

# CAARA NEWS



Cape Ann Amateur Radio Association  
Gloucester, Massachusetts  
NOVEMBER 2022 EDITION



## PRESIDENT'S COLUMN

by Brandon- NQ1W

Work is now underway at the clubhouse to prepare for our upgraded education space. Renovations should begin in the next month!

Big thanks to Jon K1TP, Bill W1WMM, Dave N1CDL, and others who have been working feverishly to sort through so much of the stuff that radio clubs like ours accumulate from donation and SK estate work. We try to find a home for everything that comes our way, but for every cherry Collins transceiver we take in, we usually also collect five or six sterilite tubs of someone's mystery cable and junk drawers. Great job. Can't thank you guys enough for smoothing the way to our big project.

Also, thank you Bill and Jon for taking care of ordering the food for the last members meeting. The members always appreciate a meal at the meeting!

Let me end by reminding members to keep CAARA in mind for donations and for gift memberships. We're anticipating a big bump in energy costs to heat and keep things running during this winter. CAARA also has some major capital improvements planned in the next year in addition to our operating costs, and we need your support to help make our dreams for the clubhouse happen. Maybe even more than almost any other time in our history, CAARA needs your support. Please consider donating along with your membership to ensure we can keep improvements coming at CAARA!

Thanks for your continued support of CAARA and happy Fall! 73

Brandon NQ1F



## THE EMCOMM MINUTE

By Dean- KB1PGH

So when your operating HF portable there's a lesson to be learned. We had planned a HF portable session up at Hospital Hill in Rockport on Saturday, October 15th. So I went up there



a bit early to check to see if no one was there and I set up my HF station. So just before 10:30 a couple of people walked up to me and told me that they are having a block party for 60 people at 1 PM and they have a permit as well. So I packed up my station and left. Unbelievable, even in mid October it is busy up there. So if you are planning to operate HF portable up there or at any public place I would recommend contacting your local city or town first to make sure no one has the place reserved. There are a lot of people on the planet now and there's not a lot of room left. So I emailed the Rockport Selectmen to see if we could use the space on the following Saturday and I never heard back from them so it was a fail.

This reminds me of the CAARA Field Day at the old Fuller School fired a few years back when when we were operating and a man came up to us all aggravated because had said that he had permission to use the field for a baseball game and that we were not supposed to be there (even though we had written permission).

He said that he was going to call the police to get us off. Came to find out he didn't have permission but still used the ball field anyway. So just make sure you have permission to use any sort of public space. It's getting crowded out there.

Moving on. You have to hand it to the Internet, They sure do know how to advertise the right products to the right people. Since I bought some Anderson Powerpole stuff online I started noticing ads for "Solder Sticks" everywhere. Of course they showed how the product works and they make it seem so easy. Ok fine, they got

**CAARA Newsletter**  
**Cape Ann Amateur Radio Association**  
**6 Stanwood Street**  
**Gloucester, MA 01930**

CAARA Newsletter is a monthly publication of the Cape Ann Amateur Radio Association (CAARA).

It is the policy of the editor to publish all material submitted by the membership provided such material is in good taste, relevant to amateur radio and of interest to CAARA members, and space is available. Material is accepted on a first come, first serve basis. Articles and other materials may be submitted by internet to Jon at [jpcrockport@gmail.com](mailto:jpcrockport@gmail.com) . If possible, material should be in Word format. Material may also be submitted as hard copy to Jon-K1TP or any Club Officer.

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Jon Cunningham- K1TP Editor  
Dean Burgess- KB1PGH Reporter

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**Welcome to CAARA:**

CAARA, an ARRL affiliated club, operates the 2 meter W1GLO repeater on 145.130 MHz with antennas located on the ATT cell tower in the Blackburn Industrial Complex in Gloucester Massachusetts. It has an average effective radius of 60 miles, and serves Eastern Massachusetts, Cape Cod, Rhode Island, Southern New Hampshire, and maritime mobile stations.

CAARA also operates the W1GLO repeater on 224.900 located at the CAARA clubhouse.

The 443.700 repeater is now on the ATT cell tower in the Blackburn Industrial Complex with greatly enhanced performance running in fusion mode and linked to 10 other repeaters in the New England area.

The Association is one of the few amateur radioclubs that has its own clubhouse. Located at 6 S tanwood Street in Gloucester, with a variety of HF stations with beam, vertical, or G5RV antennas.

Amateur radio exams are held on REQUEST at the CAARA clubhouse. Anyone who is considering a new license or an upgrade, is welcome to test with us. Currently pre-registration is necessary. Contact the head of our VE team Bill Poulin- WZ1L if you have any questions about monthly testing.

Monthly member meetings are held on the second Saturday of each month at noon except for July and August.

Each Sunday evening at 9:00 PM, the club operates a 2 meter fm net on 145.130. This is an open and informal net which disseminates club news and prepares operators for emergency communications work. All are invited to check into the net as club membership is not a requirement.

The club is open most Tuesday's from 5- 8PM for CAARA members and interested parties to stop by and socialize, as well as use the extensive collection of ham radio gear.

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me. So I decided to buy a box of them. Now of course I look on Amazon and they have they have the knock off versions of "Solder Sticks" for a bit cheaper so I bought a small box of them to see of they really work. As you can see in the photo the name is "Haisstronica" solder seal wire connectors .

The whole purpose of these is that instead of using a soldering gun to solder two wires together you can use this all in one connector which has a ring of solder enclosed in a special shrink wrap. The whole idea is that you insert the wire ends inside and then use a heat gun to heat shrink the special wrapping and melt the solder at the same time around the wire ends and it is supposed to be water proof.

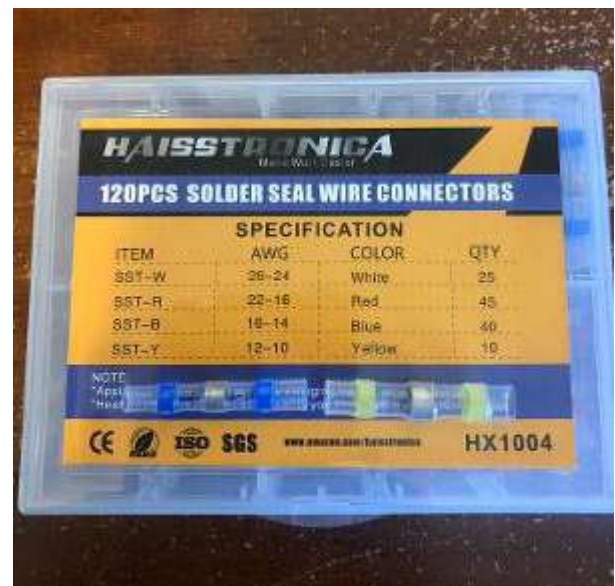
So I thought I would experiment to see if it works as advertised. As you can see on the box itself it contains connectors that will fit from 10 gauge wire up to 26 gauge wire. I took two out so you can see what they look like .You got the hard ring of solder in the middle along with the colored rings on either side of it that are supposed to melt to make a waterproof seal. The way to make them work is to wave a heat gun on it slowly and it is supposed to melt and shrink around the wire.

So lets see what happens. So as you can see in the first photo I have the wire cut and installed inside the solder stick and you can see the result in the second photo. The first time I tried it I melted right through the stick with too much heat form the heat gun.

On the second try as you can see I got it close. If you buy these I would first say that your going to have to experiment with a few before finding the right heat "Sweet Spot" instead of getting too close to the heat gun. Most of the solder in the middle melted on my second try. I did not want to go any further without melting it again. I tried to pull the connection apart and it would not move so that was good. I would recommend that you give these guys a try. It's definitely another alternative to regular solder. I would not say it was better though.

See you next month,

**Dean**





## Ham radio operator Jim Bradley of Watertown had a big heart

Few have heard the tale of Watertown patriot Jim Monroe Bradley, a man born with a birth defect that kept him from serving in the military, who aided his country during World War II using his powerful ham radio so that families could hear the voices of their loved ones — soldiers, sailors, Marines and airmen — who were convalescing in hospitals overseas.

“He was born with a bad foot and walked with a limp and had a weak heart, but he had a radio so strong that it sometimes interfered with WSM Radio,” said Bradley’s daughter, Betty Edwards, who recently donated her father’s ham radio receiver to the Wilson County Veterans Museum.

“He always had a knack for that kind of thing,” she said of her father’s talent with anything electrical, especially wireless transmission. “He was a really smart man. When he was 5 or 6, he repaired his family’s crystal radio after it broke. He could do just about anything. He built his own equipment. He probably got into ham radio in the 1930s. He built a room for it off the back porch to keep the kids out.”

Bradley was born in Liberty in 1912 and grew up in Watertown. He married Lillie Wooden on Jan. 24, 1933, and made his living as an electrician from his radio repair and appliance shop upstairs in the Pioneer Building on the Watertown square.

Betty was born in 1947 and was nine months old when her father died, so she holds no memories of her dad. The stories were passed down by her mother and sister, Arah Bradley Preston, who was nine years older. Today, Betty lives in Watertown directly across the street from where her childhood home once stood, where her father operated his ham radio.

At some time during WWII, the Federal Communications Commission came to the Bradley residence to inspect Jim’s transmissions because it occasionally knocked WSM Radio, home of the “Grand Ole Opry,” off the air. They stayed a couple days and after checking things out allowed him to continue his hobby.

“He ordered the parts and put the radio together himself,” said Betty. “His radio was so powerful that I understand it was the only one that could go overseas in the U.S. at the time.”

In fact, Bradley was able to transmit and receive to and from the European and Pacific theaters of combat.

On the American home front, families received telegrams from the military alerting them that their husbands or sons had been injured. The messages shared what military hospital they were in but did not divulge details of their injuries.

Bradley wanted to help the families of the wounded soldiers.

“He put word out on the ham radio to these families that he could reach anywhere there was fighting overseas, and if they wanted to, they could come to his house,” recalled Edwards. “He mainly heard from these families by letters. He would locate the wounded soldier first. He would get the actual patient on the



radio, but he had to go through others and sometimes it took several days to reach the patient, mostly hours late at night. He would stay up all hours of the night patching people through.”

Edwards believes there were well over a hundred families that came to their Watertown home, mainly from across the Southeast.

“Most of them would stay with us for two or three days and some came in campers. I know one couple that came down from Ohio, a man named Henry Hubbell Key and his wife, Clara, came down, and their son, Henry Hubbell Key Jr., was missing in action. Later I met the soldier’s wife, and she told me they came to Tennessee, and my dad was the first one to tell his parents that their son was still alive,” said Edwards.

“I don’t know that they talked to him but they found out he was alive. I don’t know if he was in the hospital or still in the prison camp. Most of the soldiers would have been recuperating in hospitals. He could go anywhere overseas with his ham radio, to all of Europe, the Philippines and in the Pacific.”

In the meantime, Bradley’s wife, Lillie, and mother-in-law, Dora, would make coffee and serve meals for their visitors as they waited. Lillie also taught Morse Code to those who wanted to operate their own ham radio so they could get their licenses.

Edwards said that her father built a 30-to-40-foot metal tower to support his antenna in the backyard, but he was not satisfied with it. There was a 68-foot water tower on higher ground behind the old Watertown High School, and he asked the city fathers for permission to put his antenna on top of it, and they refused.

“My dad often climbed up there and fixed the tank when it overflowed. Sometimes the water would run to the square. After they denied him putting his antenna up there, he told them, ‘Well, next time the tank overflows I’ll hold your coat while you fix it.’ Then they said, ‘OK, put your antenna on it.’ ”

Because Betty’s father died young when she was an infant, she had no recollection of his voice as a tot, but at the age of 7 or 8, she heard him speak.

“There was a man named Lavell Jackson from Guntersville, Alabama, who had heard my dad on his radio. He was 19 years old. He ended up owning Guntersville Broadcasting and two radiostations. He called my father one time and recorded their conversation and cut a record and sent it to my dad. We kept it all these years, and last year, after making a copy, I sent it to his son, Kerry,” said Edwards.

The voice of Jim Bradley, the man who touched many military families’ lives with his generous heart, was stilled in 1947 when he died at the age of 35.

“He got the flu and had a touch of pneumonia and a weak heart. They took him to the old Martha Gaston Hospital in Lebanon (the building still stands on South College Street and is known as Cedarcroft Home) and I think he died the next morning. The death certificate said he died from possible pneumonia and an enlarged heart,” said Edwards.

What compelled Bradley’s only living child to give what remained of his ham radio to the Wilson County Veterans Museum?

“The only piece of his equipment my mother kept was the receiver. It still works as far as I know,” said Edwards. “My husband, James, and I donated it because it was my dad, and I thought he deserved a little bit of recognition for what he did.”

# Invalid Ramp

by Curtis- AA3JE



When we moved to New Hampshire, it was into an old house that had been “added onto” about two owners back. This meant that there were two steps between the “old house” and the “new” house. These drew the attention of “SHE WHO MUST BE OBEYED”.

“THOSE ARE GOING TO BE TROUBLE,” she said.

“The dogs seem to be having no trouble,” I replied.

“BETTER GET A RAMP, WE MIGHT NEED ONE AS THE DOGS GET OLDER.”

So, I went to the Internet, found the pet shop in town, and drove over.

“Dog Ramp? We only do small animals. Want a hamster? Gerbil? Mealworms?”

Declining the offer of a great price on pet worms, I looked again, and after trips to Wall Mart, Home Depot, Lowes, and a kennel ten miles away, came up with no ramps. There were several on Amazon, so I ordered two, a large one and a small one.

Only buy items online which have dimensions. I found that the small one was hopeless, suitable for getting a miniature poodle up into their dog bed and the large one had other problems. It was 12 inches wide, wiggled and flexed, and nothing, not treats, not threats, not plaintive begging would make either dog have anything to do with it. Attempts to “Coax” the dogs ended in growls, both from the dogs and “SHE”.

This led to a trip to HOME STUFF, where I bought lumber, and after many false starts built a split-level ramp with traction tape.

“RIP IT OUT.”

“Why?”

“I CAN’T GET UP IT, HOW DO YOU EXPECT THE DOGS TO DO IT?”

I ripped it out but stored the pieces under the porch. I kept the landing, with a railing, which seemed satisfactory. But time marched on, and three years later the Labrador’s hind end got weaker and weaker. One day, after a loud “THUMP” announced his latest failure to manage the steps, I was taken to task, again.

“WHERE IS THE RAMP?”

Wisely, I kept silent and went for more lumber.

“I WANT IT AS LONG AS POSSIBLE!”

I got ten-footers. Wisely, I cut one, and laid it in position.

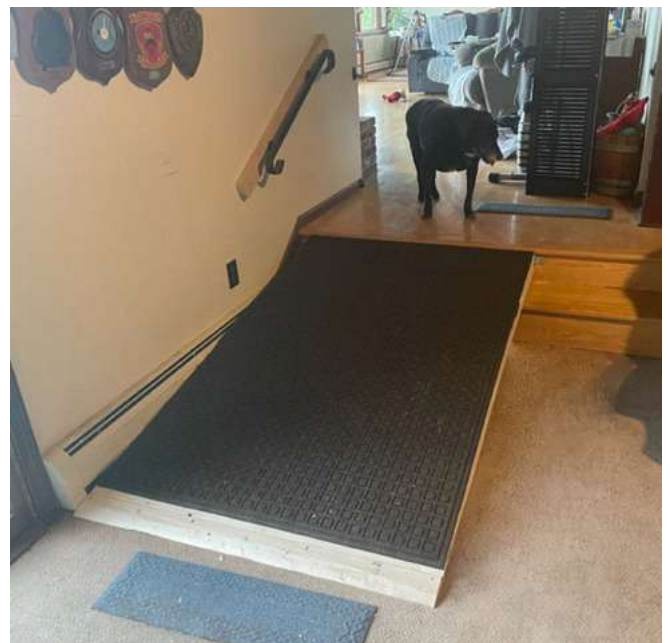
“THAT’S TOO LONG!”

So, a foot at time, I trimmed it until SHE was satisfied. Ten, nine, eight, seven, six.....

“THAT’S GOOD!”

I also made it four feet wide, so you HAD to use it. It took several trips to find the decking lumber at a reasonable price, but eventually I had a four rail, 4 by six-foot ramp. Six screws per rail by 14 rails = 84 screws. Took all day.

The dog would have nothing to do with it.



“HE NEEDS TRACTION. IT’S TOO SLIPPERY!  
CUT HIS NAILS.”

The only time I tried to give Max a manicure had been traumatic for both of us.

“GET A RUG!”

Back to Home Stuff, where I found a 4 by 6 foot traction mat, which seemed suitable.

“THAT IS THE UGLIEST THING I HAVE EVER SEEN. I WANTED NICE CARPET.”

“Let’s just see if it works.”

Max, the Labrador, who runs up and down the hills with abandon, sniffed the ramp with skepticism. I finally tempted him with treats, and he bolted down the ramp at top speed.

“THAT WON’T WORK.”

“He needs to practice.”

“SO DO I.”

Some hints to home carpenters.

Wide, shallow gradient, traction surface.

Expect criticism, Press on regardless.

## **FCC Seeks Electronic Engineers for Honors Program**

The Federal Communications Commission (FCC) announced this week that it is opening a new window for applications under its Honors Engineer Program. The one-year developmental program may lead to a term or permanent appointment. The Commission is accepting applications from recent graduates with an engineering degree and current students graduating in December 2022.

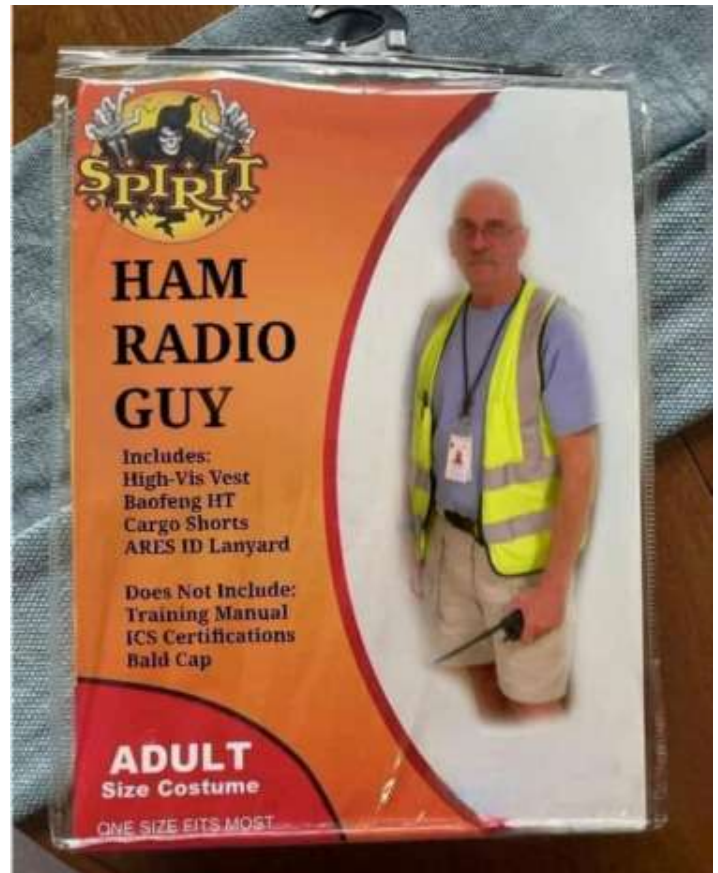
Among the duties included in the job description is training to perform “propagation analysis of terrestrial, satellite and/or airborne systems or evaluating the emission characteristics of various transmitters to

validate the co-existence with neighboring systems. Projects may also involve various computer software engineering and scientific applications.”

## **Registration is now open for Nashua Area Radio Society's Fall 2022 Ham Bootcamp**

The online event is scheduled for Saturday, November 5, 2022, from 10:00 AM - 6:00 PM EDT. There is no charge to attend the Ham Bootcamp which entails a variety of informative presentations and activities related to amateur radio, and is geared toward new operators of any license class that wish to learn more about getting on the air. Additionally, Ham Bootcamp allows those thinking of becoming hams to see what the hobby is all about.

The sessions usually have 100 - 400 attendees and over the past several years, more than 800 have attended. More information is available at the Nashua Area Radio Society's website. The Nashua Area Radio Society of New Hampshire is an ARRL Special Service Club.



Halloween Outfit....



# Neighbors

By Curtis- AA3JE

We used to live in Rockport. Nice town. Nosy neighbors who have a tendency to call the cops. I had been using a loop antenna run around the eaves, which worked, but was limited to 50 watts. Any more and it set off the CO2 detector.



“WARNING! WARNING! DANGER DETECTED! LEAVE THE HOUSE IMMEDIATELY!”

The second time I was trying to make a contact and I set the thing off, I received a complaint from a woman in her bathrobe and slippers.

“GET A NEW ANTENNA.”

I set up a multi-band fan out the back to the trees.

“NO WIRES IN THE TREES! GET OUT YOUR WALLET AND BUY ONE! A NICE ONE!”

At the next Hamfest I bought a nice box containing an all band vertical. Expensive vertical. Very tall fancy vertical.

It needed to be assembled. I pulled the car out of the garage and set up two sawhorses.

Two carefully measured sections later, I ran out of room. I opened the back window and stuck the end out.

Two more sections later I ran out of room again, so I opened the garage door.

I was finishing the last section when I heard a strange tapping.

“TAP TAP TAP”

I looked up. There at the kitchen window was “SHE WHO MUST BE OBEYED”, shaking her head.

I looked at the antenna, the back yard, the three surrounding houses, and surrendered. I got \$50 for the thing.

PSK 31. Work the world with 20 watts. Worked great. Made contacts all over with a simple loop.

We moved. In rural New Hampshire you can put up any kind of stick if it can survive the wind.

Working on it. Small problem with lightning here.

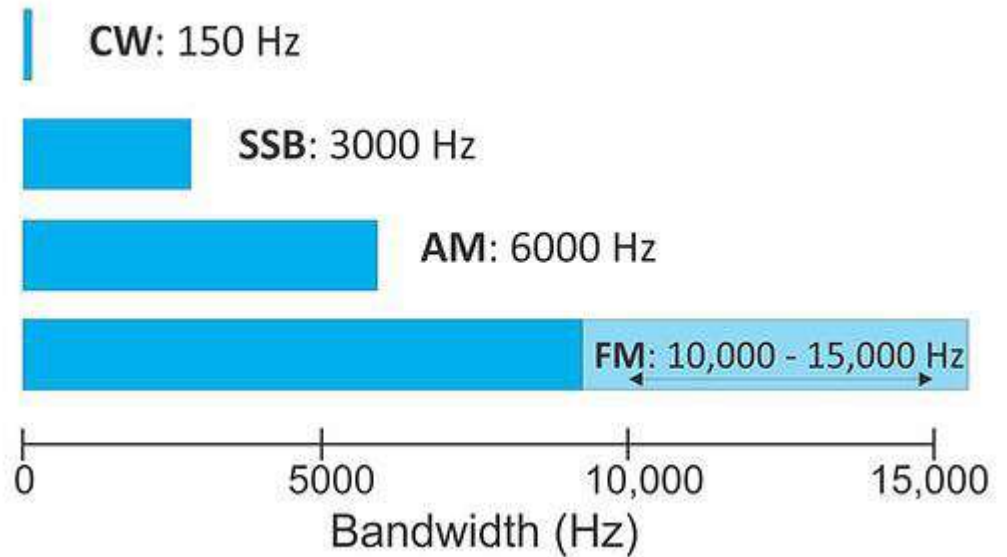




## Understanding Single Sideband (SSB)

A new Technician Class operator is likely to get started in ham radio with VHF and UHF phone operations using FM simplex channels and repeaters. The channelized world of VHF/UHF FM offers relative simplicity of operations and is a great way to get on the air immediately upon earning the Technician Class license. However, after mastering repeaters and gaining comfort with on-air FM phone QSOs, the next step for many hams is the more challenging domain of single sideband (SSB) phone operations.

Single sideband phone ops offer a broader range of radio contact opportunities, including long distance and international communications. Generally, SSB signals tend to propagate greater distances and exhibit more graceful degradation over distance than FM signals. Single sideband phone may be used on the VHF and UHF bands available to the Technician Class licensee, on the 10-meter band phone segment available to Technicians (28.3 to 28.5 MHz), and on



all HF phone sub-bands available to higher license classes. Single sideband is the predominant phone mode used for over-the-horizon skip propagation via the ionosphere. This article takes a closer look at the basics of SSB phone mode for better understanding of its complexities and operating nuances relative to FM channelized ops.

What is SSB? Single sideband is a special form of amplitude modulation (AM). What's so 'special' about it? Besides just encoding voice information with variations in signal amplitude, or power, SSB consumes a little less than half the bandwidth of a full "double band" AM signal. Let's unfold that last statement for the uninitiated new ham.

First, some bandwidth basics: A radio signal is comprised of a range of transmitted frequencies. When an operator tunes up a specific frequency on a transceiver, that displayed frequency value is the carrier frequency. The carrier may be thought of as a reference position for a small, contiguous band of spectrum (frequency range) that will all be transmitted simultaneously when the push-to-talk button is depressed and some voice audio is provided to the microphone. So, a transmitter does not emit only that singular tuned carrier frequency, but rather it emits an entire little band of frequencies near the carrier value that is used to encode the information of all the various audio frequencies of a voice. The extent of this little transmitted band of signals will vary with different types of modulation, or modes, and we refer to the extent or total range of frequencies emitted as the signal's bandwidth, in units of hertz.

The AM signal is about 6 kHz wide, and if we examine it in more detail we will find that it is actually comprised of two bands, one on each side of the carrier frequency, and they are 'mirror imaged' redundant bands or "sidebands." That is, a complete voice signal is carried by each of the two sidebands comprising the AM signal. Additionally, the AM signal includes transmission of the carrier frequency itself. While this redundant double band AM signal provides robust and high quality audio, it consumes a relatively wide

band of spectrum. As the name implies, single sideband mode utilizes only one of the two AM sidebands and also suppresses the carrier frequency in transmission.

So, the SSB signal is just under one-half the bandwidth of the double sideband conventional AM signal. The narrower bandwidth of SSB has a couple of important implications: 1) The SSB signal consumes less of the available spectrum within an amateur band, thereby allowing more signals simultaneously on the band without interference; and 2) The power of a transmission is more densely applied in the narrower band, providing a higher average effective power across the transmitted band, and thereby giving the SSB signal more 'punch' than a comparably powered FM or AM signal in which the power is spread across a much broader range of frequencies.

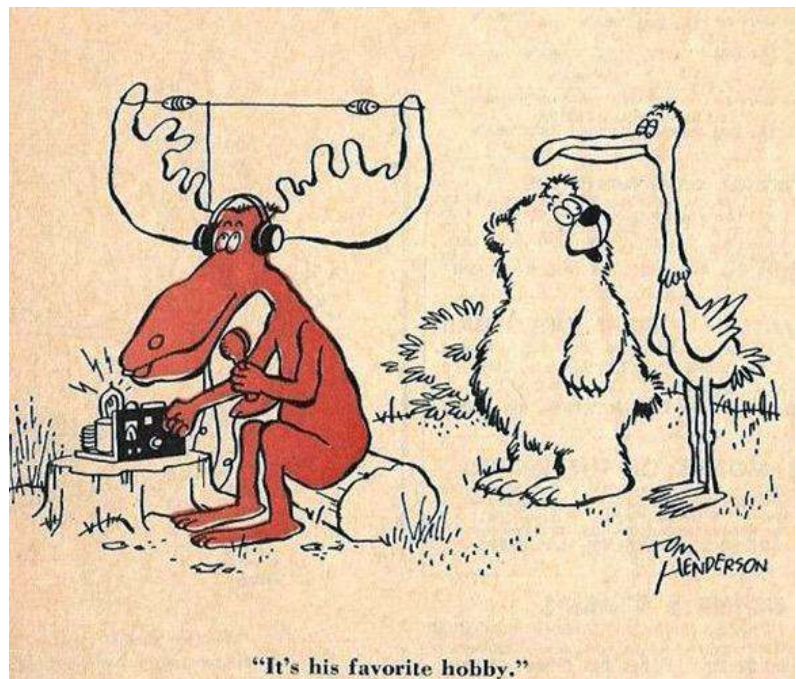
You may now be asking, "Which sideband is used with SSB mode?" The convention used by hams is that bands above the 30-meter band (frequencies higher than 10 MHz), including all VHF and UHF bands, use the upper sideband (USB) – the band of frequencies adjacent to, and higher than, the carrier frequency. For bands below 30-meters (frequencies lower than 10 MHz), the lower sideband is used. [The 30-meter band is a digital modes-only band where SSB is not used, and another exception occurs in the 60-meter band (5.3 MHz) where only five USB channels are allowed.]

The trade-off with SSB as compared to conventional double-sideband AM and especially to FM phone mode is the quality of the audio. Narrower bandwidth dictates a reduction in audio information carried by the SSB signal. As a result, SSB audio will sound a bit thinner and less rich, but it is still quite intelligible and more than sufficient for weak signal phone communications.

Weak Signals: Signals that are transmitted great distances, such as those refracted by the ionosphere over the horizon and back to earth hundreds or thousands of miles distant, become very weak in comparison to the initial output power at the transmitting antenna. As radio waves expand their power is distributed over a greater volume of space, reducing the effective power at a distant receiving station. Further, signal polarization essentially becomes randomized during transit through the ionosphere and earth's magnetic field, further reducing the signal's ability to induce currents on a distant receiving antenna at which the polarization is unlikely to be matched. These so-called 'weak signal' operations benefit from the relatively high power density of the SSB signal noted above.

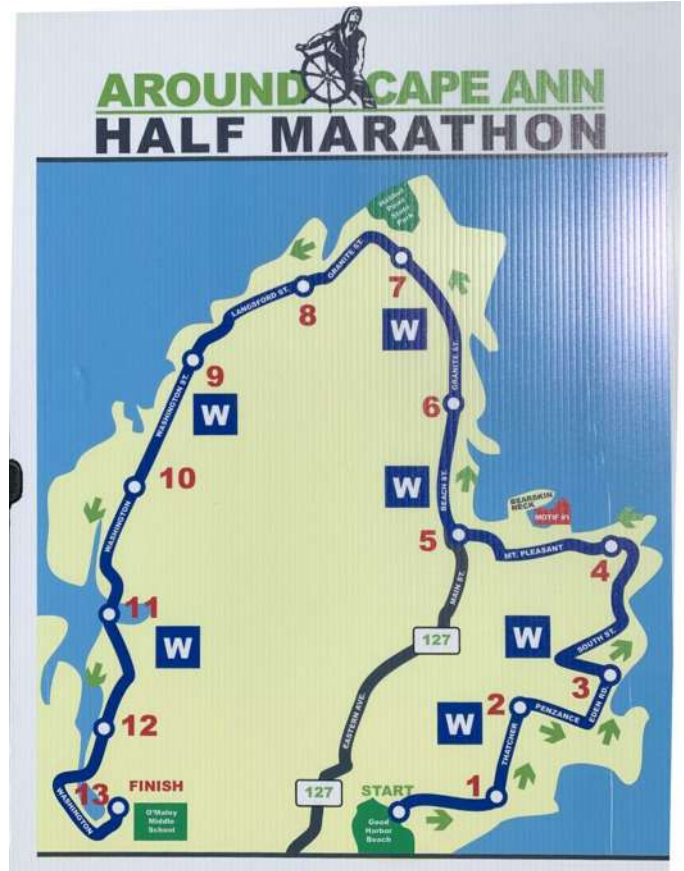
SSB is popular on the VHF and UHF bands for extended local area operations. Even signals that do not utilize ionospheric skip can benefit from the extended reach offered by SSB, such as VHF or UHF signals transmitted across a more local region.

It is common for local VHF/UHF SSB signals to be viable well over 100 miles, depending upon specific terrain features and polarization. For non-skip SSB, operators use horizontal polarization with antenna elements parallel to the surface of the earth.





# CAARA PUBLIC SERVICE TEAM-OCTOBER 16



Starts: Half Marathon Run = 9:00 AM

Freq: W1GLO 2 meter Repeater 145.130 – PL:107.2 Back up Simplex 146.505

## Around Cape Ann

	Location	Call	Name	Notes
	Net Control	W1WMM	Bill	
	Finish Line Incident CMD	WA1ESU	Fred	
	YukanRun Director Phil	Cell	Phil	978 578 3649
	Lead Vehicle	KC1AEI	Matt	
	Trail Vehicle	W1PAG	Paul	
Cp1	South St. just after Mile 2			
Cp2	Mt. Pleasant and Beach St.	N1RJB	Ron	
Cp3	Granite St after mile 7	KC1FFA	Ken	
Cp4	Washington St. after mile 9	KC1US	Bruce	
Cp5	Washington St. after mile 11			



## Simplifying the production of lithium-ion batteries

MIT spinout 24M Technologies designed a battery that reduces the cost of manufacturing lithium-ion cells. When it comes to battery innovations, much attention gets paid to potential new chemistries and materials. Often overlooked is the importance of production processes for bringing down costs.

Now the MIT spinout 24M Technologies has simplified lithium-ion battery production with a new design that requires fewer materials and fewer steps to manufacture each cell. The company says the design, which it calls “SemiSolid” for its use of gooey electrodes, reduces production costs by up to 40 percent. The approach also improves the batteries’ energy density, safety, and recyclability.

Judging by industry interest, 24M is onto something. Since coming out of stealth mode in 2015, 24M has licensed its technology to multinational companies including Volkswagen, Fujifilm, Lucas TVS, Axxiva, and Freyr. Those last three companies are planning to build gigafactories (factories with gigawatt-scale annual production capacity) based on 24M’s technology in India, China, Norway, and the United States.

“The SemiSolid platform has been proven at the scale of hundreds of megawatts being produced for residential energy-storage systems. Now we want to prove it at the gigawatt scale,” says 24M CEO Naoki Ota, whose team includes 24M co-founder, chief scientist, and MIT Professor Yet-Ming Chiang.

Establishing large-scale production lines is only the first phase of 24M’s plan. Another key draw of its battery design is that it can work with different combinations of lithium-ion chemistries. That means 24M’s partners can incorporate better-performing materials down the line without substantially changing manufacturing processes.

The kind of quick, large-scale production of next-generation batteries that 24M hopes to enable could have a dramatic impact on battery adoption across society — from the cost and performance of electric cars to the ability of renewable energy to replace fossil fuels.

“This is a platform technology,” Ota says. “We’re not just a low-cost and high-reliability operator. That’s what we are today, but we can also be competitive with next-generation chemistry. We can use any chemistry in the market without customers changing their supply chains. Other startups are trying to address that issue tomorrow, not today. Our tech can address the issue today and tomorrow.”

A simplified design: Chiang, who is MIT’s Kyocera Professor of Materials Science and Engineering, got his first glimpse into large-scale battery production after co-founding another battery company, A123 Systems, in 2001. As that company was preparing to go public in the late 2000s, Chiang began wondering if he could design a battery that would be easier to manufacture.

“I got this window into what battery manufacturing looked like, and what struck me was that even though we pulled it off, it was an incredibly complicated manufacturing process,” Chiang says. “It derived from magnetic tape manufacturing that was adapted to batteries in the late 1980s.”

In his lab at MIT, where he’s been a professor since 1985, Chiang started from scratch with a new kind of device he called a “semi-solid flow battery” that pumps liquids carrying particle-based electrodes to and from tanks to store a charge.

In 2010, Chiang partnered with W. Craig Carter, who is MIT’s POSCO Professor of Materials Science and Engineering, and the two professors supervised a student, Mihai Duduta ’11, who explored flow batteries for his undergraduate thesis. Within a month, Duduta had developed a prototype in Chiang’s lab, and 24M was born. (Duduta was the company’s first hire.)

But even as 24M worked with MIT’s Technology Licensing Office (TLO) to commercialize research done in Chiang’s lab, people in the company including Duduta began rethinking the flow battery concept. An internal

cost analysis by Carter, who consulted for 24M for several years, ultimately lead the researchers to change directions.

That left the company with loads of the gooey slurry that made up the electrodes in their flow batteries. A few weeks after Carter's cost analysis, Duduta, then a senior research scientist at 24M, decided to start using the slurry to assemble batteries by hand, mixing the gooey electrodes directly into the electrolyte. The idea caught on.

The main components of batteries are the positive and negatively charged electrodes and the electrolyte material that allows ions to flow between them. Traditional lithium-ion batteries use solid electrodes separated from the electrolyte by layers of inert plastics and metals, which hold the electrodes in place.

Stripping away the inert materials of traditional batteries and embracing the gooey electrode mix gives 24M's design a number of advantages.

For one, it eliminates the energy-intensive process of drying and solidifying the electrodes in traditional lithium-ion production. The company says it also reduces the need for more than 80 percent of the inactive materials in traditional batteries, including expensive ones like copper and aluminum. The design also requires no binder and features extra thick electrodes, improving the energy density of the batteries.

“When you start a company, the smart thing to do is to revisit all of your assumptions and ask what is the best way to accomplish your objectives, which in our case was simply-manufactured, low-cost batteries,” Chiang says. “We decided our real value was in making a lithium-ion suspension that was electrochemically active from the beginning, with electrolyte in it, and you just use the electrolyte as the processing solvent.”

In 2017, 24M participated in the MIT Industrial Liaison Program's STEX25 Startup Accelerator, in which Chiang and collaborators made critical industry connections that would help it secure early partnerships. 24M has also collaborated with MIT researchers on projects funded by the Department of Energy.

### **Enabling the battery revolution**

Most of 24M's partners are eyeing the rapidly growing electric vehicle (EV) market for their batteries, and the founders believe their technology will accelerate EV adoption. (Battery costs make up 30 to 40 percent of the price of EVs, according to the Institute for Energy Research).

“Lithium-ion batteries have made huge improvements over the years, but even Elon Musk says we need some breakthrough technology,” Ota says, referring to the CEO of EV firm Tesla. “To make EVs more common, we need a production cost breakthrough; we can't just rely on cost reduction through scaling because we already make a lot of batteries today.”

24M is also working to prove out new battery chemistries that its partners could quickly incorporate into their gigafactories. In January of this year, 24M received a grant from the Department of Energy's ARPA-E program to develop and scale a high-energy-density battery that uses a lithium metal anode and semi-solid cathode for use in electric aviation.

That project is one of many around the world designed to validate new lithium-ion battery chemistries that could enable a long-sought battery revolution. As 24M continues to foster the creation of large scale, global production lines, the team believes it is well-positioned to turn lab innovations into ubiquitous, world-changing products.

“This technology is a platform, and our vision is to be like Google's Android [operating system], where other people can build things on our platform,” Ota says. “We want to do that but with hardware. That's why we're licensing the technology. Our partners can use the same production lines to get the benefits of new chemistries and approaches. This platform gives everyone more options.”

## HAARP campaign's projects range from Jupiter to the moon

The University of Alaska Fairbanks is operating the High Frequency Active Auroral Research Program facility, or HAARP, for 13 projects this month. The projects are the latest made possible by federal support for the ionospheric research facility in Gakona.

In 2021 the University of Alaska Fairbanks received a five-year, \$9 million grant to establish and operate the Subauroral Geophysical Observatory for Space Physics and Radio Science at HAARP.

HAARP research support services lead Evans Callis says this month's research campaign is funded by the National Science Foundation.

"They help us with the funding aspect to make the program happen and we work directly with the scientists to make their work happen," Callis said.

Callis calls the 10-day campaign, which runs through Oct. 28, unprecedented.

"The most experiments that we've had under our NSF grant that we're currently operating under," he said. "Also, the most diverse set of experiments that we've had."

And it's not all hard science. Among the projects is part two of an endeavor that uses HAARP's high-power radio transmitter for art. It involves transmitting a signal into the ionosphere which can be picked by ham radio operators around the world and decoded into low-resolution TV images.

"Narrow band television video art — it also includes spoken word and sound art," Callis said. "It's kind of a collaborative work between the artist and the amateur radio community to kind of make the artwork happen."

Canadian artist Amanda Dawn Christie first transmitted art via HAARP in 2019. The other dozen projects being conducted using the HAARP facility are scientific, including a NASA experiment that involves bouncing a signal off the moon.

"Very similar to ground penetrating radar actually," Callis said. "You know we use that here on earth, but we're applying it to figuring out the composition of asteroids, the moon, things like that."

Another HAARP experiment aims to better understand a low-altitude, aurora-like atmospheric glow known as Strong Thermal Emission Velocity Enhancement, or STEVE. Callis says the experiment uses HAARP's transmitter to send out so-called hot electrons thought to cause STEVE.

"And if we see that air glow and it matches the wavelength of light that we see from naturally occurring STEVE, that would give us indication that the hot electrons are playing some role in the formation of STEVE," he said.

HAARP was built to conduct experiments in the earth's ionosphere, but another project happening this month employs it to probe a similar electrically charged region over Jupiter, the giant gaseous planet 374 million miles away.

"This is a first-of-its-kind experiment (which) at least to my knowledge has never been attempted before," Callis said. "We transmit several different frequencies from HAARP directed at Jupiter. We listen for the echo that returns, and that should be able to tell us something about electromagnetic conditions around Jupiter."

The wide array of projects underscores the enduring scientific research value of HAARP, which began in 1993.

Callis says it remains the most powerful and flexible instrument of its kind in the world, and attributes this month's research campaign to the NSF funding which provides for maintenance and prolonged viability of the facility.



“And the sense of security that brings helps scientists feel more comfortable coming up with a proposal to make use of the facility,” he said.

Scientists with NASA, the Naval Research Laboratory and Los Alamos National Lab, as well as numerous universities, are involved in this month’s HAARP research campaign. Amateur Radio Newsline Report 2348 for Friday October 28th, 2022

## **Amateur Radio Newsline Report**

### DEADLY CYCLONE SLAMS BANGLADESH

PAUL/ANCHOR: We begin this week with a developing story. As Newsline went to production, a deadly cyclone had enveloped parts of Bangladesh where the death toll continued to rise, according to reports from Reuters and other news sources. Mass evacuations preceded the arrival of Cyclone Sitrang and while there are not yet any published reports offering details of amateur radio assistance, Newsline learned informally that some stations in the country were attempting to help via VHF radio, as power was lost. At production time, Newsline was still awaiting details from the IARU and other organizations. We hope to have more details in our next newscast about the cyclone response.

(REUTERS, AMBARISH NAG BISWAS, VU2JFA)

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### AUSTRALIAN HAM CLUB REVIVES AID FUND

PAUL/ANCHOR: As devastating flood conditions persist in parts of Australia, particularly Victoria and much of New South Wales, one amateur radio club is reviving an outreach initiative begun during floods that hit at the start of this year. Graham Kemp VK4BB tells us about the effort.

GRAHAM: The North East Victoria Amateur Radio Club, which responded with financial support when historic floods ravaged so many towns earlier this year, has revived its funding initiative as parts of Victoria and New South Wales battle new flood conditions. Begun in early 2022 as the brainchild of committee members Gary Reeve VK2XF and Matt Bilston VK3VS, this emergency-response effort shows that not all amateur assistance is necessarily accomplished with radios alone.

Club secretary Frank Scott VK2BFC told Newsline that the earlier initiative began with \$2,000 from the club and quickly grew to more than \$3,000 with donations from individual amateurs and other clubs. As before, the club is asking members of the community who have had losses in the current flooding to apply to the club for an e-gift card that can be taken to supermarkets or other retail outlets to replace some of what was lost. Community members are being encouraged to apply for the cards, which are valued at an average of \$100.

He said that the club is also prepared to work directly with hams who lost equipment or towers in the flood to help them replace what is needed and re-establish their stations. Because many hams also belong to the local emergency services, the club saw this as an extension of its public service mission.

Frank said that after seeing the destruction from the latest wave of flood water, club members decided that the most appropriate response was to conduct the assistance programme once again

He told Newsline, "As we say 'When floods happen, we rise above them as a ham community.' ”

This is Graham Kemp VK4BB.

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### LATEST HAARP EXPERIMENT TO INCORPORATE HAMS' INPUT

PAUL/ANCHOR: Researchers in Alaska will soon be sifting through the results of some major atmospheric experiments - ones that included input from hams around the world. Sel Embee KB3TZD brings us those details.

SEL: Following an intense 10-day period of experiments that were to be concluded by Friday, October 28th, scientists at the High-frequency Active Auroral Research Program plan to be studying their results along with observations from participating amateur radio operators.

Hams had been invited to monitor daily transmissions that included HF ocean scatter, interactions between satellites and the ionosphere, moon bounce and an unprecedented attempt to bounce a signal off of Jupiter. The scientists were also exploring possible reasons behind the airglow phenomenon known as Strong Thermal Emission Velocity Enhancement, or by the acronym STEVE, and testing whether radio transmissions could be used to measure the interiors of near-Earth asteroids.

The program manager, Jessica Matthews, called the research the most diverse to ever take place at the Alaska facility and contained the highest number of experiments to date. She said researchers were relying on citizen scientists around the world. The research was funded by a \$9.3-million grant from the National Science Foundation.

Participating hams were able to file their reports electronically to the lab, making them eligible for QSL cards.

(ALASKA NATIVE NEWS, HF UNDERGROUND)

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SILENT KEY: MINNESOTA'S MIKE SIGELMAN, KØBUD

PAUL/ANCHOR: The Minnesota ham radio community is grieving the loss of an active longtime radio operator who was formally recognized for his generous spirit and decades of involvement. Kent Peterson KCØDGY tells us about him.

KENT: On his page on QRZ.com, Mike Sigelman, KØBUD, described himself as "one enthusiastic amateur radio operator!" He wrote: [quote] "I have been licensed since 1955 and keep heavily involved both on the air as well as in the local amateur community." [endquote]

Mike became a Silent Key on Thursday the 20th of October, but not before the former broadcast professional also left a deep imprint in amateur radio. The ARRL honored him in 2013 with the President's Award in recognition of his years of commitment and service to various league programs. Earlier this year, he was given the Public Service Award from the MapleGrove Radio Club, KØLTC.

An enthusiastic participant in local nets, contesting and DXing, he had also served as president of the Twin City FM Club and the public relations officer for the ARRL's Minnesota section manager.

Michael was 83.

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SILENT KEY: INFLUENTIAL FINNISH AMATEUR PETER TIGERSTEDT, OH5NQ/OH2BM

PAUL/ANCHOR: A ham respected in Finland for his wide-ranging work as a mentor, a pioneer and - separately - a renowned botanist - has become a Silent Key. Ed Durrant DD5LP tells us about him.

ED: Peter Tigerstedt, OH5NQ/OH2BM, was considered one of the most prominent figures in amateur radio in Finland. A news report from the Wireless Institute of Australia quotes Martii Laine, OH2BH, as calling Peter a pioneer on both the high and low ends of the HF spectrum. A professor by vocation, his other love was to mentor young radio contesters in Finland and welcome them to his contest station OH5Z. Born in 1936, he

was remembered by Al, 4L5A, writing in a forum on DxNews.com: [quote] "Now the OH5Z group has lost their 'father figure' and are looking longingly towards the horizon." [endquote]

Beyond radio, the Helsinki University professor emeritus achieved fame as an expert in plant-breeding, most especially the rhododendron. He developed a variety that bears his name.

**\*\*SILENT KEY: SOUTHGATE AMATEUR NEWS' RICHARD BRUNTON G4TUT**

PAUL/ANCHOR: If you follow amateur radio current events you are probably aware of the Southgate Amateur Radio News website. We here at Newline are sad to report that the colleague of ours in England, who ran that important website, has become a Silent Key. Jeremy Boot G4NJH has that report.

JEREMY: We are sad to announce the passing of Richard Brunton, G4TUT. Richard died at age 77 as the result of a fall on the 21st of October. The callsign may not seem familiar to you, but for decades Richard was editor of the Southgate Amateur Radio News website which has a significant international following. Each and every day, Richard would search the world's ham radio and technology resources seeking out stories of interest and publishing them. Beyond the straight news items and specialist sections of his site, Richard encouraged non-commercial podcasts and blogs to promote ham radio opinion and stimulate debate on the essential subjects of the day. He also compiled the 'CQ Serenade' weekly programme which was broadcast throughout Europe on Shortwaveradio.de and other public-facing media. Richard himself was an intensely private man who had no close family, but he reached thousands of friends daily through his website. Amateur radio has lost a statesman and a stalwart whose dedication to amateur radio was valued and enjoyed by so many.\*\*

**POLISH AMATEURS HOSTING ON-AIR MEMORIAL**

PAUL/ANCHOR: With every new Silent Key in our amateur radio community, the bands grow a little more empty. In Poland, however, amateurs are planning an activation to share and honor those who have meant so much. Ed Durrant DD5LP brings us the details.

ED: The Polish Amateur Radio Union, PZK, is conducting a memorial activation from the 1st to the 6th of November, asking amateurs to make contact with the station SPØSKM and provide the name and callsign of the Silent Key they wish to commemorate. Hams will be able to do this on 80, 40 and 20 metres using CW and SSB and on 2 metres FM. The PZK's editorial office is promoting this event which is being called, in translation, "remembrance of those who passed away." The special-event station operators will create an SK remembrance List based on SK stations noted in the log.

Each radio contact is eligible for a certificate which will be able to be downloaded later, commemorating the event and the Silent Key submitted. If a ham wishes to honour more than one Silent Key, it must be done on another day in a different QSO.

The Polish organisation's website says, in translation, [quote] "In this way, we will honour the memory of those we no longer hear on the amateur wave." [endquote]

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**HAMS WORLDWIDE PREP FOR CQWW COMPETITIONS**

PAUL/ANCHOR: As Newline went to production, hams were gearing up for the first part of the two-part CQ WW amateur radio competition - considered the largest of its kind in the world. The first of the 48-hour marathons begins on SSB at 0000 UTC on Saturday, October 29th and ends at 2399 UTC on Sunday October 30th. More than 35,000 hams are expected to be on the air for the first of the two weekend contests. After that, you have time to prepare for the CW challenge, which will be held on the weekend of November 26th



and 27th. Details, rules and the results of previous competitions are available at cqww dot com (cqww.com).

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## CALIFORNIA AMATEURS EXPAND TRAINING FOR EMERGENCY RESPONSE

PAUL/ANCHOR: A newly formed nonprofit group in California is filling a need to support ongoing disaster-response efforts. Ralph Squillace KK6ITB tells us what's been happening.

RALPH: Few people understand the value of the El Dorado County Neighborhood Radio Watch in California better than the members who have joined the group since it began in 2019. The radio watch's life-saving communication efforts using General Mobile Radio Service equipment, combines with those of the El Dorado County Amateur Radio Club to save lives - some even of their own members. This has been especially critical during wildfires and in other disasters. The two organizations are now working together even more closely - and more formally - following the creation of a nonprofit corporation known as the Community Emergency Radio Association, or CERA. As a fundraising arm for the two radio groups, CERA is there to receive donations and apply for community safety grants, magnifying the lifesaving potential of these local radio sentinels.

Alan Thompson W6WN, told Newslines that the teamwork goes beyond even that ambitious agenda. CERA is also a mentoring group, assisting in emergency preparedness, public safety exercises and instruction to prepare for the amateur radio licensing exams. Alan, who is the public information officer for the groups, said that the El Dorado hams' membership roll has grown and the Neighborhood Radio Watch now has 500 members throughout the county. Alan said the groups are also consulting with several other ham radio clubs both in and outside of California. Alan gave a presentation recently to the Cool-Pilot Hill Advisory Committee at the Pilot Hill Grange on Monday, October 24th.\*\*

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## NEW POSTAL SERVICE MESSAGE NEEDS NO DECODING

PAUL/ANCHOR: We end this week's newscast by remembering some code-breaking women of wartime, and celebrating a tribute to them from the United States Postal Service. Here's Dave Parks WB8ODF to explain.

DAVE: Sending messages the old fashioned way - by postal service - just got even more traditional for letter-writers and bill-payers in the United States. A new postage stamp has been issued honoring women of the US military who handled messages in a much-less straightforward way: They were the cryptologists of World War II, the backbone of an operation that contributed in a big way to the Allied victory.

The stamp was formally released on Tuesday, October 18th at a ceremony in Maryland. The stamp is a tribute to the more than 11,000 women who worked tirelessly with the traffic of intercepted enemy messages that were sent encoded. Like so many others in the military at that time, they were sworn to secrecy about their roles. The stamp's design features a recruitment poster seeking the participation of these women, who were known as WAVES, an acronym for Women Accepted for Volunteer Emergency Service. In announcing the new stamps, the US Postal Service called the women "STEM pioneers" adding that they [quote] "opened the door for women in the military and have helped shape information security efforts for future generations." [Endquote]

## Caveat Emptor

The local drive-in bank is very historic. It is also made out of brick. So when one of the lanes was out of order I drove through the car lane. An audible crunch told me that I had hit the passenger side mirror on my truck. After getting my cash, I parked and looked. The lens on the thing was cracked.



Now I am old enough to remember when a side mirror was a metal thing, costing about \$5, which screwed onto the car with two screws, bolts if you had a fancy car. This thing was an abomination. It had two electric motors, a glass heater, clearance lights, backup lights, and flashing arrows visible from the driver's seat to let you know you have had left your turn signal on for the last 20 miles.

I got out the UV light setting glue and sealed it. Ugly, but effective. Until it was time for state inspection. The shop manager was dubious.

"I passed it, this time, but you have a cracked lens. You need to fix it. I won't pass it next year."

Now I knew that there was a shop down the street that would pass anything for \$100 extra, but this one had great coffee and a nice waiting area, so I went to the parts department.

"Fully loaded side mirror for a Chevy pickup? \$675 plus \$300 installation and \$25 hazmat fee."

"For a plastic lens?"

"Molded in. Can't replace it. Have to replace the whole unit."

I thanked him and went home and called Mike. He used to own a repair shop.



"He's right. Glued in at the factory."

"What do I do?" I said. I was not going to pay \$1000 for a cracked lens.

"Look around."

I went on Amazon. There were plug and play replacement mirrors for \$100 a pair. I went on YouTube, and found hundreds of videos, some amateurish, some professional, some with girls wearing Bikini's. Very small Bikini's. Each had a link to some part's store.

Next sunny day, armed with various implements, I installed my \$50 mirror. On a Chevy, this involves removing six hidden screws, popping (breaking) multiple plastic widgets, and removing the inner door panel. I installed it, started the truck, and found I had replaced a mirror with a cracked lens with a mirror with no side lights at all.

I called Mike.

“What happened?” I said.

“I need to call my guy. Sometimes you have to re-program the computer.”

“Re-program the computer?”

“I had to. For my door lock switch.”

“The guy” said that you did not need to re-program but asked a germane question.

“How much did you pay for the mirror?”

“\$50.”

“Did you really think you could buy a heated side mirror with remote adjustment, parabolic side view, autofolding and six kinds of lights for \$50?”

“Huh?”

“Look, those things are made in China. About half flunk acceptance testing by the OEM. Internet parts companies come in, buy the rejects and sell them to idiots... Oops I mean customers, who buy them.”

“What do I do?” I asked.

“Look for the more expensive ones. They usually have cosmetic blemishes but work.”

Caveat Emptor. Buyer beware. Your chances of getting a refund from MUMU motors in Sze-Chen are low. They send you a new pair that also do not work.

Three weeks later I had another pair, from another vendor, \$200 this time, and installed it.

On this one, the lights that flash when you hit the remote to unlock the door don't work, but I can live with that. Oh, and the plastic housing has a funny sheen. I also had six defective mirrors left over.

The guys at the local dump were impressed. They grabbed them and put them on the trucks they use at the dump. Where they belong.



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# 10 meters is open !

Between work, being married, owning a home and having a kid sometimes once in a blue moon I like to go out and pretend that I am a amateur radio operator. I may only get a couple times a year but it's good to get on the HF radio and to relearn how to push the talk button on the microphone and listen to the static. So on Saturday, October 22nd I got a chance to work some HF where I work on a farm in Essex ,MA. So I broke out my trusty Icom IC 7300 and scanned the bands for action. So believe it or not I made a bunch of contacts on 10 meters. I made a few on 20 and 40 meters as well before all the bands went quiet due to the solar wind. After it was all over I thought of mentioning this to all the Technician class amateur radio operators out there. Did you know almost half of the total amateur radio licenses out there are Technician class? I did want to remind all of the techies out there that you do have access to the 10 and 6 meter bands for HF work .Also be aware that 10 meters is becoming more active due the rise in the sunspots and that we are closing in on the peak of the solar sunspot cycle in 2025. So this goes out to everyone out there as well. Start checking the 10 meter band for activity. The band is coming alive . So check especially between 28 300 MHZ and 28 500 MHZ for phone activity. I have actual proof that 10 meters is open in the photo of my rig! look at those green spikes representing stations . I'll give you an example of some of the stations I talked to on just a inverted V antenna 20 Feet in the air with 100 watts. I was able to contact Brazil, Hungary, Cayman Islands, France, Germany and a couple of stations from England. So don't forget about your 10 meter privileges and give out a CQ . Even if the DX is not there, there are people listening so even it's a local contact at least you used your privileges ! Don't let them go to waste!,  
73, Dean Burgess KB1PGH

