

The Radios that Started and Ended World War II in the Pacific

An examination of the radios used during the attack on Pearl Harbor and the bombing of Hiroshima.

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One of the most iconic radio messages transmitted in modern history is “Tora, tora, tora,” sent from a Japanese bomber in the Hawaiian skies to the waiting aircraft carrier in the northern Pacific on the morning of December 7, 1941. It signaled the successful surprise attack on the American Pacific fleet in Pearl Harbor. President Roosevelt declared war against the Empire of Japan the following day.

On the morning of August 6, 1945, the *Enola Gay*, a B-29 bomber, transmitted a message from the skies over Hiroshima to the American base in Tinian in the south Pacific, announcing the successful dropping of the world’s first atomic bomb. Nine days later Japan surrendered, ending World War II.

I was born in Hiroshima a month after the Pearl Harbor attack. I was three and half years old and lived with my family 20 miles from ground zero on that day in 1945. Twelve years later I entered high school. The school building, located less than 2 miles from where the bomb was dropped, had been rebuilt. I got my first ham license in the same year, and moved to the US after college in 1966. For all these years, I have wondered about the radios used in those two historic missions.

American Military Surplus

I began my search for those radios in earnest in 2000, when I retired. Finding information on wartime American radio equipment and acquiring radios of the same models that were aboard the *Enola Gay* turned out to be relatively easy. Information on US military radios manufactured during World War II has long been declassified,

including schematics, manuals, and repair instructions. The *Enola Gay* itself was fully restored, including the original radios, and is on permanent display in the Smithsonian National Air and Space Museum’s Steven F. Udvar-Hazy Center in Virginia (see Figure 1).¹

Moreover, most of the military radios that were used in battlefields and in the air and then repatriated to US soil after the war’s end (as well as those still stored in warehouses) were sold in the postwar open market as military surplus. Many American hams from the late 1940s through the 1960s got their start by acquiring inexpensive surplus gear and converting it for use on the

ham bands. The advent of the online market in the 1990s also made it easy to acquire radios from that era. Even today, over 70 years after the war ended, there is still an active market for World War II surplus American military radios.

Rare Japanese Radios

Researching and searching for Japanese military radios of the same era turned out to be a much more trying proposition. General Douglas MacArthur’s Allied Forces occupation in Japan, as well as the Japanese government, were slow and reluctant in declassifying the wartime information. Also, under MacArthur’s orders, all Japanese war materials — including any communication

equipment and their associated manuals and schematics — were destroyed in the postwar occupation period, with the exception of a small number of radios permitted for use by police and government agencies to augment the landline telephone system, which had been heavily damaged by US bombings during the war. Thus, the Japanese military radios that survived and that can be seen today are those small exceptions — those captured in the battleground and studied by the American military, or brought back by American GIs as souvenirs. There was a US government program that encouraged GIs to rip off and bring home or mail in the labels or plates attached to any captured radios, for intelligence-gathering purposes. The plates often listed model names, serial numbers, manufacturers, and locations and years of manufacture.

There are only two sizable World War II Japanese military



Figure 1 — The author and the *Enola Gay*.

radio collections in Japan that I am aware of, both of which are in private museums and their collections are not very extensive, by usual museum standards.² Quite unexpectedly, in 2012, I found and was able to acquire a transmitter that was the same as that on board the command aircraft (a three-seater bomber) that attacked Pearl Harbor and transmitted the “Tora, tora, tora” message. I was not able to find out how exactly this particular transmitter ended up in someone’s garage in California. The only thing the owner — who sold it to me over the phone — knew was that it was a Japanese military radio, and he had acquired it from a Silent Key many years before. I learned about the model name, manufacturing year, and so on only after I brought it home.

The “Tora, Tora, Tora” Transmitter

The transmitter on board the three-seater Japanese bomber was Model 96 “Ku” Mark 3 Version 2 (see Figure 2) and was manufactured by Nippon Denki Co. The specs are as follows:

Range: 1300 km (800 miles)

Frequencies: 300 – 500 kHz;
5000 – 10,000 kHz

Mode: CW only

Power: 150 W

Frequency Control: Crystal and VFO

Final Power Tube: UV816D

The transmitter-receiver pair on board was designed for air-to-air, air-to-ground, and air-to-ship application. There is no record that these radios were ever used on the ground. The transmitter was powered by a dynamotor to supply high plate voltage from the aircraft’s 12 V dc supply, the standard voltage for Japanese military aircrafts at the time. This particular model, manufactured in 1941, is a revised model of the transmitter originally produced in 1936 (see Figure 3). The original model did not have the LF band.

The Enola Gay Transmitter

In general, the radios used in the American military were superior in performance and features to those used by the Japanese military in World War II. In fact, some of



Figure 2 — A front view of the Model 96 “Ku.”

the radios manufactured for the Japanese military were copies of American radios, such as National receivers.

The transmitter on board the *Enola Gay*, model ART-13 (see Figure 4), was designed in 1940, manufactured by Collins, and had the following specs:

Range: 1500 miles

Frequencies: 2000 kHz – 18,100 kHz (LF band module option)

Modes: CW, Modulated CW, AM

Power: 100 W

Frequency Control: VFO (Crystal control unit option)

Final Power Tube: 813

The ART-13 was paired with the BC-348 receiver and was powered by a dynamotor to supply the high plate voltage from the aircraft’s 28 V dc source, the typical voltage used in American aircraft. The transmitter has 10 frequency pre-programmable VFOs, which are extremely stable. No other transmitters of the era had this feature.

Radio Messages from Pearl Harbor

Hundreds of popular Hollywood movies, books, and articles about Pearl Harbor depict a scene where Commander Michio Fuchida broke radio silence by yelling “Tora, tora, tora” into his microphone to commence the attack. This narrative, however, is not historically accurate. Hams would immediately know from the specs above that the radio was not capable of transmitting voice messages using the AM or SSB mode, but only codes in CW. What

really happened, radio-wise, is this: at 7:49 AM on December 7, 1941, Fuchida ordered his radioman, Norinobu Mizuki, to send in the Japanese Morse code, “To, to, to” (pronounced “toh, toh, toh”) — the signal to begin the attack. Four minutes later, at 7:53 AM, he ordered Mizuki to send “Tora, tora, tora,” the coded message indicating to the waiting flagship *Akagi* 320 miles away that the surprise attack was successful.

The Japanese Morse code is not an alphabetic code system in the sense that each code represents a vowel or consonant sound as in English, but is, technically speaking, a syllabogram system. Thus, “to” (written in a single Japanese kana symbol と) represents one syllable and has its own code “...”, and “tora, tora, tora” (とら, とら, とら) is sent in six Japanese CW codes: “... ..”.

Code Sent from Hiroshima

Code Sent from Hiroshima

Like the Pearl Harbor attack, the Hiroshima bombing has been the subject of hundreds of movies, books, and articles, often repeating the same inaccuracies for the sake of dramatization. One common image is that of the *Enola Gay* sending a message immediately after the bombing: “Mission successful, we are coming home.” It is widely believed that this message was sent to the waiting team in Washington, and then relayed to President Truman in Potsdam, Germany, where he had been meeting with Stalin and Churchill to discuss postwar arrangements.

What really happened was considerably more complex and nuanced. The B-29 bomber was normally equipped with one ART-13 long-distance “liaison” transmitter, designed to communicate up to 1500 miles. But the *Enola Gay* was outfitted with two ART-13s for this particular mission. One was used to transmit a steady Modulated CW tone when the final bomb run began. When the tone ceased, it meant that the bomb was released. That occurred at 8:15 AM, August 6, 1945 Japan time — 45 seconds after the bomb run had begun.

The first message — after the successful bombing was ascertained by the crew on board — was transmitted 14 minutes later to the Tinian base in CW, by the radioman,

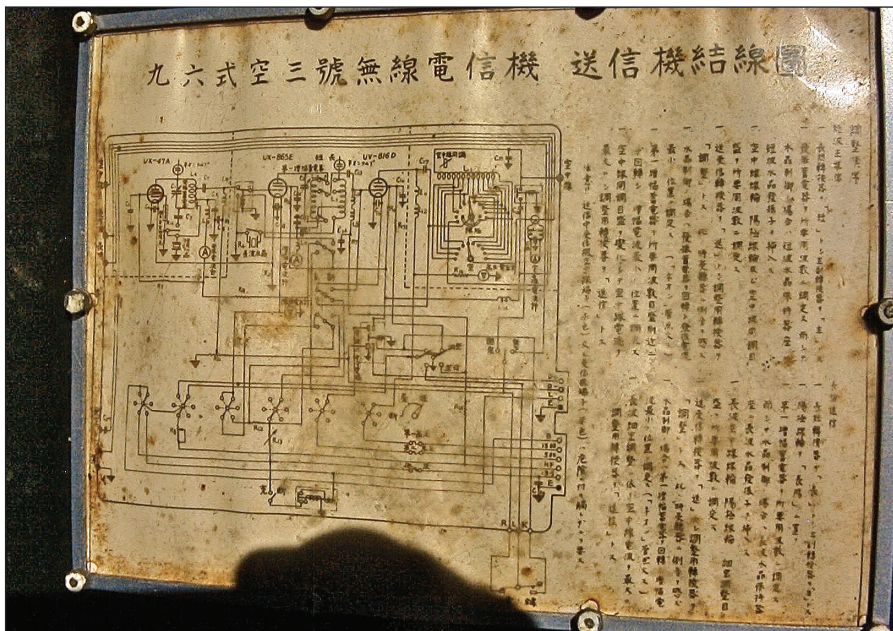


Figure 3 — The Model 96 schematic.

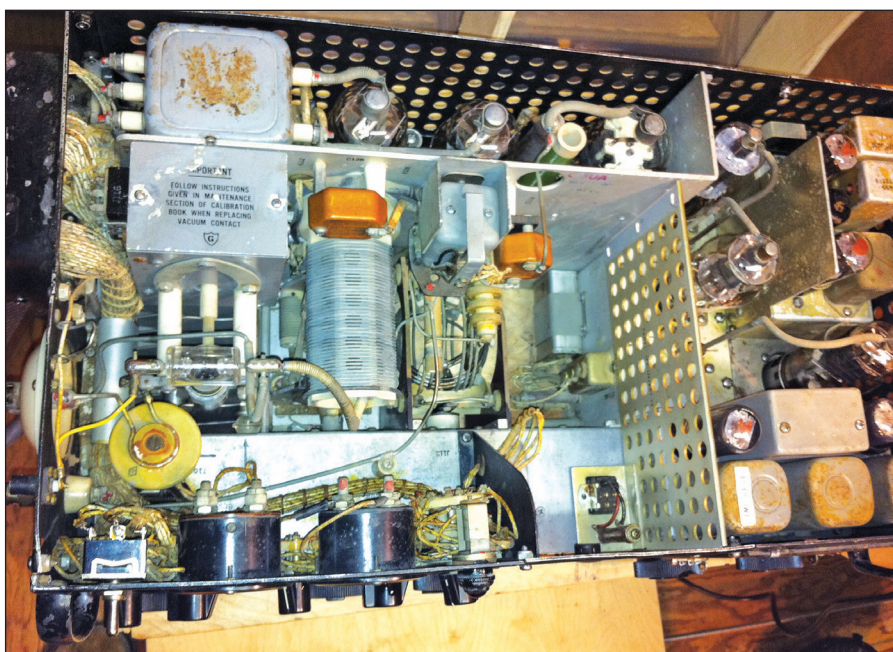


Figure 4 — Top view of the ART-13.

Richard Nelson, by order of Captain William S. Parsons, the atomic bomb expert specially assigned to this mission by the Manhattan Project. The only crew members on board the *Enola Gay* who had known the true and entire nature of the mission all along were Parsons and Captain Paul Tibbets. The transmitted message was directed to Brigadier General Thomas F. Farrell, waiting in Tinian. Farrell was a personal

representative of General Leslie R. Groves, the Director of the Manhattan Project, who was waiting in Washington.

The actual CW codes sent were "A1269" — decoded, it read "Clearcut, successful in all respects; visible effects greater than Trinity; Hiroshima primary target; conditions normal in airplane following delivery, proceeding to regular base." "Trinity" was

the codename of the first successful test explosion of an atomic bomb in Alamogordo, New Mexico, in July 1945. The coded message table had been devised only 2 days before the Hiroshima mission, strictly between Farrell and Parsons. No one else, including the radioman Nelson and Captain Tibbets, knew what each letter or number represented. President Truman was already crossing the Atlantic on his way back from Potsdam by the time he actually received the detailed message from Washington 16 hours later, but the announcement of the successful bombing had already been made to the world, due to a previous arrangement

Notes

¹In 2011, I met Mike Hanz, KC4TOS, who helped restore the *Enola Gay* radios. From him I learned of the authenticity of the restored radios, down to the use of original wires of World War II vintage. An article on my own *Enola Gay* radio restoration project appeared in the August 2011 issue of *Electric Radio*.

²These collections can be found at the Yokohama World War II Japanese Military Radio Museum (www.yokohamaradiomuseum.com/index.html) and the Hiroshima Wartime Communications Technology Museum (<http://minouta17.web.fc2.com/>).

All photos are courtesy of the author.

Hiroki Kato, AH6CY, was born in Hiroshima, and was first licensed as JA4AAO when he was in high school. After college, he came to the US to pursue graduate studies. Dr Kato taught political science and linguistics at several universities, including the University of Hawaii, Harvard, and Northwestern. He got his current call sign when he lived in Honolulu. He later worked for early Silicon Valley startups, retiring in 2000. He enjoys QRP portable and QRO remote operations, having been on the air from many states and countries. When at home in California, he collects and restores boatanchor radios, focusing on World War II-era radios. He can be reached via ah6cy@arri.net.

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