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Robert F. Heytow Memorial Radio Club

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"A Network of Tinkerers"

Monograph Overview

Philip Cala-Lazar, K9PL

In his 24-page *Technology and Culture* (July 2000) monograph, "A Network of Tinkerers: The Advent of the Radio and Television Industry in Japan," Dr. Yuko Takahashi, professor of electrical engineering at Tokyo University of Agriculture and Technology offers an overview of pre- and post-WWII Japan's consumer electronics industry with particular emphasis on television. The author attributes the genesis of the Japanese radio and television industries to "tinkerers" rather than "collaboration between big business and government industries."

"Tokyo Hoso Kyoku"

Both before and after WWII the development of radio and television in Japan largely fell to amateurs. In this, the Japanese experience paralleled the American electronics industry experience, albeit with stifled progress through three decades. Japan's stagnation was in large part due to restrictions placed on broadcast and amateur radio operations by an authoritarian government regime. Such governments seek to insulate their citizens from world news and differing opinions formulated beyond their borders.

On the eve of WWII, 1940, with a population of 73,000,000, there were only 300 officially licensed hams in Japan. During that same period, the U.S. with a population of 132,000,000, could boast of approximately 60,000 licensed amateur radio operators.

Prewar Radio

Taroh Yagi, J1DO, director Kwanto Division of J.A.R.L. and chief editor, *J.A.R.L. News*, noted in the October 1932 issue of *QST* some of the restrictions placed on Japanese operators. Japan's 125 licensees were limited to "10 watts output," observed strictly prescribed operating hours, i.e., several two-hour periods per day and were prohibited from passing traffic. (See: *K9YA Telegraph*, April 2011, "Who Did You Meet Today?")

Historically "…the electronics industry began with radio, a field founded by amateurs and tinkerers." Dr. Takahashi states early radio listeners in Japan (as in the United States) built their own receivers and often went on to become the pioneers of the fledgling radio manufacturing and broadcasting industries. These pioneers were the "unofficial" segment of the "radio and electronics industry." On the other hand, "…large scale producers and assemblers of equipment, government, and public institutions constituted its 'official' sector."

In 1925, Japan's first radio broadcast emanated from *Tokyo Hoso Kyoku* (Tokyo Broadcasting Station Radio). Later designated NHK, it remained Japan's sole broadcaster until 1951. TRF radios were the prewar receivers of choice thanks to their simplicity, price and relative insensitivity to shortwave DX broadcasts and any propaganda therein. These inexpensive radios were analogous to contemporary Germany's *Volksempfanger* or "Peoples' Radio."

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Philip Cala-Lazar, K9PL
Editor

Mike Dinelli, N9BOR
Layout

Dick Sylvan, W9CBT
Staff Cartoonist

Rod Newkirk, VA3ZBB (SK)
Contributing Editor
2004 - 2012

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Alan Turing, *The Imitation Game* and Us

John Swartz, WA9AQN

Benedict Cumberbatch as Alan Turing

The movie *The Imitation Game* was released in late 2014. Its accompanying media blitz stirred attendance and helped put the film into a number of Oscar nomination categories. Benedict Cumberbatch was cast as ace Bletchley Park codebreaker Alan Turing, the math genius now credited as being one of the fathers of modern digital computing. Having seen Cumberbatch's portrayal of Sherlock Holmes, I was anxious to see how he would play the part. I had read two biographies and a number of other works dealing with British efforts to crack Nazi codes, so I had already developed a sense of the Turing character. The trailers for the film, however, projected something a bit different and I was prepared to be disappointed. Nevertheless, the movie was definitely one I wanted to see.

The opening scenes of the film are punctuated with a quick burst of Morse at about 23-25 words per minute. I had a sneaking suspicion that I was the only one in the audience who could read it. (OK, I confess . . . my wife and I rented it and watched the film at home!). The code was cleanly sent, but made no sense; it could only have been German military traffic encrypted on an Enigma machine. I was hooked from the start.

The screenplay is an adaptation of one of the two biographies I had read and was good enough to win an Oscar. The story builds on several themes whose major components are: Turing's genius, his contributions to mathematical and computer science, to cryptography during the war, and his very unusual personality. In particular, the film highlights his social awkwardness (which some have even called autism or related conditions), and his sexuality.

Considerable artistic liberty has been taken in order to assemble a highly dramatic, thought-provoking movie. Several critics have examined whether the film accurately represents Turing's personality and character, his role in "Ultra" (the code name used for the effort to solve Enigma, other codes and how the intelligence gathered was used without divulging its source), and whether the film distorts the historical record. You can find those reviews on the Internet. Taking into account the reviews, the Turing biographies, and some of the literature dealing with Bletchley Park, Ultra, and the intelligence war, you'll see that the movie isn't a definitive treatment of any of them. Nevertheless, it is a very emotionally enticing introduction to those subjects.

The film does a fine job portraying the secrecy, intrigue, determination, ingenuity, focus and talent which the British brought to bear in the war. The complete story of Turing's role remained secret for 50 years, as British intelligence knew that knowledge of the extent of its activities during the war might be useful to the wrong people during the postwar decades. That secrecy contributed in part to the impression that the war was won by overwhelming Allied might. In truth, Allied might was mightily assisted by cunning, talent, brains and focus. The full story only started to emerge around 1970. Fortunately, the movie has attracted even more attention to the contributions from Bletchley Park. There could easily have been two separate movies, one focusing on the Allied solution to Enigma and the birth of modern computing, and the other about the impact of treating homosexuals as criminals. Telling them together, however, makes for a dramatic story which magnifies the tragedy of Turing's postwar years.

> *"Bletchley Park, Ultra, and the intelligence war"*

The movie proceeds with a series of flashbacks from a 1951 police interrogation. Following a neighbor's report of a disturbance at Turing's residence, the police were investigating a possible burglary. Turing tells them nothing was taken, but one policeman becomes suspicious of the eccentric math professor. Flashbacks then take us on a voyage through Turing's life and develop the themes that emerge and shape the film.

So, you may ask, how is the film related to amateur radio? There are only a few scenes in which Morse is heard or interceptors are copying code. Those scenes do remind us oldies of our struggles to learn the code.

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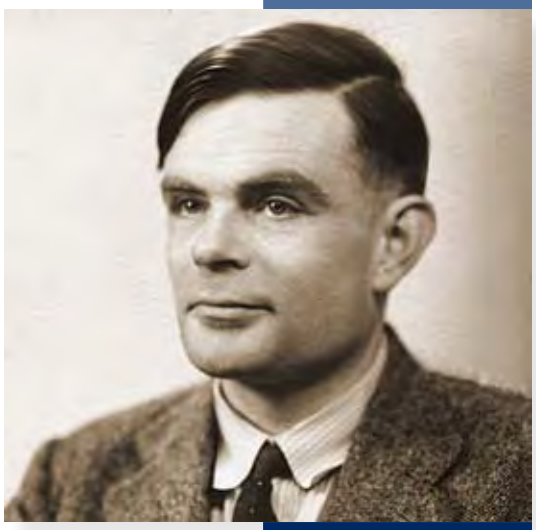
telegraph@k9ya.org

But anyone who is now active on HF can identify with the skills the interceptors needed to dig weak signals out of the QRM and QRN. It was their work product that became the raw material for the codebreakers at Bletchley Park. In one scene, an interceptor is copying random code. Although only a few letters are audible, the interceptor's copy is correct. The wartime listeners worked long shifts, searching for signals and copying the encrypted Enigma messages. They had no skimmers or modern DSP filtering, and errors were potentially fatal to the decryption process. However, the movie's main focus isn't the interceptors, and there is little hint that without the extensive networks of interceptors, the codebreakers would not have had the wealth of raw material for their work.

Another scene shows an Enigma machine and a submarine. The *Kriegsmarine* used the 4-rotor variation of the Enigma for submarine communications, which the film makers got right. The machine which Turing builds in the movie is an accurate recreation of one of the "bombes" used at Bletchley Park. The film's bombe may very well be the one that is on display and in operation today at BP. It had been recreated by a dedicated team of volunteers who worked on it for years. The bombe was an electromechanical device used to find the settings of the Enigma wheels for that day's traffic; it was not designed to read the text of the message. To complicate matters, not only did the Germans change the settings of the Enigma machines every day, but the basic settings for any given day were not the same for the army, air force or navy, nor were they uniform within each of the services. After months of failures, Cumberbatch's Turing eventually realizes that the time required to resolve each day's settings made it impossible to keep up with the traffic. In a "eureka" moment, he recognizes that there were patterns of traffic which had predictable content that might be used to resolve the settings. Thus, he brought human intelligence back into the equation to make up for a shortcoming of the machine. The use of "traffic analysis" and "cribs," as they are called, provide hints about predictable message format and content (for example, one operator ending all his messages with an encrypted, "*Heil Hitler*"). This revelation shortens the time required for the bombe to give a possible solution. With the machine reset, Turing and his associates take the output of the bombe, race to another building at Bletchley Park, and use the result to set the wheels on a real Enigma machine. They are then able to read the German text. Then, and quite dramatically, Turing quashes the desire of his team members to try to act on what they have discovered. The movie accurately shows the real role of the bombe, and very cleverly introduces the viewer to the use of cribs and traffic analysis, as well as the need for secrecy in use of the decrypted intelligence.

"Kriegsmarine"

One key line in the movie is repeated at three distinct times during Turing's life: "Sometimes it is the people no one imagines anything of who do the things that no one can imagine." This theme is brought to life by the juxtaposition of Turing's genius and his eccentricity, his brilliance and his awkward social behavior, the centrality of secrecy in the work at Bletchley Park, Turing's sexuality, and the gender politics of the time. And, that theme really is the source of the movie's power. However, it is also a theme we can bring to bear in our daily lives: shouldn't we look for the positive in everyone, regardless of the existence of such drama in their lives? In the world of amateur radio, we enjoy the companionship and reap the rewards of a very wide range of personalities, abilities and interests. You can hear it when you tune across the bands (unless it is a contest weekend, of course . . . sorry, we won't go there . . .), or, you can see it at any hamfest.



Alan Turing

There is no evidence that Alan Turing ever had an amateur radio license. But, in the true spirit of amateur radio, he pushes the edges of science and technology for solutions. At the end of the movie, Turing is shown in his room surrounded by his homemade electronic computer. His contraption bears no resemblance to what we know as a computer today, but the room sure does look like a hamshack! As for Cumberbatch, I was very impressed by his portrayal of Turing. The trailers were assembled to entice an audience; the full performance was closer to what I had imagined from my reading. To have made a complete and accurate documentary of either Turing or of the history of codebreaking in World War II would have taken many more hours of film. And, neither would likely have introduced these subjects to as wide an audience as was drawn to *The Imitation Game.*

The movie gets a "589" from this QTH. ■

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Back to My Roots, Redux

Paul W. Ross, W3FIS

As I said in my previous article, I decided to take up CW seriously again after many years. At times, this has been a painful process. There seem to be lots of people out there to whom QRS is a great mystery!

I found that to obtain any measure of success, I needed to go "cold turkey." I am not a heroin addict, nor do I play one on television.... To make this all work, I found it necessary to:

1. Disconnect the microphone on the rig and put it on a high shelf in the closet out of the way of temptation. SSB rag chews may be fine, but CW ones are a really different and highly rewarding experience.
2. Disconnect the digital interface for things like PSK-31 and Olivia, and move the computer to another desk in the shack (actually, I use a spare bedroom as shack/office, and get evicted when company comes).
3. Dig out the vintage J-38 key from my youth that I had picked up for the remarkable price of $1.00 more years ago than you would care to know. Some steel wool, gloss black spray paint (for the cast base), a few passes with a fine "point" file on the contacts, some automobile polish, and it is good to go for another 50 years! Set the contact spacing with a folded business card.
4. At the suggestion of the XYL, who was trained as a medical secretary, I went to the corner drug store and got a stenographer's pad, with a spiral binding and two narrow columns. This makes copying code by "stick" much easier. Who knew....
5. To avoid messing up the garage door opener, or causing the china cabinet touch switch to flicker (the XYL does not care for this), I cut power back to 10 watts. Not quite at QRP levels, but close enough. If I really want to go QRP, I'll break out one of the various MFJ Cub transceivers I own.

"QRS is a great mystery!"

Of course, all still does not go that well. I was quickly introduced to a nasty case of glass arm, known to all old-time telegraph operators. The arm and wrist quickly tire after a period of brass pounding. Other than risk a trip to my orthopedist for a cure for carpal tunnel syndrome, some research turned up the European method of handling a telegraph key.

Instead of placing the key well back from the edge of the desk and resting the whole arm on the desk while keying, place the key closer to the *edge* of the desk, letting the arm instead of the wrist do the work. This is completely counter-intuitive, but is much easier on the wrist and arm! Google is your friend!

Of course, now enamored of straight keys, I concluded that I really needed another one. A discussion with the XYL about needing another key devolved into a discussion about "how many pairs of shoes...?" This may not have been the best strategy, but with a birthday coming up, an order was placed for another key. Some years ago, I built a nice paddle from a kit from American Morse Products. This was the path of least resistance for a new and interesting key, not having access to a decent machine shop. The paddle came out so nicely that I opted for one of their straight key kits. It is really nice and works very well, but there is still a fond place in my heart for the J-38, of course.

A word to the wise—be *really* careful about going on the air with a paddle and keyer (my main rig, an Alinco DX-SR8) has a nice built-in keyer. You can easily fill the air with a massive string of dits or utterly mess up a letter or two. Frankly, mastering a straight key has been much the better line of attack. The paddle and keyer come later when the glass fist catches up with me!

With 10 watts, homeowner's restrictions (no outside antennas—mine is in the attic), and a bit of patience, I have easily worked stations up and down the east coast without any problem. I find that answering a CQ from a station that is sending slowly is a safe

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Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

Rose

Part 4

Scott B. Laughlin, N7NET

"Do you want to go to lunch with us, Artie?"

"Us? What do you mean by us?"

"Rose is a girl I met. I'm taking Rose and her family to May's for lunch."

"This will give May something new to talk about," said Artie, adding, "thanks, but I just ate. I'll stay here and run the booth for you while you're gone."

"That's great."

Soon he spotted Rose in the crowd headed his way. He waited for them and then the four of them walked to May's, which was also located on the square

"So what do you do when you aren't at the Lord's Acre Day Celebration?" her father asked after they were seated at a table.

"I run Henry's Automotive."

"Henry died a couple years back. I used to take my pickup there. Did you buy the place?" her father asked.

"Henry was my father. I worked in the shop through high school and until I was drafted."

"Army?"

"Yes. Signal Corps."

"So you're not a combat veteran?" her father asked.

"Nope, I was not a combat veteran. No decoration here. I never saw any action. I was a radio operator."

"Oh?" her father said, a judgmental tone creeping into his voice.

"Virgil, how rude," Rose's mother scolded.

"You could say that, I guess. I heard the war from afar."

"How so?" he asked, placing his elbows on the table and leaning forward.

"I was a radio operator in Iceland. We, my fellow compatriots and I, relayed weather reports to aircraft being ferried to the European theater. Much of the radio traffic was probably coded messages. But we didn't try to decipher them, even if we could have. But you are right. I never saw any action."

"Virgil is my name. This is my wife, Anne. And of course you already know Rose," her father said.

Charlie was relieved to see Virgil lose some of his edge. The stern appearance seemed embedded in his face, but part of that was because of his bushy eyebrows and handlebar mustache.

"Was it cold in Iceland?" asked Rose after a lengthy pause in the conversation.

"Very, and windy. And it was not uncommon to experience winds exceeding one hundred miles per hour. But our quarters and our workplace were both comfortable, heated by natural steam coming from the ground."

"Really? But when you were outside, how could you walk in wind like that?" asked Rose.

"Virgil, how rude"

"We couldn't. We had ropes along the pathway we used when the snow or sleet was too severe to see through. Sometimes had to get down on all fours and crawl," Charlie explained.

May had been busy with other customers, but now she was approaching with menus and four glasses of water.

"Charlie. How is the message sending going?"

"Good. Better than I'd hoped for," he replied, then made the introductions around the table, Virgil, Anne and Rose.

May knew them, of course.

"So how long have you been out of the army?" Anne asked."Three weeks tomorrow. It's been a busy time with getting my dad's shop going and preparing for this celebration."

"So you are you getting customers at the shop?" asked Anne.

"Oh yes. I learned the mechanic trade from my dad while I was still in high school. We worked in the shop together. So I had my own following."

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www.k9ya.org

telegraph@k9ya.org

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Postwar Radio

Contributing to what would become the postwar radio boom, the U.S. occupation government sought to liberalize the political climate while lifting the prewar ban on the reception of foreign broadcasts and encouraging radio set production. All, as Supreme Commander for the Allied Powers, General Douglas MacArthur saw it, to advance the Japanese nation's democratization and as a bulwark against the spread of communism in Asia.

TVK-II

With the postwar opening of commercial broadcasting in 1951, superheterodyne radios were introduced to fully cover the new Japanese broadcast bands. Prewar radios were strictly limited to the two NHK frequencies. In the U.S., superheterodyne radios were available from the early 1930s. The Japanese government's rigid broadcasting limits delayed the more modern design's nationwide introduction by two decades.

NHK's research laboratory, engineers' associations, government ministries and local governments "encouraged the hobby of radio" while organizing "training courses in radio construction and repair."

"Akihibara Electric Town"

In Japan, mirroring the U.S. experience, WWII surplus formed the basis for a resurgent amateur radio, expedited electronics experimentation and provided the inexpensive gear that, modified, equipped many ham radio shacks.

Akihibara

The author traces the roots of Tokyo's famed "Akihibara Electric Town" to the postwar glut of "decommissioned" military electronics gear from both legal and black market sources. Osaka's Nipponbashi Electric Town served the same role in that city.

War's end also saw the introduction of kits and improved parts availability. Among firms offering radio receiver kits was Toyota, who between October 1947 and January 1949, sold 1,440 radio kits complete with 7,400 government-rationed vacuum tubes. The kits were manufactured at Toyota's Kariya-minami plant.

Eventually, Japanese hobbyists could purchase kits for electro-mechanical and, later, purely electronic television receivers.

After 1950, the Korean War stimulated the war-decimated and now burgeoning Japanese electronics industry with repairs to U.S. military electronics gear. In addition, it offered "Japanese engineers an opportunity to learn the latest electronics technology."

In Japan (and the U.S.) demobilized military personnel and civilians swelled the postwar ranks of technicians and radio operators. The number of Japanese postwar tinkerers could have been greater still, had pre-war Japan been more ham radio friendly. The FCC's Part 97.1's trained cadre of radio operators manned the wartime ranks of Signal Corps and Navy sparks operators who, postwar, manned the ranks of a surging amateur radio service.

"After the Japanese defeat, the promotion of science and technology for the reconstruction of Japan became a national obsession." In this regard we recall the impact *Sputnik I* had on America's science education syllabus and the American psyche.

Radio Magazines

Paralleling the American example set by Hugo Gernsback's magazines cum catalogs, beginning with *Modern Electrics* in 1908, postwar Japan published "...magazines [that] also served as components distributors: radio magazines set up mail-order services through which tinkerers were able to buy components and kits." To these publications was attributed "The postwar radio-building boom...[t]hey encouraged boys to begin experimenting with radios, taught readers how to build and repair receivers, and explained new technology." It was claimed, "that almost every Japanese boy tried to construct a radio in postwar Japan." These magazines also sponsored "short training courses."

Television

Japan's first television broadcast in 1953 was followed by a growing demand for television receivers. The high cost of those early sets created a market for home-brewed and kit-built receivers. Those kit producers set the stage for the major manufacturers who succeeded them.

From the tinkerers who built their own televisions from kits or fully homebrewed, came many of the skilled technicians and corporate executives in Japan's highly-regarded electronics industry. Those hobbyists,

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

thanks to their intimate knowledge of the product, when employed by large electronics manufacturers, arrived with valuable assets including high expectations for "quality and service." The tinkerers included Susumu Satoshi, president of NF Corp.; Satoshi Shimada, developer of one of the earliest transistor televisions at Sony; and Takeshi Hidai, engineer and executive officer at Denki Onkyo, later merged with Murata.

In 1950 it was estimated a TV receiver would be priced at nearly "five hundred thousand yen." The Japanese yen was then pegged at 360 to the U.S. dollar, thus $1,389 ($13,469.67 in 2015 U.S. dollars, http://www.usinflationcalculator.com).

By 1953-1954 a "home television receiver with a seventeen-inch picture tube" produced by a major Japanese manufacturer could be purchased for ¥200,000 ($556 or $4,866.71 in 2015). At the time, new hire, university degreed, employees received an average monthly salary of ¥10,000 ($28 or $245.09 in 2015). At that price to salary ratio, many advanced hobbyists chose to build their own receivers.

To serve that cadre of skilled hobbyists the *Amachus Terebijon Kenyukai* (Japan Amateur Television Research Group) was founded in 1950. The JAT "organized contests for handmade receivers and conducted field experiments in distant reception." JAT's president was Koichi Kasahara, J3DD, "an officer of Tokyo Tsushin Kogyo," later renamed Sony Corporation. While still a university student, Kasahara experimented with television from 1925 as JFMT and succeeded in imaging a Mutt & Jeff cartoon drawing.

"Amachus Terebijon Kenyukai"

Television kits ranged from craftsman level to a Heathkit-like level "where the tuner and intermediate frequency amplifier had been wired and adjusted." The TVK-II, introduced in 1952, fell into the latter category. Equipped with a round, seven-inch, picture tube it cost ¥50,000 ($139 or $1,347.94 in 2015), roughly half the price of an pre-assembled set."

The TVK in TVK-II, was *Terebijon Buhin Kenkyukai* (Television Components Association)—established in 1952 by "eight component manufacturers." TVK published "five standard circuit diagrams for home televisions, TVK-II to TVK-VI." At the apex of their popularity, "nearly forty small companies entered the television kit market." Those 40 companies produced approximately "one hundred thousand...kits."

Kits were priced 50% cheaper than assembled sets for a number of reasons including taxation. Kits were not taxed until "1 May 1959 [when] the commodity taxation was revised." Kits with picture tubes of 14 inches or smaller were taxed at 20% and larger sizes at 30%.

In the early 1960s with televisions assuming "appliance" class ubiquity with increasing economies of scale, prices fell, making kits far less economically attractive. By 1963, "the majority of kit manufacturers had halted production...."

Around that same period, the early 1960s, a number of component manufacturers, seeing their market share drop, reinvented themselves by "assembling high fidelity stereo equipment, communications equipment for amateur wireless (ham radio), and measuring instruments...." Their names, familiar today, included Pioneer, Sansui and Trio (Kenwood). What TV kit builders lost, amateur radio operators and audiophiles gained.

Conclusions

Dr. Takahashi concludes:

This culture of radio and television tinkering was different in Japan than in postwar America. While a significant culture of radio tinkering existed in America, it did not extend into the television area. Television kits were not produced in America on the same scale as in Japan.

Radio and television flourished in postwar Japan partly because of the loss of World War II and the poverty of the Japanese people in the postwar era. Paradoxically, the poverty of occupation-era Japan created the traditions that produced an outstanding and competitive electronics components industry and television receiver industry in Japan in the 1960s.

For additional coverage of U.S. amateur radio in the immediate postwar period see: *K9YA Telegraph*: "A Place of One's Own," December 2005; "Cold War Tales," February 2007; "The Way We Were," July 2013.

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telegraph@k9ya.org

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"I'm curious, about this radio thing. Evidently you had the radio before you were drafted, yet radio and auto mechanics seem so far apart from each other," said Anne.

"They are. After Mom died Dad didn't have a lot of time to spend with me. So he helped me join the Cub Scouts. One thing led to another. Eventually there was an opportunity to earn a merit badge by learning Morse code. My friend, Artie, and I–when we were ten years old—learned the code together. The Cub Scouts used code oscillators to produce a tone. Of course, the two of us, a couple of kids, we didn't have oscillators. I'd read how the navy used lights to signal other ships during radio silence. So we used pieces of a broken mirror, and played war games, flashing coded messages to each other. It was all just for fun until Artie flashed a message from three blocks away about an old lady who had fallen in the street. I was able to call for help on the phone.

I guess Pete, the fellow at the radio repair shop, heard about our good deed. He invited us to his ham station in the back room of his shop. It wasn't long before both Artie and I earned our Class B license. The rest of it is history, as the saying goes."

He could see by the way Rose's eyes were glazed over that she was not interested in radio talk.

"Are you out of school?" Charlie asked her.

"I graduate next spring."

"Then off to college?"

"I think so. I'd like to be a teacher."

"What would you like to teach?" he asked between bites.

She finished chewing her last bite before she responded. "High school," she began, "I'm most interested in geography."

"Ah, geography. I suppose the geography ties closely with geopolitics. That should be very interesting. In my radio experience, not in the army, but in ham radio, I've talked to dozens of countries. I can show you cards, QSL cards confirming my contacts from most of these countries. Some of them are pretty interesting."

"Talked?" asked Rose.

"Well, in Morse code, of course. My fist does the talking, so to speak, no pun intended."

"So they all spoke English?"

"No, not all of them. But with Morse we hams have a means of working around the language barrier with Q-signals. Most radio operators the world over knows enough of them to hold a brief conversation. QTH followed by the name of his city and country tells me where he lives and the same for him. If I send QTH Butler Missouri USA, he knows where I live.

"Oh my," he said, interrupting himself. I need to get back to the radio booth." ■

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bet. If you send too fast, they will think you can receive that as well. It reminds me of when I went into a store in San Antonio, Texas. It was clear that the store owner was Mexican. So, stupid me, I said "hello" in Spanish. My accent must have been fine, and I was treated to a "machine gun" conversation in Spanish. Do not do that.... On the air, such behavior leads to no end of "AGN PLS," and other minor embarrassments!

Will I go back to SSB voice or digital modes? Most likely, but with time, my skill at CW is steadily improving. Maybe I can talk the XYL into a Christmas present of the replica *Titanic* key, or even a Vail key (Vail did all the mechanical work for Samuel F. B. Morse). ■

Ham Lingo

DICK SYLVAN, W9CBT

"BARE FOOT"

Robert F. Heytow Memorial Radio Club

www.k9ya.org

telegraph@k9ya.org