# The View from the Top

## *As LORAN towers come down around the world, one alum remembers them and their climbers fondly*

By CDR Carl Burkhart USCG (Ret.), '62

*Typical 625-ft. Loran-C tower (Kargabarun, Turkey)*

With the demise of the Loran system, it seems appropriate to acknowledge a relatively unsung group of Academy graduates who were intimately and very physically involved in one facet of the system—the tall antenna towers.

### *Aviators Aren't the Only Coasties in the Sky*

Since it was forty-four years ago, I can't remember my exact thoughts—but I'm pretty sure they were something like, "You want me to do what!?"

I was standing at the base of the 625-foot tower at the Nantucket Loran A/C Station. I was relieving Bob Wells ('58) as a staff civil engineer in the First District office, and Bob was taking a week to show me around the units I would be responsible for in the areas of facility planning, maintenance, and construction. The ink was still wet on my postgraduate degree in civil engineering, and I was eager to apply my new-found learning in the areas of concrete, steel, and sewage treatment (which is actually fairly interesting).

Bob had just informed me that one of my duties was to inspect the 625-ft. Loran-C tower and its guy systems. And by "inspect" he didn't mean by looking at it from ground level. A trip or two up the ladder to the very top would be in order during my tour in the district office.

Like nearly all Academy graduates, I had climbed the 150 feet to the top of *Eagle's* mainmast—once. But a trip up a ladder to a height 75 feet higher than the Washington Monument? More than once maybe? Sorry…this was not mentioned in any of the postgrad courses at the University of Illinois, and certainly not in the brochure for the Academy.

Eventually, however, after months of trying to avoid the subject I cracked open the bible—the Tower Manual (CG-358). I read—rather scanned—it from cover to cover, then bit the bullet and went on an inspection trip to Nantucket. The station scheduled off-air time, I swabo-ed a crew member as safety observer, I strapped on a heavy belt with a safety climbing device attached, and up I went.

After finally reaching the top, I squatted on the rest platform to catch my breath. Although only 25 years old, I was a smoker and not exactly in shape. When my heart calmed down, I experienced an exhilaration hitherto unknown to me. Ascending sixty-two stories without the help of an elevator had its rewards. At

*LORSTA Jan Mayen viewed from about 600 feet*

that height the summer breeze was much fresher, and the 360-degree vista of the island of Nantucket and Narragansett Bay was amazing. It was the view from an airplane, but without the noise and the fuselage. Tethered by a small line and surrounded by a railing of steel pipes, I actually felt a sense of security. It was the perfect place for Greta Garbo, who famously said, "I vant to be alone."

I was hooked.

## Civil Engineer Tower Climbers

I was not the first Academy graduate to scale a tall tower and I was far from the last. Those involved in station construction in the early 1960s and later expansions in the U.S., and the dozens of civil engineers who served in offices responsible for Loran-C and Omega stations over the decades, wound up climbing towers again and again in the far corners of the world. From that fateful day at Nantucket in 1966 to my retirement in 1982 I logged over three miles straight up on these towers—a feat readily matched, and in more than a few cases greatly exceeded, by my fellow civil engineers, both military and civilian.

My initial experience pales when compared to those of others who came before or after me. For example, immediately after graduating from post-graduate school John Milbrand ('66) found himself traveling from Kauai to Yap Island to Palau supervising major tower maintenance at Loran-A and -C stations in those remote Pacific locations—with zero training under his belt.

We civil-engineer-tower-climbers were an important element in the Loran and Omega programs. The clear goal of these programs was to keep the signal on-air to the maximum. This was certainly a function of the dedicated work of the electronics engineers and technicians, the crew responsible for power generation, and station crewmembers of all disciplines. It was our job to keep the towers standing.

## Our "Sticks"

Our towers were of varying heights, but generally rose 125 feet or 300 feet for Loran-A, 625 feet or 1350 feet for Loran-C [visualize the Empire State Building], and 1400 feet for Omega. At two Loran-C stations there were four-tower arrays, and two Omega stations utilized valley-span antennas. During the latter part of the last century, many 700-ft. towers were erected throughout the United States as Loran-C expanded in CONUS.

In every case there were many components in the antenna structure, and a good number of them were critical from a structural point of view. If a critical component failed, down came

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the tower or antenna array. Fortunately, there were redundancies and some fail-safe features, but it is a fact that over the years towers have collapsed without warning.

It was our job to periodically inspect these structural components—at times using instrumentation but mainly using the Mark One Eyeball at as close range as possible. It took me only one look at the pile of twisted steel that was once a 1350-foot tower at Angissoq, Greenland to help me take the job of tower inspection very, very seriously.

Unfortunately, there were failures leading to the collapse of some tall towers. Two 1350-ft. towers fell as a result of fatigue in a guy insulator component—a design flaw—something that no visual inspection could have foreseen. A 625-ft. tower in Turkey collapsed during a snowstorm, having experienced in a twelve-hour period an amount of heavy wet snow equal to an entire winter's snowfall for the region. Another 625-ft. tower on Jan Mayen island in the North Atlantic collapsed due to failures attributed to construction faults. There were some collapses in the early days of Loran-C (circa. 1962) attributable to design faults or construction problems.

But we often discovered problems during our inspections that could well have resulted in component failure or collapse. For example, while Geoff Potter ('59) was scaling the 1350-ft. tower in Cape Race, Newfoundland, he happened to notice that the large-diameter pin connecting the top of a guy to the tower was in the process of slipping out of its socket. The designers has used a relatively small cotter pin to keep the much larger pin in place—a serious design flaw that was soon remedied Coast-Guard-wide.

*Specialized construction equipment, LORSTA Tan My (Vietnam)*

## The Benefits

Many of the readers of this article are intimately familiar with the subject of Loran—not only because they were electronics or civil engineers, but because they had the pleasure of being assigned to command a station. They know that Loran duty gave one a rare opportunity to see a far corner of the world. Some of these 'corners of the world' can be described metaphorically as one of the nether parts of the human body. Other Loran stations were in near-paradise locations. The upside of having to climb tall towers for a living was the ability to visit these places and observe, and often participate in, the cultures of the various peoples of the world.

For example, one of us could be at tropical Yap Island experiencing a native dance complete with grass skirts, while on the other side of the world another could be in the company of an armed escort while leaving Jan Mayen island to guard against the danger of hungry polar bears. One of us might be sipping tea in Bangkok, while another was sipping Turkish coffee in Instanbul.

The advent of the Omega navigation system brought new responsibilities and opportunities for travel to places that the Coast Guard has rarely, if ever, gone before. We found ourselves in Japan, Australia, Argentina, Trinidad, Rio de Janeiro, North Dakota, and La Reunion, for example, working with 1400-ft. towers and valley-span antennas. Civil engineer Neal Herbert ('60) was assigned to the Navy as overall project officer for the turnover of all eight Omega stations to the Coast Guard.

Those of us who had the good fortune to be stationed in the Activities Europe office in London not only had a whole heck of a lot of towers to inspect and maintain, but we also had an opportunity to interact with some real characters and learn a lot about Scandinavian culture. Whether trekking through a glacial valley in Greenland with the Dane Aksel Mikkelsen, drinking Brennivin in Reykjavik with the Icelander Haraldur Sigurdsson, or sharing a kilo of shrimp in Bodø with the Norwegian Ole Hagen, it was great to have developed a camaraderie with these representatives of host nation agencies.

Then, of course, there was the Loran-C station on the island of Sylt in the North Sea. I heard from some colleagues that across the street from the station there was a nudist beach. Yet another opportunity for cultural development, I suppose. I don't recall looking in that direction while I was on the tower, supervising German painters and attempting to find phrases such as, "No, two coats of orange not just one" in my pocket dictionary.

## Innovators

We never received formal training for tower work in post-grad school, certainly not at CGA, but instead learned on the job. We were mentored by those who

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had gone before, we learned from the text and illustrations of the Tower Manual (which we ourselves wrote and improved on over the years), and we learned from hands-on experience and the inevitable dumb mistakes. We also employed civilian experts, both of the civil service and of private industry, to help us and to teach us by their good example.

Ted Holtzman ('57) put it this way: "The education we received at the Academy was so basic and so solid in the sciences, that when we were faced with the engineering challenges of tall towers many years later we were able to devise solutions that the industry itself had not thought of. The tower designers had not concerned themselves with future maintenance problems such as the galvanic action of dissimilar metals."

We innovated. Where once it was necessary to go off-air in order to put someone on a tower we devised safe methods of inspection, maintenance, and repair while the tower was "hot." We developed new methods of measuring tower alignment and twist, and new ways to measure guy tensions more accurately. For example: Neal Herbert was instrumental in developing the Autoplumb method of tower alignment measurement; Pete Hennings ('62) developed a more accurate method of measuring tower twist; the electronics engineer Pete Henry ('47) and I developed an improved device for eliminating the electromechanical deterioration of fiberglass insulator rods; and John Milbrand found himself at the Loran-C station at Sellia Marina (Italy) doing the unthinkable—changing out the tower's base insulator while remaining on-air.

Along with our electronics engineering compatriots we also innovated on a large scale. Geoff Potter was intimately involved in the design and fabrication of a pre-packaged, air-transportable Loran-C station (known as ATLS). This system was deployed to the station at Tan My in Vietnam, and to the isle of Lampedusa in the Mediterranean Sea following our ejection from Libya by Muammar al-Gaddafi.

The body of technical knowledge built by the early generation of tower climbers, such as those cited above, helped assure better quality in the new generation of 700-ft. towers that were used in the expansion of CONUS coverage.

## The Strange Stuff

We changed light bulbs. What's that, you say, about changing light bulbs? Yes, that was part of our duty—not only did we scale the heights but we also did it with a backpack full of light bulbs. Most bulbs, called obstruction lights, were the size of those in your bedside lamp. The larger bulbs—those that flash—were the size of small melons.

There were hazards in our job, but not the falling-off-of-the-tower kind. There were safety climbing devices on the ladders, and double tethers were conscientiously employed by us as we moved in and around the tower structures. A few of us felt the power of the Loran-C signal, however, as we approached too close to the base insulator or stuck our head above the top railing of a 1350-ft. tower in order to get a better view.

Lou Casale ('62) was about two-thirds of the way up the 1350-ft. tower at the Port Clarence station [north of Nome, Alaska] when an electrical storm approached. The guy insulators began to arc and Casale felt tingling in his body as his hair stood on end. He claims the speed record for tower descent. Also claiming the record, albeit on a smaller 625-ft. tower, is Bruce Good ('73) who was at the top of the tower in Hokkaido, Japan when it began to sway as a fairly large earthquake hit the area.

*Pete Hennings ('62) mounting an energized Loran-A tower, wearing a conductive suit*

Many of our duty assignments were in very desirable offices—Hawaii, Juneau, Naples, and London come to mind. But this also meant a good deal of travel away from home, since Loran stations were geographically widespread. Transportation logistics were often interesting, to say the least, and frequently involved several modes in the same trip. One might fly to a foreign airport, take a bus to a ferry terminal, get on another bus after departing the ferry, and finally be met by the station CO in his car. Sometimes weather delays, strikes, and breakdowns would prolong the journey. Many stations were located on remote islands such as Jan Mayen in the extreme North Atlantic, where tower inspection opportunities might be severely limited by weather conditions and the need to catch the last flight out.

As project officers for construction of Loran-C facilities we often had to

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meet the unusual logistics challenges of remote locations, as well as the special challenge of tall tower erection. The need for a large-radius antenna field that was relatively flat was of concern in site selection and preparation. Even when a tall tower was not involved, there were unusual issues. For example, in constructing the Loran monitor station in the Shetland Islands, Bob Wells was faced with the need to construct antennas upon a layer of peat 6-15 feet in depth—and to ensure that the site design provided access for the local farmer's sheep.

## War Zone

And of course there were very special factors involved with our stations in the Vietnam war zone. A chain of Loran-C stations was constructed in Southeast Asia during the Vietnam war, all but one of the four stations outside of combat areas. Construction project officer Bruce Beran ('57) at Tan My [35 miles south of the DMZ] met special challenges not covered in the manuals—like flying bullets and mortar attacks. The site posed certain engineering challenges—local "housing" was built on sticks—and the need for a relatively secure location was paramount. Deep 150-ft. pilings were required for the tower and guy foundations, a relatively rare technical requirement.

Bob Wells climbed the tower at Tan My more than once. He recalls that trying to keep his mind on business while observing the "show" of exploding bombs and shells in the distance was a bit unnerving.

Beran was relieved as project officer at Tan My by Lou Casale, who had some close calls in the Southeast Asia Section (SEASEC) area including evading the enemy during an aborted helo evacuation. At the Loran station on notorious Con Son island, Casale was forced to walk among venomous snakes in the antenna field while checking tower alignment with a transit.

*The author performing maintenance on an energized tower, LORSTA Upolo Point (Hawaii)*

The Coast Guard was tasked by the military authorities in Vietnam with keeping the signal on-air at all costs, so John Wallace ('61) discovered means of "hot" tower work years before they were perfected and documented in the Tower Manual. Wallace also got himself volunteered to change out light bulbs on three Voice of America towers in Vietnam, with hostile activity in the immediate area.

## Footnote

In developing ideas for this article I contacted several veteran tower climbers of my era. Their enthusiastic replies showed that we all have a special sense of accomplishment as well as a wealth of sea stories related to our experiences with the Loran and Omega systems. We were able to develop an in-house Coast Guard expertise in an area that was critical to the performance of a key Coast Guard mission, and was helpful in the subsequent expansion of U.S. coverage. And in the process we were able to see much of the civilized—and uncivilized—world, furthering our understanding of mankind in ways not realized by most Coast Guard officers.

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