

# A Lesson In Crypto For Two Radio Clubs With One Goal

## *Clubs Combine Forces To Spice Up Member Activity*

by Murray Green, K3BEQ, K3BEQ@arrl.net



---

*The National Cryptologic Museum is the National Security Agency's principal gateway to the public. It shares the nation's, as well as NSA's, cryptologic legacy and place in world history.*

---

located near the headquarters of the National Security Agency, Fort George G. Meade, Maryland, about 20 miles north of Washington D.C. Some 50 club members attended, including some who work at, or have retired from the agency. So sit back, make yourselves comfortable, and follow in the footprints of their tour through these photos. (Many thanks go to the National Cryptologic Museum for the photographs and accompanying captions.)

The National Cryptologic Museum is the National Security Agency's principal gateway to the public. It shares the nation's, as well as NSA's, cryptologic legacy and place in world histo-

Radio club meetings can sometimes be repetitious; the reading of the minutes, going over old and new business, complaints and, well, you know what I mean. There are times when you simply have to get out of the clubhouse and see how the other half of the world lives. And that is where a good Activities Chairperson is so important, someone who can spice up member activity. In the case I'm going to relate, the spice turned out to be something different and a little off the beaten track.

### **A Special Visit: The National Cryptologic Museum**

A distinct advantage to residing in the Washington D.C. metropolitan area is the many excellent museums and other areas of interest. No wonder the region is listed in the top 10 most visited U.S. tourist attractions. The area also has many varied amateur radio clubs, including full service, repeater-oriented, DX, contesting, you name it. Two of them, the Green Mountain Repeater Association and the D.C. Metropolitan Amateur Radio Club, decided to combine forces and tour one of the many museums, with the stipulation that it be partially communications oriented. The museum that was finally selected was not even in existence 12 years ago; its future exhibits were still classified.

But things change, and so it happened that the two clubs mutually agreed to visit the National Cryptologic Museum,



*Army cryptologists first went to the field during World War I. This site is a mock-up of the World War I Verdun intercept site in France, built by NSA craftsmen based on the two extant pictures of the original shack. Although signal intelligence was in its infancy, information was gained from direction finding, radio intercept, and decryption, and was used for tactical planning by the American Expeditionary Forces. Just as American combat troops in the "Great War" frequently had to fight with foreign equipment, their intercept activities also were conducted with foreign equipment; in this case, the radios are of French manufacture. (Courtesy National Cryptologic Museum)*

---



During the early 1900s, the Army operated from mobile as well as fixed installations. The museum displays a picture of a mobile U.S. direction finding truck, or “tractor” in the terminology of the time. The truck had a DF antenna, which was turned by hand from the inside. By measuring the angle of entry and the skip of a signal coming in and bouncing off the ionosphere,

an operator could pinpoint the distance the radio wave had traveled—rather advanced for 1918. (Courtesy National Cryptologic Museum)

This enciphering and deciphering device was acquired from West Virginia by NSA in the early 1980s. It was first thought to have been a model of the “Jefferson cipher wheel,” so called because Thomas Jefferson described a similar device in his writings. We believe it to be the oldest extant device in the world, but the connection with Jefferson is unproven. Such devices are known to have been described by writers as early as Francis Bacon in 1605 and may have been fairly common among the arcane “black chambers” of European governments. This cipher wheel was evidently for use with the French language, which was the world’s diplomatic language up through World War I. How it came to be in West Virginia is unknown. (Courtesy National Cryptologic Museum)



ry. Located adjacent to NSA Headquarters, Ft. George G. Meade, Maryland, the museum’s collection contains thousands of artifacts that collectively serve to sustain the history of the cryptologic profession. Here, visitors can catch a glimpse of some of the most dramatic moments in the history of American cryptology, the people who devoted their lives to cryptology and national defense, the machines and devices they developed, the techniques they used, and the places where they worked. For the visitor, some events in American and world history will take on a new meaning. For the cryptologic professional, it is an opportunity to absorb the heritage of the profession.

Originally designed to house artifacts from the agency and to give employees a place to reflect on past successes and failures, the museum quickly developed into a priceless collection of the nation’s cryptologic history. It opened to the public in December 1993 and quickly became an area highlight.

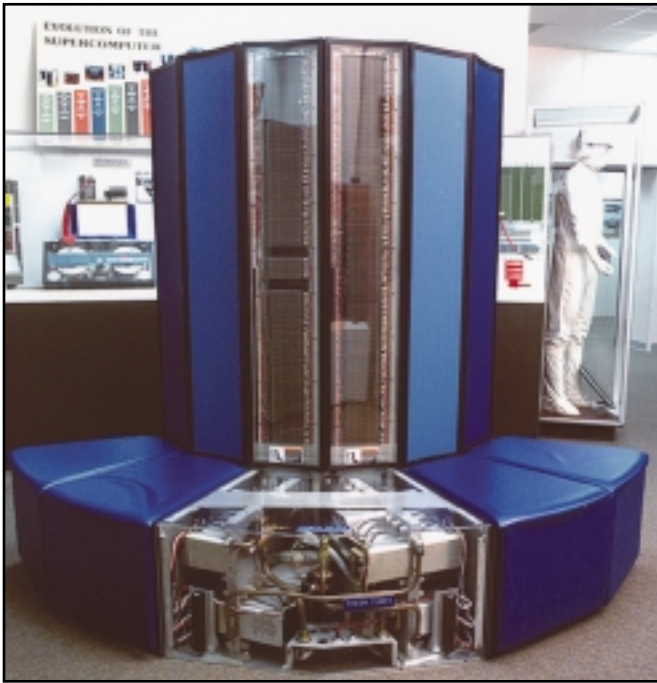
The first and only public museum specifically related to the intelligence community, it hosts approximately 50,000 visitors annually from all over the country and all over the world, giv-



Surrounded by complex machines, the exhibit on code talkers appears out of place, but is actually a monument to the most complex machine of all—the human mind. Lacking secure battlefield voice communications during the Great War, the Army employed Choctaws to encrypt voice communications, using their native language, itself encoded. The Army studied the program even before war was declared in 1941, and during World War II employed Comanches, Choctaws, Kiowas, Winnebagos, Seminoles, Navajos, Hopis, Cherokees, and others. The Marine Corps took the Army work and codified, expanded, refined, and perfected it into a true security discipline, using Navajos exclusively. In campaigns against the enemy on many fronts, the Native American Code Talkers never made a mistake in transmission nor were their codes ever broken. (Courtesy National Cryptologic Museum)



On August 4, 1945, Soviet school children gave a carving of the Great Seal of the United States to U.S. Ambassador Averill Harriman. It hung in the ambassador’s Moscow residential office until 1952 when the State Department discovered that it was “bugged.” The microphone hidden inside was passive and only activated when the Soviets wanted it to be. They shot radio waves from a van parked outside into the ambassador’s office and could then detect the changes of the microphone’s diaphragm inside the resonant cavity. When Soviets turned off the radio waves it was virtually impossible to detect the hidden “bug.” The Soviets were able to eavesdrop on the U.S. ambassador’s conversations for six years. The replica on display in the museum was molded from the original after it came to NSA for testing. The exhibit can be opened to reveal a copy of the microphone and the resonant cavity inside. (Courtesy National Cryptologic Museum)



ing them a peek into the secret world of code making and code breaking.

Here you see just a brief glimpse of some of the museum's exhibits. Hopefully it will serve as an incentive for other clubs and their activity chairpersons to take a close look at what facilities they have in their local areas. They may be surprised at the

On exhibit in the museum are two Cray supercomputers. The XMP-24 on display is the upgrade of the original XMP-22, which was the first supercomputer Cray ever delivered to a customer site. It was in operation from 1983 to 1993 and was arguably the most powerful computer in the world when it was delivered. It used serial processing to conduct 420 million operations per second. The second generation Cray, the YMP, replaced the older version in 1993. It had a 32-GB (32 billion bytes) memory capacity. In 1993 most personal computers held only 16 million bytes. The YMP used vector processing, a very powerful form of overlapping, parallel processing, to conduct 2.67 billion operations per second. The YMP was decommissioned and went on display at the museum in 2000. NSA, with its partners in industry, continues to be a leader in research and development of computer technologies, pioneering the frontiers of computer science and engineering. To house and develop these new systems, NSA has the world's largest supercomputing facility and the Special Processing Lab is located on ← its campus. (Courtesy National Cryptologic Museum)

many interesting places to visit that are free to the public. Indeed, according to the American Association of Museums, there are nearly 16,000 museums throughout the nation. Some 1,330 can be searched by state at <http://icom.museum/vlmp/usa.html>. Use Internet search engines to search for others. Give it a try. You won't be disappointed.

I'd also encourage club officers and activity chairpersons to read the excellent ARRL *Active Club Online Primer* that covers virtually every aspect of club organization and how to maintain member interest. It's a must-read and can be found at <http://www.arrl.org/FandES/field/club/cpw/cpw.html>. ■

*Some information in this article appeared in the November 2004 QST.*