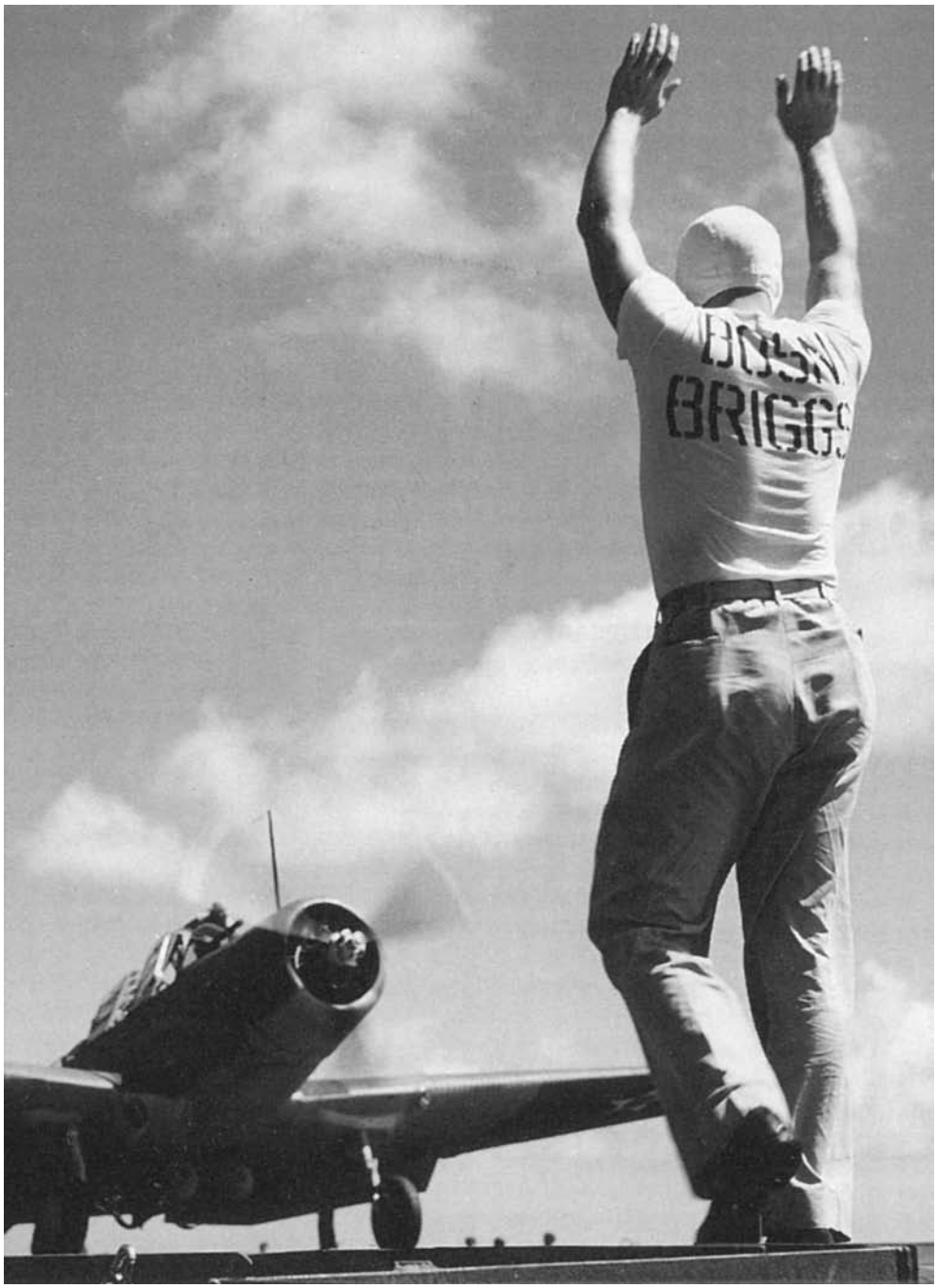
TIGHAR TRACKS

THE JOURNAL OF THE INTERNATIONAL GROUP FOR HISTORIC AIRCRAFT RECOVERY



February 2006 Volume 22 #1

. . . that they might escape the teeth of time and the hands of mistaken zeal.

– John Aubrey
Stonehenge Manuscripts
1660

About TIGHAR

TIGHAR (pronounced "tiger") is the acronym for The International Group for Historic Aircraft Recovery,a non-profit foundation dedicated to promoting responsible aviation archeology and historic preservation. TIGHAR's activities include:

- Compiling and verifying reports of rare and historic aircraft surviving in remote areas.
- Conducting investigations and recovery expeditions in co-operation with museums and collections worldwide.
- Serving as a voice for integrity, responsiblity, and professionalism in the field of aviation historic preservation.

TIGHAR maintains no collection of its own, nor does it engage in the restoration or buying and selling of artifacts.The foundation devotes its resources to the saving of endangered historic aircraft wherever they may be found,and to the education of the international public in the need to preserve the relics of the history of flight.

TIGHAR Tracks is the official publication of The International Group for Historic Aircraft Recovery. A subscription to *TIGHAR Tracks* is included as part of membership in the foundation (minimum donation $55.00 per year).The editors welcome contributions of written material and artwork. Materials should be addressed to: Editors, *TIGHAR Tracks*, 2812 Fawkes Drive, Wilmington, DE 19808 USA; telephone (302) 994-4410, fax (302) 994-7945; email tigharpat@mac.com. Photographs and artwork will be returned on request.

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On the Cover

USS *Yorktown's* Air Department Bos'n directs a TBD-1 Devastator during the Battle of the Coral Sea, April 1942. From *That Gallant Ship – U.S.S.* Yorktown *[CV-5]* by Robert Cressman.

On the Web

http://www.tighar.org

Board of Directors

To Save a Devastator

Now ... we're able and eager to let everyone know what we've been up to and invite you to join the team.

TIGHAR is pleased to announce that the Survey Phase of our Devastator Project is now completed and we are ready to begin the Permitting and Evaluation Phase. Much of the hard work and remarkable progress made over the past two and a half years has necessarily been conducted out of public view. Now, with a myriad of crucial understandings, agreements, and partnerships finally in place, we're able and eager to let everyone know what we've been up to and invite you to join the team.

If all goes as planned, an Evaluation Expedition in September/October of this year will conduct an engineering assessment of the aircraft and also collect small detached components and sample material for scientific testing by the U.S. Navy's National Museum of Naval Aviation and by Texas A&M University's Center for Marine Archaeology and Conservation. The tests will permit the design of a recovery and conservation plan that will maximize the chances of achieving the project's ultimate goal: to save a Devastator, and in the process, conduct the first true archaeological recovery and preservation of an intact historic aircraft from an undersea environment.

In the Marshall Islands, the traditional chiefs ("iroij") of Jaluit and the Jaluit local government have approved the recovery and conservation of the aircraft "according to the best available techniques and technology of historic preservation." In a formal agreement signed last year, they appointed TIGHAR to be their "exclusive manager and agent in all matters relating to the recovery, conservation and exhibition of the deeper of the two Douglas TBD-1 aircraft in Jaluit lagoon. We delegate to TIGHAR full authority to manage the aircraft on our behalf and to work closely with the Historic Preservation Office to assure compliance with the Historic Preservation Laws of the Republic of the Marshall Islands."

TIGHAR is also working directly with senior officials of the national government of the Republic of the Marshall Islands including President Kessai H. Note, the Ministers of Internal Affairs and Foreign Affairs, the Historic Preservation Officer, the General Manager of the EPA, and with the American Ambassador to the Marshall Islands. Without exception, all have been supportive and positive about the way TIGHAR is proceeding with this historic project.

TIGHAR's 2004 survey and documentation of the aircraft was done under the auspices of a permit granted by the RMI Historic Preservation Office. This year's expedition will require a similar permit. A TIGHAR delegation has just returned from Majuro where government officials were briefed on the latest Devastator Project plans/progress and again expressed their support for our approach.

Because this year's anticipated expedition will involve the actual recovery of material, TIGHAR will also need a permit from the U.S. Naval Historical Center's Underwater Archaeology Branch. The head of that office, Dr. Robert Neyland, is working closely with us to make sure our permit application meets all the Navy's requirements. Schedule permitting, Dr. Neyland will also join the TIGHAR expedition team in the field.

We won't know what the full recovery/conservation budget will be until the sample testing is done and the plan is finalized. One of the main reasons for recovering test material is to reduce the unknowns. Otherwise, erring on the side of caution could be needlessly expensive. The Naval Aviation Museum Foundation has already pledged the initial $200,000 toward a full recovery conditional, of course, upon Navy approval of the plan.

With the evaluation and permitting process on track, the Devastator Project's greatest need is now funding. It will cost an estimated $125,000 to do the work scheduled for 2006. To help us meet that goal, the Edward E. and Marie L. Matthews Family Foundation has offered a "challenge grant" that will match, two-for-one, all contributions to TIGHAR for the Devastator Project up to a total of $83,000. In other words, if you donate $100, TIGHAR will receive $300. A thousand dollars becomes three thousand, and so on. We feel sure that you, the members of TIGHAR, will embrace such a generous offer and help us keep this historic project moving forward.

The expedition planned for later this year will evaluate Douglas TBD-1 Bu. No. 1515 in Jaluit Lagoon for possible recovery. Sample material and small detached components will be collected for scientific testing as part of the development of a conservation plan for the aircraft. TIGHAR photo by J. Hoover.

Please use the enclosed form to join the team today. Together we can save a Devastator.

DEPARTMENT OF THE NAVY
NAVAL HISTORICAL CENTER
805 KIDDER BREESE STREET SE
WASHINGTON NAVY YARD DC 20374-5060

IN REPLY REFER TO

5000
Ser UA/00340
November 21, 2005

Mr. Richard E. Gillespie
Executive Director
Tighar
2812 Fawkes
Wilmington, DE 19808

Dear Mr. Gillespie,

I want to complement you and Tighar on your current efforts to investigate, interpret, and preserve the two Navy TBD aircraft located in the lagoon of Jaluit. Your research is beneficial to the history of naval aviation and World War II in the Pacific and to the preservation of these two aircraft. I know the National Museum of Naval Aviation desires to have a TBD on display for the public at their museum. These aircraft are therefore important artifacts to the Navy and the nation as a whole.

Tighar's efforts to explore the feasibility of recovery and conservation of one of these aircraft, and to develop written plans for recovery, conservation, restoration, and the financing of these activities are essential to our agency conducting a Section 106 National Historic Preservation Act review for recovery. I also believe that whatever Tighar can do in conjunction with Texas A&M University and the Naval Aviation Museum Foundation to advance research into conservation of aircraft, particularly those coming from saltwater environments, will be a boon to all who are interested in seeing historic aircraft preserved for future generations.

Therefore, I wish you well in your endeavors and look forward to Tighar's proposals.

Sincerely,

Robert S. Neyland

ROBERT S. NEYLAND, Ph.D.
Head, Underwater Archaeology Branch

NAVAL AVIATION MUSEUM FOUNDATION, INC.
BUILDING A NATIONAL TREASURE

17 November 2005

Mr. Richard Gillespie
TIGHAR
2812 Fauwkes Dr.
Wilmington, DE 19808

Re: TBD "Devastator" Recovery Project

Dear Mr. Gillespie,

This is to advise you that the Naval Aviation Museum Foundation is prepared to contribute $200,000 to the recovery effort being organized by TIGHAR to retrieve a TBD "Devastator" from the waters of Jaluitt Atoll in the Marshall Islands.

Please be advised that the disbursement of these funds to TIGHAR is conditioned upon permission from the Navy to make such a disbursement and the approval by the Navy of the salvage operation.

In view of the information you have provided, I foresee no objections by the Navy to the project.

Sincerely,

Charles E. Ellis, Jr.
Captain, JAGC, USN (Ret)
Chief of Staff/Deputy CEO

P.O. Box 33104 • NAS Pensacola, FL 32508-3104 • (850) 453-2389 • (800) 327-5002 • FAX (850) 457-3032
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Unsung Hero

No aircraft type played a more significant role in stemming the Japanese tide of conquest in the opening months of the Pacific war. No aircrews suffered greater proportional losses. And no airplane has gotten more of a raw deal from history than the Douglas TBD-1 "Devastator."

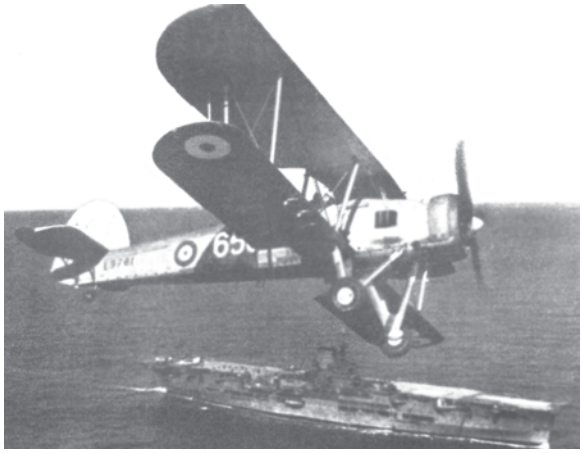
When it joined the fleet in 1936, the TBD-1 heralded a new era in naval aviation. Its sleek monoplane design, all metal construction, 200 mph-plus speed, powered folding wings, and retractable landing gear stood in stark contrast to contemporaries like the British Fairey Swordfish. Strange as it may seem, the Devastator was the first American carrier-based aircraft to be equipped with wheel brakes.

Today the Devastator is most often remembered as the woefully obsolete torpedo bomber whose crews were slaughtered at the Battle of Midway. Of the forty-one TBDs launched that day from USS *Hornet*, *Enterprise*, and *Yorktown*, only four returned – a 90% loss rate. All of the fifteen airplanes in *Hornet's* squadron (VT-8) were shot down. Not a single torpedo found its mark.

What is usually forgotten is that the TBD's newer, faster, more heavily-armed replacement, the Grumman TBF-1 "Avenger" fared no better that day. Of the six Avengers that participated in the battle, five were lost and the one surviving aircraft just barely returned, shot to pieces and with only two of its three crew members still alive.

The horrific losses suffered by the American torpedo bombers at Midway were not so much due to any inadequacy of the design as to the limitations imposed on the aircraft by the weapon they carried combined with a disastrous tactical situation.

The Bliss-Leavitt Mark XIII aerial torpedo was apt to break apart if dropped from an altitude greater than 100 feet and a speed higher than 110 knots. An aircraft thus engaged in a torpedo attack against a warship was extremely vulnerable to anti-aircraft fire and defending fighters. The key to successful deployment of the torpedo depended upon either complete surprise or assault



The British Fleet Air Arm placed an order for the new Fairey Swordfish in 1936, the same year the Douglas TBD-1 made its maiden flight. Photo courtesy Fleet Air Arm Museum.

by several aircraft from multiple directions, covered by friendly fighters and carefully choreographed with simultaneous dive-bomber and horizontal bomber attacks to divide the enemy's defensive fire.

On May 7, 1942, at the Battle of the Coral Sea, twenty-two TBDs were among ninety-three aircraft that carried out coordinated attacks on the Japanese aircraft carrier Shoho, sinking her in a matter of minutes. American losses were minimal. (See sidebar, "An Urgent Recommendation," below.)

The confused, catch-as-catch-can nature of the tactical situation at Midway resulted in the torpedo bombers making unsupported attacks upon alerted and heavily defended targets. The Devastator crews pressed on despite these overwhelming odds and the result was as tragic as it was inevitable. Their sacrifice, however, was not unrewarded. The low level attacks by the TBDs served to pull the Japanese fighter cover down "on the deck" allowing the high-flying SBDs to reach the target area and begin their dives unopposed. The resulting accuracy of the American dive bombing attacks was largely responsible for the victory at Midway.

Unquestionably obsolete by the time it saw combat, the Devastator nonetheless played a crucial role in the opening months of the Pacific war. After Midway, the TBD was relegated to stateside training duties where accidents and mishaps further reduced its ranks.

There were never very many TBDs produced, 129 to be exact.* Now they're all gone. Not one example survives in any museum or collection.

With your help, TIGHAR is determined to correct that situation.

* *By comparison, Avenger production totaled 9,839 aircraft.*

An Urgent Recommendation

An excerpt from the after action report by the commander of the USS* Yorktown *Air Group provides a description of the lessons learned at the Battle of the Coral Sea and some cautions that were to prove tragically prophetic just weeks later at Midway.

Torpedo Planes

From the experience gained by VT-5 in the attacks of May 4, 7, and 8th, certain factors became apparent insofar as Material, Personnel, and Tactics are concerned.

Material

As previously stated in the report on the engagement of the 7th, this command is firmly convinced that a satisfactory torpedo plane must be fast, have a long range, the ability to dive, and sufficient gun power to defend itself. In connection with this a torpedo must be developed that can be dropped at high speed and from a height of 200 feet altitude.

Personnel

Torpedo plane pilots must be given every opportunity to make drops against a maneuvering target and to observe the torpedo run. This will clearly bring out to the pilot (l) The relative slowness of the torpedo after striking the water, (b) The great amount of lead necessary for a beam or close to beam shot, and (c) the large effect of small errors in target course and speed, if torpedo is dropped at long range. The practice of carrying and dropping dummy torpedoes is considered useless and a waste of time except for brand new pilots.

Tactics

In the recent engagements, the Japanese screen has scattered instead of closing in to support the ship being attacked. This is, however, no indication that in the future it will be done. Such a method would be an excellent counter to our system of attack. Due to the slow speed and low altitude of drop required for the Mk. 13 torpedoes, our planes are forced to come in low and slow. In the event that the Japanese change their system and put a heavy cordon of ships around their large vessels, it is doubted whether a successful torpedo attack could be launched by TBD's without the loss of the major part of the squadron.

Torpedo attacks alone, are not very effective against high speed maneuverable targets. This was amply proved in the attack on TULAGI, where VT-5 attacked a Japanese CA maneuvering at high speed outside the harbor and was unable to obtain a hit; another example was the inability of the Japanese torpedo planes to score a hit on the Yorktown on May 8.

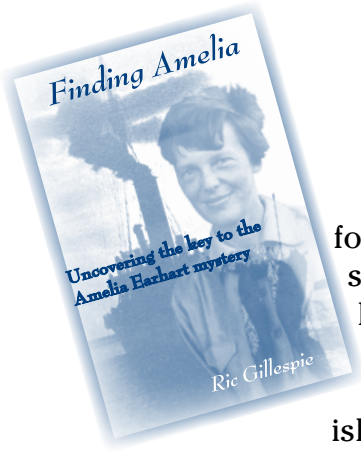
In order to inflict the maximum damage on a maneuvering ship it is essential that the torpedo and dive bombing attack starts just before and continues through the torpedo attack. This has the following advantages:

It provides mutual support and forces the enemy to divide his fire.

The spray and smoke from close misses will partially obscure the torpedo planes from the target, and the concussion will reduce the accuracy of the AA fire.

With the present type of torpedo planes it is essential that they be furnished with fighter protection. It is considered that on the attack of May 8th, VT-5 would have suffered severe losses from enemy aircraft if the TBD's if they had been unescorted. While it is understood that TBF"s are being provided, and the present type torpedo is being modified to allow for dropping at higher altitudes and greater speeds; the need for these has been so clearly emphasized by the BATTLE OF THE CORAL SEA that it is again urgently recommended that immediate steps be taken to replace the TBD's with TBF's.

(The entire report can be found at: http://www.ibiblio.org/hyperwar/USN/ships/logs/CV/cv5-Coral-prelim.html)



Progress Report

The original deadline for completing the manuscript was Dec. 31 but I have another 90 days if I need it. With luck I should be able to finish by the end of February.

The writing has been going well but it's taking longer than anticipated because, after consulting with the Naval Institute Press, I decided to make a change in the way the book is organized. As you may recall, my original plan was to divide the book into two quite separate sections. The first part of the book would tell the story of Earhart's world flight attempts, her disappearance, and the U.S. government's unsuccessful attempt to find her. The second part would present a study of the post-loss radio signals and an evaluation of their credibility.

As I began to write the narrative of the government search it soon became apparent that the story of the search is the story of the post-loss signals. The signals heard by the searchers, and the reports of signals heard by others, drove virtually every aspect of the search. When the effort was finally called off, for all the sea miles scoured by ships and hours flown by search aircraft, the only product of the search – the only clues discovered – were the post-loss radio signals.

I decided that, rather than treat the signals as a separate issue, I would deal with them in context. The book is now a single continuous narrative (see the new table of contents). The book will still be accompanied by a DVD that will include all of the source material cited in the text.

The two draft chapters included in this issue of *TIGHAR Tracks* take the story the up to the moment when the men of the *Itasca* realized that Earhart was lost and might not be able to find her way to Howland Island before her fuel ran out.

As always, I'll look forward to whatever comments and suggestions you have. We've made many changes to the chapters published in earlier issues based on TIGHAR member peer review. Email me at tigharic@mac.com or you can send a fax to 302/994-7945, and the mailing address is still 2812 Fawkes Drive, Wilmington, DE 19808.

You can still join the TIGHAR Literary Guild, be recognized on the DVD, and receive a free signed copy of the book upon publication. Your continued support is vital.

Ric

Chapter 7

Denmark's a Prison

Earhart and Noonan made the 1200-mile flight from Darwin to Lae without incident except that, once more, there was radio trouble. After takeoff she was able to talk to Darwin for the first part of the journey but as she approached New Guinea she was unable to establish contact with the airfield at Lae. This time the problem was procedural rather than mechanical.

As the airline manager at Lae later reported, "On arrival Miss Earhart pointed out that whereas these radios [the two telegrams she had sent from Darwin the night before] advised us of a wave length of 36 metres, in reality her wave length was 49 metres which explained why we failed to pick up any messages from her."[1]*

Lae had not heard Earhart's transmissions because they were told to listen on the wrong frequency, but Amelia would not have been able to hear Lae even if the conversion from kilocycles to meters had been correctly computed. In her telegrams she intended to advise Lae that she would be both transmitting and receiving on her daytime frequency of 6210 kilocycles. For her to receive on that frequency, Lae would, of course, have to be transmitting on that frequency. The radio station at Lae, however, transmitted on 6522 kilocycles and, like most stations at that time, did not have the capability or legal latitude to alter their broadcast frequency.

Because she did not receive any of Lae's transmissions Earhart could not try to use her radio direction finder to navigate and, consequently, did not discover that her direction finder was unable to home in on high frequency transmissions.

When Earhart landed at Lae, Black's reply to the message she had sent to him from Java was waiting for her. In outlining the radio procedures to be used on the flight to Howland, Earhart had asked Black to tell her if any of the frequencies she had requested were "unsuitable for night work."[2] The problem, of course, was not the time of day so much as that her request for signals on 7500 kilocycles was at odds with her own description of the capabilities of her direction finder. Black's telegram did not point out the discrepancy but assured her that *Itasca's* transmitters were calibrated and ready to send her signals on 7500, 6210, 3105, 500 and 425 kcs.[3]

In the same message, Black advised Earhart that the *Itasca's* own direction finder had a frequency range of 270 to 550 kilocycles. The Electra could transmit only on 3105 and 6210 kilocycles. The cutter would be unable to take bearings on her signals. Black made no mention of the high-frequency direction finder that had been set up on Howland Island.

He did, however, "request we be advised as to time of departure and zone time to be used on radio schedules."[4] The "zone time" was important. Amelia's 2,500-mile flight from Lae to Howland would be crossing several time zones. For the radio schedules to work, the ship and the plane would need to be in agreement about what time it was.

Black's telegram did clear up one issue. Earhart's earlier request that *Itasca* transmit the ship's position along with its call letters revealed that she was not sure about exactly where the cutter would be. Black specified, "*Itasca* at Howland Island during flight."[5]

Early the next morning, Wednesday, June 30, 1937 in Lae, Earhart sent off a reply to Black via Samoa, addressing her cable to "Commander USS *Itasca*."

> Plan midday takeoff here. Please have meteorologist send forecast Lae Howland soon as possible. If reaches me in time will try leave today. Otherwise July 1st. Report in English, not code, especially while flying. Will broadcast hourly quarter past hour GCT. Further information later; Earhart.[6]

She had, as best she could, answered Black's query about when she would depart. She had also answered his question about what zone time to use for her radio schedules. The flight would use GCT (Greenwich Civil Time)† and she would transmit at quarter past each hour, not at quarter past and quarter to the hour as specified in earlier messages. She also asked that messages sent to her "especially while flying" should be sent in "English, not code."[7] Neither Earhart nor Noonan was adept at sending or reading Morse code and could only "recognize an individual letter if sent several times."[8]

Earhart next cabled her husband in Oakland:

> Radio misunderstanding and personnel unfitness probably will hold one day. Have asked Black for forecast for tomorrow. You check meteorologist on job as FN must have star sights. Arrange credit if *Tribune* wishes more story.[9]

* *The conversion formula is very simple. Divide 300,000 by kilocycles to get meters. Divide 300,000 by meters to get kilocycles. 36 meters is 8333 kilocycles. 36.6 meters is 8197 kilocycles. 49 meters is 6122 kilocycles. 3105 kilocycles is 96.6 meters. 6210 kilocycles is 48.3 meters.*

† *Same as today's Greenwich Mean Time or Universal Time.*

The message reveals a number of problems and misconceptions that were to plague preparations for the flight to Howland Island.

A few minutes earlier she had sent a message to *Itasca* saying that she would depart at midday if the weather forecast reached her in time. Now she seemed resigned to delaying her departure until the next day, Thursday, July 1st, due to "radio misunderstanding and personnel unfitness."

What Earhart meant by "radio misunderstanding" is obvious. During the previous day's flight from Australia, confusion about frequencies had prevented her from establishing radio contact with Lae. The misunderstandings would have to be sorted out and the radios tested before she could undertake the long and difficult flight to Howland.

Her reference to "personnel unfitness" seems equally clear. Amelia's wire to her husband was sent at 06:30 a.m. local time in Lae. The previous day's eight-hour flight from Australia had capped a week of early mornings and frustrating delays. It is hardly surprising that Earhart and Noonan didn't feel up to immediately setting off on a journey that was expected to take a minimum of eighteen hours.*

In her wire to her husband that morning Earhart asked him to "check meteorologist on job as FN must have star sights,"[10] but there was no meteorologist on the job. Two weeks before, on June 14th, Richard Black had advised Putnam that, once Earhart reached Howland Island, Lieutenant Arnold E. True, the Navy meteorologist at Fleet Air Base, Pearl Harbor, would provide a forecast for the flight to Honolulu. Black suggested that Putnam arrange for a Lae/Howland route forecast through the weather facilities at Lae. Putnam's response, "Can *Itasca* forward Howland weather forecast to Lae?"[11] suggests that he was confused on several points.

When Earhart was ready to leave Lae she would need more than a prediction of what the weather was likely to be when she got to Howland. She needed a forecast for the entire 2,500-mile route. To provide such a forecast, a meteorologist needed observations and measurements from many points on and near the route over a period of several days.

Lt. True could provide a forecast for the Earhart's Howland to Honolulu flight because he had good weather data for that part of the northern Pacific. He did not, however, routinely receive weather observations from the southwestern Pacific because, in 1937, U.S. Navy operations in that region were very limited.

Except in the immediate vicinity of Howland Island, Earhart's route from Lae lay exclusively over the waters, territories, and colonial possessions of Great Britain. Black reasoned that the British/Australian administration in New Guinea would be better equipped to provide the weather services Earhart required, hence his suggestion that Putnam make arrangements with Lae.

Doing what he could to assist the presumed meteorologist at Lae, Black set up a system intended to provide the weather bureau there with data from U.S. ships and islands in the central Pacific. It appears that neither Putnam nor Black inquired as to whether there was, in fact, a weather bureau or forecasting facility at Lae. There wasn't. Earhart arrived in New Guinea with no provision for obtaining a weather forecast for the longest and most dangerous leg of the World Flight.

The "FN" who must have star sights was Fred Noonan. He would be using celestial navigation and dead reckoning to bring the flight close enough for Earhart to use radio direction finding to fine-tune the approach to Howland Island. Although his job was critical to the flight's success, it was performed autonomously aboard the airplane and required no particular coordination with external support services. Consequently, none of the messages sent to Black, or to the Coast Guard, or to the Navy during the planning for the second World Flight attempt and the preparations for the Lae/Howland trip included a reference to Noonan. Earhart mentioned Noonan regularly in her stories to the *Tribune,* but the men at sea did not see newspapers. The unintended effect was that no one aboard the ships that would be supporting the flight was sure that Noonan was on the airplane.

Earhart's June 30th cable to her husband reveals yet another apparent information gap. Referring to the message she had addressed to "Commander USS *Itasca,*"[12] Amelia told Putnam that she had "asked Black for forecast for tomorrow."[13] It appears that Earhart was under the impression that Richard Black was the captain of the *Itasca*. She and the Department of Interior representative had never met. Earhart's first direct contact with Black was the telegram she had received from him while she was in Java. It was sent from "USCG *Itasca*" and signed simply "Black."[14]

The last line of her telegram to Putnam was, "Arrange credit if *Tribune* wishes more story."[15] The delays in Java and the consequent flurry of international phone calls were expensive and she was apparently running low on cash.

For Earhart and Noonan, Wednesday, June 30th, was a day of recuperation and preparation. Fred Noonan helped the Guinea Airways maintenance staff service the Electra and address a number of minor problems. The mechanics were familiar with the aircraft type because the airline operated a Lockheed Electra of its own. Meanwhile, the Guinea Airways

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* *Tired and stressed as they undoubtedly were, there is no indication in any of the contemporary accounts of their stay in New Guinea that either of them was in less than good health. Allegations that Earhart was ill and that Noonan was drinking heavily are based on stories told years later and are not supported by the historical record.*

general manager, Eric Chater, did what he could to get some weather information for Earhart. He sent a telegram to the Chief Wireless Inspector in Rabaul, New Britain saying:

> Amelia Earhart would be grateful if you could obtain weather reports by about ten am first July from Nauru or Ocean Island, Tarawa and Rabaul. Also, for your information, her plane KHAQQ will transmit on 6210 kcs quarter past each hour on her flight across to Howland Island.[16]

Rabaul passed along the request but the only response was from the radio operator on Nauru, an island about halfway along, and just north of, the route to Howland. The wind there was reported to be from the southeast at 3 knots and the weather was "fine but cloudy."[17]

Some time that day, Amelia phoned in a story to the *Tribune* describing the flight from Darwin and the airfield at Lae.

> Everyone has been as helpful and cooperative as possible – food, hot baths, mechanical service, radio and weather reports, advice from veteran pilots here – all combine to make us wish we could stay. However, tomorrow about noon we hope to be rolling down the runway, bound for points east.[18]

Across the International Dateline in California, it was Tuesday afternoon, June 29th, and George Putnam was trying to generate media interest in the imminent completion of Amelia Earhart's World Flight. The only firm commitment he had was for her to be the guest on a popular radio program that aired on Monday nights and he needed to know whether she would be back in time do the show on July 5th.

The last information he had about his wife's whereabouts was an Associated Press report that she had left Darwin for Lae the previous afternoon, his time.[19] He had not yet received the telegram Earhart sent from Lae saying that she would "hold one day,"[20] nor was he aware of her phone call to the *Tribune*. As far as Putnam knew, Earhart could already be on her way to Howland. A wire sent to Lae might miss her. The Coast Guard's San Francisco Division, on the other hand, was in direct radio communication with *Itasca*. To be sure his message reached Amelia, Putnam had the Coast Guard send it to the cutter.

> Following for Miss Earhart upon arrival Howland Island: Flight contingencies permitting, is Saturday arrival likely? Sunday latest? Either perfect. Confidential: Want you to know very important radio commitment Monday night. Nothing else whatever. Signed Putnam.[21]

Itasca was not asked, and made no attempt, to forward the message to New Guinea. Earhart never saw it.

At noon in Lae, Amelia watched the airfield's radio operator, Harry Balfour, as he checked the aircraft's ability to receive "long wave" (low frequency) signals of the sort most useful for radio direction finding. The test went well and Balfour was able to receive signals sent by a nearby station on 500 kilocycles.

Although the radio receiver aboard the airplane seemed to be functioning well, other radio related problems were threatening to delay the flight's departure. The accuracy of Fred Noonan's celestial navigation on the trip to Howland depended upon the accuracy of his chronometer. To enable navigators to correctly set their time pieces, radio stations at selected locations around the world broadcast special signals at specified times each day. Lae, New Guinea could usually receive the broadcasts from stations in Australia and French Indochina but on this day Balfour's attempts to get time signals for Noonan were frustrated by local interference. The flight to Howland could not begin without a successful time check.

That afternoon – Wednesday, June 30, in Lae, – Earhart sent another message to Black via Samoa announcing her latest departure plans and asking him to try to establish direct radio contact between Itasca and Lae.

> Account local conditions plan start July 1st, 23:30 GCT, if weather okay. Will *Itasca* try contact Lae direct on 25 metres – Lae on 46 metres – so can get forecast in time? Particularly interested probable type percentage clouds near Howland. Now understand *Itasca* voicing 3105 on hour and half hour with long continuous signal on approach. Confirm and appoint time for operator here to stand watch for direct contact; Earhart.[22]

She wanted *Itasca* to call Lae on a frequency of 12000 kilocycles and listen for a reply on Lae's transmitting frequency of 6522 kilocycles. If a direct radio link could be established it would eliminate the uncertainty, confusion, and hours of delay in routing message through Samoa. Still unaware that there was no meteorologist aboard *Itasca*, Amelia hoped to have a forecast in hand in time for her planned departure at 9:30 a.m. local time the next morning, July 1st.

That evening, nearly twelve hours after it was sent, Earhart's early morning message asking for the meteorologist's forecast finally reached *Itasca*. A radio transmission was immediately sent to Fleet Airbase Pearl Harbor asking that Lieutenant True be contacted at his home. "Earhart appears to think *Itasca* has Navy aerologist aboard. Black requests you give at least an opinion."[23]

While waiting for True to respond, a reply was sent to Earhart via Samoa.

> Reference your message. Have no aerologist aboard. Have requested forecast from Fleet Air Base, Pearl Harbor for Howland to Lae though doubtful if obtainable. Will forward Honolulu Howland forecast as indicated.[24]

This time the communication delay was infinite. The message does not appear to have reached Lae at all.

Late that night, Lieutenant True sent a message to Earhart, via Samoa, with his best attempt at a forecast for the Lae/Howland route. As weather forecasts go, it was largely meaningless. True's only sources of weather data for the area in question were USS *Ontario*, the Navy ship on station at roughly the halfway point along the route, and *Itasca* at Howland. *Ontario* was getting some rain squalls. The weather was good at Howland. Other than that, True's forecast was based on his knowledge of what was "generally average" for the region.[25] Minimal though the information was, the message does not appear to have reached Earhart.

Around 9 p.m. that night, *Itasca* received Earhart's message requesting that they make direct radio contact with Lae. She had, however, neglected to give them Lae's call letters, so at 10 p.m. another telegram was sent to her via Samoa. "Request *Itasca* be advised call letters of station to be contacted." In the same message, *Itasca* confirmed its understanding of the radio procedures to be used during the upcoming flight.

> Will transmit letter 'A' with call letters repeated twice end every minute on half hour and hour on 7.5 megacycles. Will broadcast voice on 3105 kcs on request or start when within range.[26]

Once again, the cumbersome system of relaying communications through Samoa appears to have failed. *Itasca* received no reply to its request for the station's call letters but seems to have made some attempt at direct communication anyway. The effort was not successful.[27]

The next morning was Thursday, July 1st in Lae. Earhart and Noonan were rested. The plane had been serviced and the radio receiver tested. A weather forecast from the meteorologist assumed to be aboard *Itasca* was expected shortly. Noonan still needed to set his chronometer but everyone hoped that the needed time signals would be received in time for a mid-morning departure. Rising terrain off the southeast end of Lae's three thousand foot turf runway dictated that Amelia would have to make the heavily overloaded takeoff to the northwest out over the Gulf of Huon. The early morning offshore breeze was blowing the wrong way, but the wind direction typically reversed as the day progressed. At 6 a.m. Earhart sent a message to *Itasca*, "Plan leave by ten this morning New Guinea time."[28]

Before the plane was fueled for the flight to Howland, Amelia made a short test flight to confirm that everything was working. She was, at last, able to establish two-way voice communication with the ground, transmitting to Lae on her daytime frequency of 6210 kilocycles and receiving Balfour's reply on Lae's frequency of 6522 kilocycles. Balfour's assessment of the aircraft's transmitter was that the "carrier wave on 6210 kc was very rough and I advised Miss Earhart to pitch her voice higher to overcome distortion caused by rough carrier wave, otherwise transmitter seemed to be working satisfactorily."[29] Earhart then asked him to send a "long dash" while she attempted to take a bearing on the station but her attempt to use her homing device was, once again, unsuccessful.

The airplane's radio direction finder was based upon the principle that a circular antenna is more efficient when oriented to face the incoming signal than if it is receiving the transmission edgewise. When the "loop" antenna over the cockpit was rotated, the sound got louder or softer depending on the orientation of the antenna to the incoming signal. It was easier to tell when the signal was quietest than when it was loudest, so the pilot turned the loop until a minimum signal was heard and so could determine from which direction the signal was coming.

During the test flight, Earhart found that she could receive Lae's signal but, as she rotated the loop, the intensity of the sound did not change. In the terminology of the time, she could not "get a minimum" and so could not get a bearing on the sending station. The problem, of course, was that although the radio receiver could pick up the signal and she could hear the tone in her headphones, the direction finding aspect of the system could not respond to such a high frequency. Amelia, however, decided that the unsuccessful airborne test was due to the airplane being so close to the station that the signal was too strong.

It is not clear whether Balfour's previous ground test of the receiver included taking a bearing using the direction finder, but it is known that his test was carried out on a signal of 500 kilocycles, a frequency well within the loop antenna's 200 to 1500 kilocycle capability. In the flight test, Earhart tried to take a bearing on Lae's 6522 kilocycle signal but could not get a minimum. Balfour accepted Earhart's diagnosis of the problem, and so passed another opportunity to discover the flaw in her plan for finding Howland Island.

In Balfour's defense, it must be said that the Bendix direction finder was new and probably not familiar to a wireless operator working in the wilds of New Guinea, nor had Balfour been privy to earlier messages to the Coast Guard concerning the frequency limitations of her homing device.

Earhart concluded her test flight shortly after 7 a.m. and the Guinea Airways ground crew began the process of fueling the airplane for the long flight to Howland. There were still two unresolved problems: no weather forecast for the route had been received, and Noonan still needed to get a time check on his chronometer. The trip was expected to take at least 18 hours. The arrival had to be in daylight but Noonan's best celestial navigation required the stars. The approach to Howland, therefore, was best made in the hours immediately after sun-up and that meant a morning takeoff from Lae the day before.

The departure window came and went with still no forecast and no time signals. Around 11:00 a.m., Earhart reluctantly postponed the flight and at noon she sent a message to Richard Black aboard *Itasca*:

> Due local conditions takeoff delayed until 21:30 GCT, July 2nd. Any forecast Lae/Howland before then appreciated. Notify *Ontario* change.[30]

Earhart was saying that she now planned to depart from Lae at 7:30 a.m. the next morning.

Back in California, George Putnam, having learned that his wife had not left Lae on June 30th but not yet aware that the July 1st departure had also been cancelled, was still trying to find out whether she would be home in time for the radio engagement Monday night. Knowing that *Itasca* was trying to establish direct contact with Lae and hoping to catch Amelia before the scheduled takeoff, he had the Coast Guard's San Francisco Division send an urgent message to the ship:

> Please forward Earhart, Lae. Rush. Is there likelihood Oakland by Monday morning? Reply via *Itasca*. Important.[31]

Itasca never established direct radio contact with Lae and the message was not forwarded to Lae as a telegram.*

Throughout the remainder of the day – Thursday, July 1st – in Lae, Balfour continued his effort to receive time signals. Earhart and Noonan, as they had done during early enforced delays, used the time to do some local sight-seeing.

At some time during the day, a weather forecast for the Lae/Howland route was received from Lt. True at Fleet Air Base, Pearl Harbor. Guinea Airways manager Eric Chater, in a letter written three weeks later, recalled that the forecast had been received, via Samoa, at 7:30 that morning.[32] U.S. Navy records, however, show that True's forecast was not transmitted from Hawaii until more than an hour after that time and messages relayed through Samoa were taking a minimum of three and a half hours to reach Lae, if they got there at all. Whenever the forecast actually reached New Guinea, the picture it painted of the weather to be expected along the route was typical for the region.

> Earhart, Lae. Forecast Thursday.
>
> Lae to *Ontario* – Partly clouded. Rain squalls 250 miles east Lae. Wind, east south east, 12 to 15.
>
> *Ontario* to longitude 175 – Partly cloudy, cumulus clouds about ten thousand feet. [Visibility] mostly unlimited. Wind, east north east, 18.
>
> Thence to Howland – partly cloudy. Scattered heavy showers. Wind, east north east, 15.
>
> Avoid towering cumulus and squalls by detours as centers frequently dangerous.
>
> Fleet Air Base, Pearl Harbor[33]

When no storm systems are present, virtually every day in the central Pacific is partly cloudy with big, puffy cumulus clouds often building to around ten thousand feet. Some get big enough to develop into localized squalls with heavy showers. Any pilot knows that it's a good idea to stay out of such clouds. The forecast surface winds would be moderate quartering headwinds, as they would be almost any day in that part of the world. Winds at altitude might be quite different, but that information was not available.

The forecast was for "Thursday," but whose Thursday? True had sent the forecast at 12:20 Hawaiian Time on Wednesday, June 30th. Across the Dateline in Lae, New Guinea, at that moment, it was 8:50 a.m. on Thursday, July 1st. Was this a forecast for Earhart's today or for True's tomorrow? Unclear as the intended day may have been, the prognostication was so typical of the region that it didn't much matter.

That evening Amelia wrote another press release for the *Tribune*. She had received no reply to her suggestion that a charge account be arranged, so she sent her story as a telegram, collect. Echoing Hamlet to express her frustration, she wrote:

> "Denmark's a prison" and Lae, attractive and unusual as it appears to two fliers, just as confining. Lockheed stands ready for longest hop weighted with gasoline and oil to capacity, however clouds and wind blowing wrong way conspired keep her on ground today. In addition FN has been unable, account radio difficulties, to set his chronometers. Lack knowledge their fastness or slowness. We shall try to get off tomorrow, though now we cannot be home by Fourth of July as hoped. Earhart.[34]

Finally, at 9 p.m., a marginal signal from Sydney, Australia was heard and at 10:30 the Adelaide time signal came through clearly. The time check indicated that Noonan's chronometer was three seconds slow but, for a flight requiring the degree of precision needed to bring the plane as close as possible to such a small island, Noonan wanted more than one verification of his time piece.

The next morning – July 2nd, 1937 – the planned 7:30 a.m. takeoff did not happen, but at 8:00 a.m. another clear time signal was received, this time from Saigon, and the chronometer checked out the same as the night before. According to Chater, "Both Captain Noonan and Miss Earhart expressed their complete satisfaction and decided to leave at ten o-clock."[35] That hour happened to also be 00:00 Greenwich Civil Time. For a flight departing at that time, the GCT time throughout the trip would be the same as the flight's time aloft.†

The Electra had been fueled for the trip following Earhart's test flight the previous morning. Although

* *Over the years there have been accusations that George Putnam pressured his wife to make the flight to Howland before she was ready, and there is no doubt that the messages he sent to her via the* Itasca *conveyed a sense of urgency – but Earhart never saw them.*

† *It has often been alleged that Earhart's takeoff time was selected specifically for that reason, but her earlier plans to depart at 9:30 and 7:30 local time argue against that assertion. The juxtaposition of the takeoff time with 00:00 GCT appears to have been nothing more than a convenient coincidence.*

Amelia's press release described the aircraft as being "weighted with gasoline and oil to capacity,"[36] the plane was actually about 50 gallons shy of its maximum fuel load.

The reason was simple and sensible. The Lockheed's engines performed best for takeoff on 100 octane aviation fuel, but the new high-test gasoline was not yet widely available. All but one of the Electra's twelve fuel tanks carried the standard 87 octane gas. An 81 gallon tank in one wing had been filled with the 100 octane fuel at the last stop where it could be had, probably Bandoeng. Now that tank was about half empty, leaving an adequate 40 gallons or so for the heavily overloaded takeoff, but it could not be topped off with Lae's lower-grade fuel without diluting its contents.

Earhart's aircraft had a well-documented total fuel capacity of 1,151 U.S. gallons.[37] After fueling at Lae for the trip to Howland Island, the airplane had about 1,100 U.S. gallons of gasoline aboard, according to accounts written shortly afterward by Eric Chater, the Guinea Airway's manager;[38] and James Collopy, the District Superintendent for Civil Aviation.[39] Because the tanks were filled in the morning hours of the previous day, the loaded airplane necessarily sat through the heat of an entire New Guinea day and it is reasonable to expect that some fuel was lost due to expansion and leakage through the fuel tank air vents. Such loss is common, fairly negligible, and quite apparent from the dribbling vents and wet patches on the ground. Although not specifically mentioned by Chater or Collopy, it is also reasonable to expect that, for such a fuel-critical flight, any such loss would be replaced during final inspection on the morning of the takeoff.

Given the controversy surrounding subsequent events, there has been a great deal of discussion and speculation about how long and how far the Electra could fly on 1,100 gallons of gas. The answer is, it depends. In the spring of 1936, when selecting an aircraft for her anticipated globe-circling flight, range was, quite naturally, Earhart's primary consideration. Her original plan called for a non-stop flight of nearly 3,000 miles to Japan after mid-air refueling over Midway Island. Lockheed got the order with a promise that their Model 10E Electra could be modified to carry enough fuel to fly for 4,500 miles. On June 4, 1936, while Earhart's Model 10E Special was under construction, the company published a study explaining how such phenomenal range could be accomplished.

The 37-page document, entitled "Lockheed Report No. 487 – Range Study of Lockheed Electra Bimotor Airplane" was authored by engineers C.L. Johnson* and W.C. Nelson and includes 17 graphs and 9 pages of tables and computations. The study concludes that "It is possible to fly a Lockheed Electra Model 10E non-stop for a distance of between 4100 and 4500 miles starting out with 1200 gallons of gasoline and the proper amount of oil."[40]

There were, of course, caveats. The range projections were for "zero wind" conditions and required the meticulous management of numerous variables such as airspeed, throttle settings, and propeller RPM. Of critical importance was the adjustment of the fuel/air mixture to assure that the engines were functioning at peak efficiency.

According to the Lockheed study, with a fuel load of 1,100 gallons, the Electra should be able to cover 3,680 miles in zero wind in somewhere between 24 to 27 hours depending on a fairly narrow range of airspeed choices. Put another way, 1,100 gallons would give the Electra between 24 and 27 hours of endurance at airspeeds between 135 and 150 mph. Headwinds or tailwinds would determine the actual distance covered.

A flight equivalent to the distance from Lae, New Guinea to Howland Island, in zero wind, could be expected to take between 17 and 19 hours depending on the airspeed selected. If Earhart used the higher airspeed profile specified in the study, she could fly against an average headwind of 15 mph for the entire flight, arrive in the vicinity of Howland 19 hours after takeoff, and still have at least a five-hour – 26% – reserve.

The long range capabilities of the Model 10E Special were not merely theoretical. During the preparations for the World Flight, Johnson had flown with Earhart in her Electra to gather further data and make sure Amelia understood how to implement the fuel management techniques and procedures he and Nelson had worked out. In March, Earhart had departed Oakland, California with 947 gallons of fuel aboard and landed in Honolulu, Hawaii nearly sixteen hours and 2,400 miles later. According to Amelia, there was more than four hours worth of fuel still in the tanks – a comfortable 25% reserve.[41]

In May of 1937, while Earhart's Electra was still under repair following the Luke Field wreck, the performance predicted in Lockheed Report 487 was again dramatically validated when Dick Merrill and Jack Lambie made back-to-back non-stop Atlantic crossings in the other Model 10E Special, the "Daily Express."

As Earhart contemplated her impending 10 a.m. departure from Lae on July 2nd, 1937, the only weather forecast to reach her had indicated that more or less average conditions existed along her entire route. She could expect moderate headwinds and she might have to divert around occasional squalls, but, if she could get the Electra airborne with the heaviest fuel load she

* *Clarence L. "Kelly" Johnson had helped design the Model 10 and went on to become one of the world's most famous aeronautical engineers, leading the design teams on such aircraft as the P-38 Lightning, the F-104 Starfighter, the U-2, and the SR-71 Blackbird.*

had ever carried, she could have every expectation that she could fly all that day, all night, and arrive in the Howland area around 7 a.m. the next morning. If the island didn't appear on schedule she'd have about five hours, until at least noon, to locate it or find somewhere else to land.

In the closing line of her press release to the *Tribune*, Amelia had written:

> Not much more than a month ago I was on the other shore of the Pacific, looking westward. This evening, I looked eastward over the Pacific. In those fast-moving days which have intervened, the whole width of the world has passed behind us – except this broad ocean. I shall be glad when we have the hazards of its navigation behind us.[42]

The hazards of its navigation were greater than she supposed. Her declared intention to take bearings on high frequency signals sent by *Itasca* was doomed to failure as were any efforts by the cutter to take bearings on the high frequency signals she could send. Unless Noonan's navigation was uncannily accurate, the only glimmer of hope was the borrowed high frequency direction finder set up on Howland, and Earhart didn't even know it was there.

She had begun her press release with a line from Hamlet, but it is a quote from Macbeth that speaks to her departure from Lae.

> I'm for th' air; this night I'll spend
> Unto a dismal and a fatal end:
> Great business must be wrought ere noon.[43] ◆

Notes

1 Eric Chater, letter to Frank Griffin, July 25, 1937.
2 Earhart to Black, June 26, 1937.
3 Governor of Samoa to Earhart, June 28, 1937.
4 Governor of Samoa.
5 Governor of Samoa to Earhart, June 28, 1937.
6 Earhart to *Itasca*, June 30, 1937.
7 Earhart to *Itasca*, June 30, 1937.
8 Chater.
9 Earhart to Putnam, June 30, 1937.
10 Earhart.
11 Hampton to Black, June 18, 1937.
12 Earhart to Putnam, June 30, 1937.
13 Earhart.
14 Black to Earhart, June 23, 1937.
15 Black.
16 Chater.
17 Chater.
18 New York *Herald Tribune*, June 30, 1937.
19 New York *Herald Tribune*, June 29, 1937.
20 Earhart to Putnam, June 30, 1937.
21 Putnam to Earhart, June 29, 1937.
22 Earhart to *Itasca*, June 30, 1937.
23 *Itasca* to Fleet Airbase Pearl Harbor, June 29, 1937.
24 *Itasca* to Earhart, June 29, 1937.
25 Fleet Air Base to Earhart, June 29, 1937.
26 *Itasca* to Earhart, June 29, 1937.
27 *Itasca* to COMFRANDIV, June 29, 1937.
28 Earhart to Black, June 30, 1937.
29 Chater.
30 Earhart to Black, July 1, 1937.
31 COMFRANDIV/Putnam to Earhart, June 30, 1937.
32 Chater.
33 Fleet Air Base to Earhart, June 30, 1937.
34 Earhart to *Tribune*, July 1, 1937.
35 Chater.
36 Earhart to *Tribune*, July 1, 1937.
37 Bureau of Air Commerce Aircraft Inspection report, May 19, 1937.
38 Chater.
39 James Collopy, letter to the Secretary, Civil Aviation Board, August 28, 1937.
40 C. L. Johnson & W. C. Nelson, "Lockheed Report No. 487 – Range Study of Lockheed Electra Bimotor Airplane," June 4, 1936.
41 Earhart, *Last Flight*.
42 Earhart to *Tribune*, July 1, 1937.
43 Wm. Shakespeare, *Macbeth*, III.5.

Chapter 8

Lost

Across the Dateline it was July 1st and the Howland Island airport was ready for its first customer. Just offshore, the men aboard the Coast Guard cutter were preparing to provide weather and navigational assistance to the plane and trying to find out if Earhart was finally on her way.

The cutter's communications capabilities were considerable, but they were not unlimited. Of *Itasca's* four transmitters, two could send the high-frequency signals Earhart had requested. Only one of them could provide the Morse code letter "A"s on 7500 kilocycles that Amelia hoped to home in on. That radio, however, was also needed for communication with the outside world.

The other high frequency transmitter, if tuned somewhat beyond its normal limits, could handle Earhart's request that *Itasca* talk to her on 3105 kilocycles. *Itasca* had only one high frequency transmitting antenna, so the two transmitters could be not be used simultaneously. A switch mounted on the ceiling of the radio room selected which of the two units was connected to the antenna.

Situated on the top deck just behind the funnel, the room measured sixteen feet from side to side with a door at each end, and a scant nine feet front to back. Large metal cabinets that housed the ship's transmitters and receivers stood on the floor and hung from the walls leaving just enough room for the desks of two operators. Each man had a telegraph key for sending Morse code and a typewriter that he used to keep a running log of incoming and outgoing transmissions. Normally, the operators listened over headphones, but received signals could also be put out over a loudspeaker mounted on the wall.

The principal players on this narrow stage were the cutter's radiomen. *Itasca's* Communications Officer was Ensign W.L. Sutter but, apart from certifying the smoothed copies of the logs, he is virtually invisible in the official record. As in most small military detachments, the person running the show was the senior non-commissioned officer. In *Itasca's* communications section, that person was Chief Radioman Leo G. Bellarts. He had joined the Coast Guard to follow his passion for radio. He was 30 years old.

The radio room of USCG Tahoe*, sister ship to* Itasca.

Under Bellarts' supervision aboard *Itasca* were three young men who had not yet progressed beyond the Coast Guard's lowest rating for radio technicians. Many years later, Leo Bellarts remembered Radioman 3rd Class William Galten as his most trusted operator. "I could give Galten a job and Galten would go ahead and carry it through. He would do what I told him to and I was perfectly, you know, at ease because I knew Galten was a reliable man. He was a good man."[1]

Bellarts was less complimentary about Radioman 3rd Class George Thompson (no relation to the cutter's captain). "Thompson was a very peculiar individual. He was an ex-Army man – ex-Army operator and you'd tell him to do something and he'd do it as long it fit with his idea."[2] It was George Thompson who had disregarded orders from San Francisco Division during the dispute about *Itasca's* transmitter. "Thompson was a good operator. Maybe better than Galten as [far as being an] operator is concerned. But as far as reliability, I'd put Galten ahead of Thompson."[3]

The most controversial of the cutter's communicators was Radioman 3rd Class Thomas O'Hare. He was, in Bellarts' opinion, a "fast operator"[4] in more ways than one. Everyone aboard *Itasca* knew that the Earhart flight was of great interest to the press and to the public.

> I started missing little papers that was around the shack – radio shack. … somebody was picking souvenirs up. … I knew there was somebody in the radio shack that was doing it. Snitching that stuff. … O'Hare, I think was one of 'em because I never got a copy of his log. And I got a little bit disgusted so I passed the word – absolutely those things, when they get off a watch, they are to deliver [the logs] to me by hand only. Lt. Commander Baker, he was the exec and I told him about it and he said, take care of the logs. Keep all that stuff, he says. Don't let it out of your hands.[5]

Radioman 2nd Class Frank Cipriani, the fourth operator under Bellarts' supervision, was an outsider aboard *Itasca.* Normally assigned to the cutter *Roger B. Taney*, Cipriani had been brought aboard at the request of Richard Black specifically to man the high-frequency direction finder to be set up on Howland Island. "Temporary. He was a temporary man. And so he went over on the beach and it was just as good. …We didn't want him."[6]

George Thompson had the watch just after midnight on July 1st when a radiogram arrived for Black from U.S. Navy Radio in Tutuila, American Samoa. Earhart had sent the message from New Guinea the previous afternoon.

> Due local conditions, take off delayed until 21:30 GCT, July 2nd. Any forecast Lae/Howland before then appreciated.[7]

Earhart was saying that she intended to take off from Lae at 7:30 a.m. on Friday, July 2nd. That would be 10:00 a.m. on Thursday, July 1st aboard *Itasca*. Richard Black had less than ten hours to get a new forecast to her. The only means of communication with her was by telegram via Samoa. That was taking a minimum of four hours and often much longer. The forecast had to come from Lieutenant True, but it was now the middle of the night in Hawaii and True was probably at home and asleep. *Itasca* immediately sent a message to Fleet Air Base, Pearl Harbor: "Request forecast Lae to Howland Island for Earhart. Anticipate early departure this date."[8]

Seven and a half hours passed before Fleet Air Base transmitted a forecast to be forwarded to Earhart via Samoa. Once again, True cautioned that he really didn't have much information.

> Accurate forecast difficult account lack of reports your vicinity. Conditions appear generally average over route. No major storm. Apparently partly cloudy with dangerous local rain squalls about 300 miles east of Lae and scattered heavy showers remainder of route. Winds east south east about 25 knots to *Ontario* then east to east north east about 20 knots to Howland; Fleet Base Pearl Harbor.[9]

Itasca received the forecast but Earhart didn't. The general manager of Guinea Airways was later to report that the telegram arrived in Lae "as the machine was leaving the ground."[10]

Aboard *Itasca*, the morning, noon, and afternoon passed with no word as to whether Earhart had left Lae. At 4:45 p.m. Thomas O'Hare was on duty in the radio room and asked U.S. Navy Radio in Tutuila, American Samoa to "give me flash if you find out. … We don't think she took off or we would know by now."[11] An hour later, just to be safe, O'Hare made his first attempt to pick up the plane: "Tuning for KHAQQ on 3105 kcs – Results negative."[12]*

At 6:10 p.m. San Francisco Division sent word that the United Press was reporting that Earhart took off at noon Lae time.[13] If true, it meant that she had been in the air for several hours. Commander Thompson considered the news reliable enough to order a special radio watch begun specifically to listen for the inbound aircraft. He also sent Frank Cipriani, the Radioman 2nd Class borrowed from *USCG Taney*, ashore to man the high frequency direction finder set up on the island.[14]

The Associated Press correspondent aboard *Itasca*, James Carey, filed a report that described the situation as it was understood aboard the cutter at that time: "Earhart arrival expected 10:30 morning. Estimate 20 hour plus flight. Easterly winds forecast Howland. Headwinds en route."[15]

In setting up the special radio watch to communicate with the Electra, *Itasca's* Chief Radioman, Leo G. Bellarts, had to sort out Amelia's desired frequencies, schedules, and procedures from the fragmentary instructions received in the past weeks. As Bellarts reviewed the radio room's copies of the various messages it appears that he was missing a key piece of the puzzle.

Bellarts was not aware of instructions contained in a cable Earhart sent the morning after she arrived in Lae. Addressed to "Commander *USS Itasca*" it said, "Plan midday takeoff here. Please have meteorologist send forecast Lae Howland soon as possible …."[16] The realization that Earhart was counting on the cutter to provide a weather forecast for the upcoming flight had prompted a frantic effort to contact the Fleet Air Base meteorologist at home in Honolulu and get him to come up with some kind of prognostication. The information in the second half of Earhart's message was vital but required no immediate action:

> Report in English, not code, especially while flying. Will broadcast hourly quarter past hour GCT.[17]

In 1937, virtually all marine and aviation long distance communication was conducted in Morse code. Most ships did not use radiotelephone at all and aircraft only used voice radio for short-range calls. Earhart's request that *Itasca* use exclusively "English" was, therefore, highly unusual. The idea that an aviation professional, especially a famous long distance flyer, would not be fluent in Morse code was almost unfathomable.

It was for just that reason that Earhart had gone to some pains to explain to her hosts in New Guinea that both she and Noonan "entirely depended on radio telephone reception as neither of them were able to read Morse at any speed but could recognize a single letter sent several times."[18] She had also warned *Itasca* to "Report in English, not code."[19] Bellarts, however, never got the word. During the flight, the vast majority of the cutter's transmissions to the plane were sent in Morse code.

Equally important, and equally missed, was Earhart's stipulation that she intended to transmit only once each hour, at quarter past the hour, and that she would keep her radio schedule according to Greenwich Civil Time (GCT). In this respect, Earhart was very much up to date. Recognizing the need for standardized time coordination with aircraft that were crossing several time zones during a single flight, Pan American Airways used Greenwich time for all communications schedules.

The Coast Guard, and for that matter the U.S. Navy, had no such need and were still operating according to a worldwide system of half-hour local time zones. Throughout the flight, *Itasca's* radio operators used local time calculated as Greenwich minus eleven and one half hours. In practice, being eleven hours out of synch was of little consequence, but the half hour discrepancy was a problem. "On the hour" for Earhart was "on the half hour"

** The radio call sign for Earhart's airplane was KHAQQ.*

for *Itasca*. When Earhart's watch read quarter past the hour, the clocks aboard *Itasca* were at quarter to the hour. As a result, the men aboard the cutter had the impression that Amelia was contradicting herself when, in fact, she was doing exactly what she said she would do.

How it came about that *Itasca's* Chief Radioman did not have this single crucial message is not known, but the most obvious explanation is that the radio room's copy of the message was one of those "little papers" that went missing as a souvenir and so was not available to Bellarts when he tried to piece together Earhart's instructions.

Bellarts took the first special watch himself and began listening for signals. He soon heard "Very weak signals on 3105. Unreadable and seemed [to] shift about."[20] Later that hour he typed "No sigs on [3105] during period 7:45-48."[21]

Earhart was, in fact, transmitting at about that time. Bellarts didn't hear her because she was sixteen hundred miles away and sending on her other frequency. However, Harry Balfour, the wireless operator in Lae, New Guinea, did hear the transmission. "Position 4.33 South, 158.7 East. Height 8,000 feet over cumulus clouds. Wind 23 knots."[22] This report, the third heard by Balfour, put the plane in the vicinity of the Nukumanu Islands, not yet half way but on course and on schedule for Howland Island. The Electra had covered the roughly nine hundred miles from Lae in about six hours for an average speed of somewhere in the neighborhood of 150 mph.*

At 8,000 feet, the airplane was where it should have been for maximum efficiency and, with the approach of nightfall, the report that it was above the tops of the cumulus clouds was good news. As the day cooled off, the clouds should not build any higher. Earhart's "Wind 23 knots," however, was meaningless without mention of the wind's direction.

Finally, just before 8 p.m. aboard *Itasca*, official notification of Earhart's departure arrived from Lae, via Samoa:

> Urgent, Black, *Itasca* … Amelia Earhart left Lae at 10 a.m. local time July 2nd. Due Howland Island 18 hours time.[23]

This information presented a new picture. The plane had left Lae two hours earlier than previously reported and the 18-hour time en route estimate indicated that Earhart anticipated lighter headwinds than predicted in the most recent forecast. *Itasca* should now expect the plane to arrive at around 6:30 a.m.

At about the same time the message arrived from Lae, Leo Bellarts handed off the special Earhart radio watch to George Thompson. Following Bellarts' instructions, Thompson listened for signals from Earhart on 3105 kilocycles, especially at quarter to and quarter past the hour. On three occasions during his six-hour watch he heard unreadable voice transmissions but nothing he could identify as coming from the airplane.

Thompson also followed Bellarts' instructions about what signals *Itasca* was to transmit. A few minutes before each hour and half hour he sent the local weather in Morse code, followed on the hour and half hour by the Morse code letter "A" repeated for three minutes, all on 7500 kilocycles.

As night settled over the island, Frank Cipriani set up the borrowed high-frequency direction finder and began listening for Earhart. He started listening for Earhart at 9 p.m. on July 1st, but the radio log that he kept indicates that he began his watch at 10 p.m. on July 2nd.[24] The log is one day and one hour ahead of the actual local time.

Apparently, when Cipriani went ashore at Howland on the evening of July 1st he was confused about what day it was (not at all unusual aboard a ship on a long voyage) and believed the date to be July 2nd. Consequently, events recorded in the Howland radio log as happening on July 3rd, actually occurred on the 2nd. July 4th is really July 3rd. By July 5th Cipriani had figured out his error and the log is correct from then on.

The date discrepancy was an error, but the time difference was intentional. Cipriani, like the radio operators aboard the cutter, kept his radio log in local time. *Itasca* used actual local time as computed according to U.S. Navy conventions. On the island, however, the colonists used Honolulu time for the sake of convenience in coordinating radio schedules with Hawaii. The net result was that local time on Howland was an hour later than local time aboard the ship standing just offshore.†

The obvious errors and apparent contradictions in the various radio logs have prompted charges of negligence where there was only a lack of information, and allegations of conspiracy where there was merely confusion.

Aboard the cutter, as George Thompson stood the special Earhart radio watch, William Galten serviced the ship's regular radio duties. When he wasn't handling routine administrative traffic, Galten, too, listened for Earhart at quarter to and quarter past each hour, making note in his log of what he did and did not hear. Like Thompson, he heard nothing that he could be sure was the plane, but a few minutes before 10 p.m. he heard a very weak Morse code transmission, "KHAQQ [the Electra's call sign] this is VK [Galten couldn't get the rest of the sender's call sign]. What is your position now?"[25] The station Galten heard was the island of Nauru, call letters VKT. Earhart's planned route passed roughly one hundred miles south of the British colony and the operator there later reported that he had heard voice transmissions from the plane shortly before Galten heard his transmission.[26] At the time, however, all Galten knew was that someone, somewhere was trying to call Earhart.

* *Estimates of the Electra's speed, position, and progress during the flight from Lae are of necessity rough approximations. The accuracy of Earhart's few reported positions cannot be verified nor is it possible to know how old the information was at the time Earhart made the report.*

† *In 1937, Hawaii was using Greenwich minus ten and a half hours. Local time in the Howland area, as used by* Itasca, *was Greenwich minus eleven and a half hours. For the sake of clarity, events on Howland will be described in* Itasca *local time.*

At two o'clock in the morning, Thomas O'Hare relieved Galten on the administrative watch and Bellarts once more took the Earhart watch. Half an hour later, he spoke into the microphone for the first time, "*Itasca* to Earhart."[27] At this point the plane had been in the air for fourteen hours and should be within radio range, but the only sound in Bellarts' headphones was the familiar crackle of static.

No word of the flight's progress had been received since the initial report of its departure from New Guinea. If Lae or anyone else had heard from Earhart since then, they hadn't told *Itasca*. The sleeping ship drifted on the dark ocean to the west of Howland. On the bridge, the officer-of-the-deck ordered the engine ahead one third to ease the ship to within five miles of the island. In the radio room, Bellarts continued to send the weather and "A"s.

At quarter to three he listened for her scheduled broadcast, and there was a voice. It was barely discernible against the background noise, but Bellarts was sure it was her. The transmission lasted for three minutes and he couldn't make out a word of what she was saying. He typed "Heard Earhart plane but unreadable thru static"[28] and notified the bridge that first contact had been made.

Commander Thompson, in his official report, later claimed that at this time

> Bellarts caught Earhart's voice and it came in through loud speaker, very low monotone "cloudy, overcast." Mr. Carey, Associated Press representative, was present. Also Mr Hanzlik [sic] of United Press, both gentlemen recognized voice from previous flights to and from Hawaii. There was no question as to hearing Earhart.[29]

Overcast conditions would prevent Noonan from using star sightings to track the flight's progress, but the ship's radio logs do not support Thompson's allegation. Asked about the discrepancy many years later, Bellarts vehemently denied that he had heard Earhart say "cloudy, overcast" and explained that, at that time, the loud speaker was not in use.

> That static was something terrific, you know, just crashing in on your ears. And I'll guarantee you that Hanzlick and that other joker never heard that. Oh, I would definitely be on the phones. Absolutely. Not on a loud speaker.[30]

Exactly an hour after the first reception, Bellarts heard her again. Although Bellarts didn't know it, Earhart was transmitting precisely when she had said she would – once an hour at quarter past the hour Greenwich Time. This time the signal was a bit stronger and he could make out that she "will listen on hour and half on 3105."[31]

To Bellarts, it appeared that Earhart was changing the agreed-upon procedure. Following the instructions Earhart sent from Java, he had been sending her the Morse code letter "A" and the ship's call letters, NRUI, on the hour and half hour on 7500 kilocycles.[32] He was apparently not aware that on the same day Earhart sent her instructions, San Francisco Division advised her (presumably via Putnam) that "*Itasca* will voice radio on 3105 [to] her on hour and half hour as she approaches Howland."[33] Earhart confirmed that change in a telegram she sent to Black from Lae on June 30th, "Now understand *Itasca* voicing 3105 on hour and half hour" and, she added, "with long continuous signal on approach."[34] It appears that another little paper had gone missing from the radio room.

Her request for a long continuous transmission when she got close clearly implied that she intended to find the island by homing in on the signal using her radio direction finder. On June 26th, she had said that her direction finder "covers from 200 to 1500 and 2400 to 4800 kilocycles.[35] A signal sent on 3105 kilocycles would fall within that range. It looked like a workable plan if she was right about the capabilities if her direction finder but, somehow, Bellarts never got the word.

In the pre-dawn hours of July 2nd, as Earhart passed her fifteenth hour aloft en route from Lae, she was probably wondering why she had heard nothing from *Itasca*. Her transmission, "Will listen on hour and half on 3105"[36] was a reminder, not a change.

Commander Thompson's version of the 3:45 a.m. reception, as related in his official report, is quite different from the entry that appears in Bellarts' original log.*

> *Itasca* from Earhart … *Itasca* from Earhart … overcast … will listen on hour and half hour on 3105 … will listen on hour and half hour on 3105.[37]

Again, a clouded sky could have serious consequences for the flight's navigation but there is no "overcast" in the original radio logs nor does the word appear in the transcript filed by Army Air Corps Lieutenant Daniel Cooper. According to Thompson's report, the lieutenant joined the group in the radio room at 3:40 a.m.[38] Cooper's version of the 3:45 reception matches Bellarts' log entry, "Will listen on hour and half hour on 3105 —(very faint, S-1)."[39]

"S-1" means Strength 1. The strength of received radio signals was rated on a subjective scale of one to five. According to accepted international standards in 1937, Strength 1 was "Hardly perceptible, unreadable;" Strength 2 was "Weak, readable now and then'" Strength 3 was "Fairly good, readable but with difficulty;" Strength 4 was "Good, readable;" and Strength 5 was "Very good, perfectly readable."[40†]

Just before 4:00 a.m. *Itasca* time, San Francisco Division sent a message asking *Itasca*, "Have you established contact with plane yet?"[41] Radioman O'Hare replied, "Heard her but don't know if she hears us yet."[42]

On the hour, in accordance with Earhart's request, Bellarts sent the current weather using voice ("fone" in

* *The raw logs were often strewn with errors and revisions. Standard practice was to "smooth", that is, re-type, the rough logs before filing them as part of the official record. Most of* Itasca's *surviving radio logs are "smoothed" versions but, fortunately, Chief Bellarts saved the raw log of the special Earhart radio watch.*

† *As can be seen, Cooper should have rated the 3:45 reception as S-2. Some researchers have assigned hard values to how far away the Electra must have been at a given time based upon signal strength estimations included in the various logs and reports, but S-numbers represent general impressions, not precise measurements.*

Coast Guard parlance) on 3105 kilocycles. Two minutes later he sent the weather again on the same frequency, this time using Morse code.

At quarter past the hour he listened on 3105 for a transmission from Earhart but heard nothing. On the half hour, he broadcast the weather by voice and code.

During this time O'Hare, at the other radio position, was switching back and forth between keeping schedules with other stations and listening for Earhart on 3105. Radio Wailupe, the main U.S. Navy radio facility in Hawaii, asked, "Do you hear Earhart on 3105?"[43] O'Hare replied, "Yes, but can't make her out."[44]

There should have been a transmission from Earhart at 4:45 a.m. (16:15 aboard the Electra), but there wasn't. O'Hare listened for five minutes and logged "Tuned to Earhart. No hear."[45] Bellarts, presumably, was also listening but his log contains no entry for that time.

What happened next can only be pieced together from the two radio logs. It appears that a few minutes before the top of the hour Bellarts, knowing what he was going to do at five o'clock, typed, "Sent weather/code/fone/3105 kcs."[46] But before he got to the end of that line on the log sheet and entered the time as 0500, Earhart's voice was suddenly in his headphones. On the same line he typed "(heard Earhart (part cldy)"[47] and, instead, entered the actual time – 4:53.

At the other position, O'Hare was also caught off guard. He was sending a message to Radio Wailupe when "Earhart broke in on fone 3105 / now ???? unreadable."[48] He logged the time of this event as 4:55.

Despite subsequent official claims to the contrary, this ambiguous incident was the only occasion in either of the cutter's two radio logs in which Earhart was thought to have made a comment about the weather.

They continued to listen but heard only static. By six o'clock it had been over an hour since the last transmission from the plane. So far, Bellarts and O'Hare had heard Earhart's voice three times. Bellarts had logged portions of two receptions as intelligible phrases. O'Hare had not been able to understand anything she said.

The long night was coming to an end. All hands were up and breakfasted and the ship was now standing just offshore the island. The eastern sky blushed with the promise of dawn as the cutter's boats headed for the island carrying the various teams designated to support the aircraft's landing, greet the famous flyer, and service the airplane.[49] Somewhere over the dark western horizon, the Electra drew closer with each passing minute.

Then, at quarter past the hour, Earhart was back on the air. "Wants bearing on 3105 // on hour // will whistle in mic."[50] She then announced that she was approximately two hundred miles out and started whistling.[51]

Earhart's request for a bearing came as a surprise. It was never the plan for the ship to take bearings on signals from the plane. While she was in Lae, Black had informed Amelia that *Itasca*'s direction finder was limited to frequencies from 270 to 550 kilocycles.[52] Now she was asking *Itasca* to take a bearing while she whistled into the microphone on 3105 kilocycles.

Bellarts later said that she did not actually whistle. "I put down whistle because she said was whistling. Actually it was an audible sound. …It was higher than a hum. A shrill note."[53] In Bellarts' opinion, Earhart was trying to mimic the steady high-pitched tone of a telegraph key being held down. He felt that, had *Itasca's* direction finder been able to respond to such a high frequency, "We could have handled it. But, notice, notice when she did that. One minute after she asked 'on the hour.'"[54]

Although it is apparent that Earhart did not understand the frequency limitations of radio direction finding, she was not behaving as erratically as Bellarts believed. Amelia was using Greenwich time, as she had said she would. For her, the time was not 6:15, it was 17:45. She was transmitting right on schedule and asking *Itasca* to send the bearing at the ship's next transmission time at the top of the hour.

Bellarts, however, saw an irrational woman who refused to answer his calls, changed her plans from one minute to the next, and was now asking him for help he couldn't provide. "And I was sitting there sweating blood because I couldn't do a darn thing about it."[55]

The only person who might be able to do something about it was Frank Cipriani, the radioman Commander Thompson sent ashore the previous evening to set up the high frequency direction finder Black had borrowed from the Navy. As Earhart "whistled," O'Hare called Cipriani and told him take bearings on the signal.[56]

Cipriani could hear Earhart at Strength 3 ("Fairly good"[57]) using a long antenna rigged to the receiver, but when he switched to the smaller loop antenna on the direction finder, reception dropped to almost nothing. Then she stopped transmitting. "Bearing nil."[58]

While the radio operators struggled to accommodate Earhart's request for a bearing, the sun arrived and Commander Thompson gave the order for the ship to begin making smoke so as to be more visible.[59]

In his official report, Thompson implied that *Itasca* continued to lay down smoke for upwards of two hours.[60] There is, however, a problem with the claim. *Itasca* was a steam ship powered by two oil-fired boilers. Steam was generated from water pumped through tubes in the boiler fireboxes. The only technique available to *Itasca* for making smoke was to reduce the amount of air in the fuel-air mix being pumped into one of the fire boxes. The procedure produced thick clouds of heavy black smoke but also deposited soot on the steam tubes. More than about fifteen minutes of such abuse could result in uneven soot build-up, hot spots, tube rupture and the catastrophic failure of the boiler.

Although *Itasca's* deck log notes that the ship began making smoke at 6:14 a.m., there is no corresponding entry for when smoke making ceased.[61] It is possible, and perhaps probable, that no smoke was being generated after about 6:30 a.m.

In the radio room, the two operators kept trying to establish communication with the plane. At about this time, O'Hare abandoned any attempt to maintain communication with San Francisco and Hawaii. For the rest of the morning, both radio positions were occupied exclusively with trying to reach out to Earhart while Coast Guard headquarters, the Navy, George Putnam and the press waited anxiously for news of the plane's arrival.

At 6:45 a.m., Earhart was back on, stronger now. Bellarts logged her words as "Please take bearing on us and report in half hour."[62] On the next line he typed "I will make noise in mic" and added "– about 100 miles out."[63]

O'Hare's log records the event somewhat differently. He typed "Earhart on now. Reception fairly clear now".[64] "Want bearing and want report in ½ hour."[65]

Reviewing the log more than thirty-five years later, Leo Bellarts was still baffled by Earhart's request, "Take bearing on us and report in a half an hour. Well, why do that? [I]f you take a radio bearing you get the bearing back like that. You don't wait no thirty minutes to get it back to them."[66]

Once again, the time discrepancy between ship and plane created a false impression that Earhart was acting irrationally. For Amelia, the time was quarter past the hour and she was undoubtedly asking for the bearing to be sent at *Itasca's* next scheduled broadcast time "**on** half hour," not "**in** half hour."

On Howland Island, although Cipriani was "using the direction finder and receiver sparingly due to heavy drainage on batteries,"[67] he too, heard the transmission.[68] The signal Cipriani heard was strong – he rated it Strength 4 ("Good, readable"[69]) but it was too short and obscured by too much static for him to get a bearing.

Coming as it did only half an hour after both Bellarts and O'Hare heard her say she was two hundred miles out, Earhart's assertion that she was now one hundred miles away caused further concern. If true, it meant either that the aircraft was traveling at the unlikely speed of 200 miles per hour or that her earlier distance estimate was significantly in error. There is, however, reason to doubt that she ever said she was one hundred miles out.

Three operators – Bellarts, O'Hare, and Cipriani – heard and separately logged the transmission. All three logs agree that she asked for a bearing and both Bellarts and O'Hare noted that she wanted the bearing sent to her "in half hour" [sic]. O'Hare and Cipriani both mention that the signal is strong. Only the Chief Radioman's log, however, includes a comment about the plane being one hundred miles out. A platen misalignment in Bellarts' original log reveals that the phrase was inserted after the carriage return for the next line.

It may be that the notation "– about 100 miles out" was Bellarts' estimate based upon the strength of the signal, and was misinterpreted as a quote from Earhart by those reading the log. Whether she said it or not, the estimate was attributed to Earhart and contributed to the growing impression among the ship's company that they were dealing with someone who didn't know what she was doing.

For the next half hour the two operators shared the single high frequency antenna back and forth as O'Hare sent "A"s on 7500 and Bellarts tried to reach Earhart on 3105. If she made another report at quarter past the hour it was blocked by a transmission that Bellarts was sending at that moment.[70]

At 7:18 a.m. Bellarts sent her a voice message on 3105, "Cannot take bearing on 3105 very good. Please send on 500 or do you wish to take a bearing on us? Go ahead please."[71] There was no reply. On the chance that Earhart would comply with his request that she send a signal on 500 kilocycles, Bellarts handed the special Earhart radio watch off to William Galten and went forward to the bridge to man the ship's own direction finder.[72]

The flight was now approaching its nineteenth hour aloft and the growing strength of the plane's radio transmissions through the early morning hours meant that it was drawing steadily closer to *Itasca* and the island airfield. James Kamakaiwi, the leader of the Department of Interior colonists and the man for whom the airport was named, described the morning and the mood in the island's daily log:

> The sky was partly cloudy, mostly with high scattered cumulus drifting slowly past. The *Itasca* kept in close to the lee of the island, sending out huge clouds of smoke to aid Miss Earhart in finding the island. Rescue party [sic] were stationed on the runways and out in boats, while the official greeters waited anxiously at the reception spot. All eyes gazed fondly, proudly, and eagerly over the horizons….[73]

But for the radio operators, there was more frustration than fondness and, as the sun and the temperature rose, so did their foreboding.

On the bridge, Bellarts had the ship's direction finder in operation but heard nothing on 500 kilocycles. He told George Thompson to keep trying while he returned to the radio room to see if there was any further word from Earhart.

All five of the Coast Guard radiomen were now engaged in trying to establish contact with the plane. On the island, Frank Cipriani listened on 3105, hoping to be able to get a bearing with the high-frequency direction finder if and when Earhart transmitted again. On *Itasca's* bridge, George Thompson manned the ship's direction finder and monitored 500 kilocycles in case she sent a signal on that frequency. In the radio room, William Galten sent both voice and code on 3105 when Thomas O'Hare was not sending "A"s on 7500 kilocycles. The receiver that was set to listen on 3105 was plugged in to the loud speaker so that everyone in the room could listen. All the while, Chief Radioman Bellarts stood by, directing the effort.

At 7:30, Galten asked Earhart to "Please reply to our signals on key, please."[74] and listened in vain for a reply.

From 7:35 to 7:40 O'Hare sent "A"s on 7500.[75] Then the antenna was switched to Galten who sent more "A"s on 3105.[76] At about this time a third transmitter, this one

with low frequency capability and its own antenna, was fired up so that O'Hare could send code on 500 kilocycles at the same time Galten was transmitting on 3105.[77] As Bellarts recalled, "We have everything blasting on her. And it appeared to us that she just didn't – wasn't even trying to hear us."[78]

And then, suddenly, Earhart was back on again, very strong now. None of the radio logs assign a strength value to the transmission but later reports have it at Strength 5: "Very good, perfectly readable."[79] As Bellarts described it many years later:

> I actually did go outside and stand right outside the radio shack and started listening like that – you know, thinking well, I must hear a motor any second. Actually we had people out on deck. We thought she was going to be flying right down into our rigging the way – oh, man – she came in like a ton of bricks. I mean that.[80]

Galten's log records Earhart's message as, "KHAQQ calling *Itasca*. We must be on you but cannot see you. But gas is running low. Been unable to reach you by radio. We are flying at 1,000 feet."[81] The entry was logged at 7:42.

O'Hare logged, "Earhart on now. Says running out of gas. Only ½ hour left. Can't hear us at all." He then commented, "We hear her and are sending on 3105 and 500 same time constantly and listening for her frequently."[82] He had the time as 7:40.

This was real trouble. Earhart had apparently reached the place where she expected her destination to be, but could see neither the island nor the ship. To the men of *Itasca*, it was equally apparent that no airplane was visible or audible in the sky above and around them. There was no escaping the fact that the plane could no longer be considered to be en route to Howland. Amelia Earhart was lost. ◆

Notes

1–4 Leo Bellarts, transcript of interview, April 11, 1973, p. 36.
5 Bellarts, p. 13.
6 Bellarts, p. 2.
7 Earhart to Black, July 1, 1937.
8 *Itasca* to Fleet Air Base, July 1, 1937.
9 Fleet Air Base to Earhart, July 1, 1937.
10 Chater, letter to Griffin, July 25, 1937.
11 Radio log *Itasca*, 16:45, July 1, 1937.
12 Radio log *Itasca*, 17:50, July 1, 1937.
13 COMFRANDIV to *Itasca*, July 1, 1937.
14 *Itasca* deck log, July 1, 1937.
15 Carey to Associated Press, July 1, 1937.
16, 17 Earhart to Commanding Officer *USS Itasca*, June 30, 1937.
18 Chater.
19 Earhart to Commanding Officer *USS Itasca*, June 30, 1937.
20, 21 *Itasca* radio log, Position 2, July 1, 1937.
22 Chater.
23 Thompson, *Radio Transcripts – Earhart Flight*, July 19, 1937.
24 Howland Radio Log, 2200, July 2, 1937.
25 *Itasca* Radio Log, Position 1, 2151, July 2, 1937.
26 Telegram from U.S. Consul in Australia to State Dept., July 3, 1937.
27 *Itasca* Radio Log, Position 2, Raw version, 0236, July 2, 1937.
28 *Itasca* 0245-48.
29 Thompson p. 39.
30 Bellarts.
31 *Itasca* Radio Log, Position 2, 0345, July 2, 1937.
32 Earhart to Black, June 26, 1937.
33 COMFRANDIV to *Itasca*, June 26, 1937.
34 Earhart to Black, June 30, 1937.
35 COMFRANDIV to *Itasca*, June 26, 1937.
36 *Itasca* Radio Log, Position 2, 0345, July 2, 1937.
37, 38 Thompson p. 40.
39 Cooper, U.S. Army report "Expedition to the American Equatorial Island in connection with the Amelia Earhart flight," July 27, 1937.
40 Madrid International Telecommunication Convention, 1936.
41, 42 *Itasca* Radio Log, Position 1, 0358, July 2, 1937.
43, 44 *Itasca* Radio Log, Position 1, 0440, July 2, 1937.
45 *Itasca* Radio Log, Position 1, 0445-50, July 2, 1937.
46, 47 *Itasca* Radio Log, Position 2, Raw version, 0453, July 2, 1937.
48 *Itasca* Radio Log, Position 1, 0455, July 2, 1937.
49 *Itasca* Deck Log, July 2, 1937.
50, 51 *Itasca* Radio Log, Position 2, Raw version, 0614, July 2, 1937.
52 Governor of Samoa to Earhart, June 28, 1937.
53 Bellarts, p. 72.
54 Bellarts, p. 73.
55 Bellarts, p. 74.
56 *Itasca* Radio Log, Position 1, 0620, July 2, 1937.
57 Madrid International Telecommunication Convention, 1936.
58 Howland Radio Log, 0717, July 3, 1937.
59 *Itasca* Deck Log, July 2, 1937.
60 Thompson, p. 43.
61 *Itasca* Deck Log, July 2, 1937.
62 *Itasca* Radio Log, Position 2, raw log, 0645, July 2, 1937.
63 *Itasca* Radio Log, Position 2, raw log, 0646, July 2, 1937.
64 *Itasca* Radio Log, Position 1, 0642-45, July 2, 1937.
65 *Itasca* Radio Log, Position 1, 0647, July 2, 1937.
66 Bellarts, p. 76.
67, 68 Howland Radio Log, 0747, July 3, 1937.
69 Madrid International Telecommunication Convention, 1936.
70 *Itasca* Radio Log, Position 2, Raw Version, 07:15, July 2, 1937.
71 *Itasca* Radio Log, Position 2, Raw Version, 07:18, July 2, 1937.
72 *Itasca* Radio Log, Position 2, Raw Version, 07:18 and 07;25, July 2, 1937.
73 James C. Kamakaiwi, Daily Log for Howland Island, March 21 to July 18, 1937, July 2, 1937.
74 *Itasca* Radio Log, Position 2, Raw Version, 07:30, July 2, 1937.
75 *Itasca* Radio Log, Position 2, Raw Version, 07:35-40, July 2, 1937.
76 *Itasca* Radio Log, Position 2, Raw Version, 07:41, July 2, 1937.
77 *Itasca* Radio Log, Position 1, 07:40, July 2, 1937.
78 Bellarts, p. 81.
79 Madrid International Telecommunication Convention, 1936.
80 Bellarts, p. 24.
81 *Itasca* Radio Log, Position 2, Raw Version, 07:42, July 2, 1937.
82 *Itasca* Radio Log, Position 1, 07:40, July 2, 1937.