



# PCARA Update



Volume 23, Issue 12 Peekskill/Cortlandt Amateur Radio Association Inc. December 2022

## Sound and vision

We kicked off November with a PCARA **Membership Meeting** on Saturday November 5, 2022, at 10:00 a.m. at the Putnam Valley Free Library in Putnam Valley, NY. There were 15 members in attendance to witness Vincent KD2VAV receive his First Place certificate for winning the October 29, 2022 PCARA **Fox-hunt** at FDR State Park. Well done Vincent! Also, thanks to Malcolm NM9J for providing the fox. **Nominations and elections** for the Board of Directors positions of Vice President and Treasurer were also held. Both Bob N2CBH and David KD2EVI were renominated to the positions of Vice President and Treasurer respectively. A vote was held, and they were re-elected unanimously. Congratulations Gentlemen!



PCARA's November 19 breakfast took place in the seated area at the new Uncle Giuseppe's Marketplace in Yorktown.



Greg KB2CQE (right) presents Vincent KD2VAV with his certificate as winner of the Foxhunt held on October 29.

The November **PCARA Breakfast** was held at the new Uncle Giuseppe's Marketplace in Yorktown Heights, NY on November 19, 2022 at 9:00 am. There was a tremendous turnout of some 16 people! There were even some new faces. The energy and excitement were palpable, the new location was beautiful, and excitement of the approaching Holidays was in the air. People reluctantly departed more than 2 hours later to tend to other matters and responsibilities.

PCARA now has its own **YouTube Channel**, courtesy of Rob AD2CT. Rob has released his professionally edited and produced video of Jay NE2Q's September 10, 2022 presentation on "Pros and Cons of Various Ver-

tical Antennas with demonstrations of common-mode current detection & cures." The Peekskill / Cortlandt Amateur Radio Association YouTube Channel can be reached at <https://www.youtube.com/@peekskillcortlandtamateur7670>. It should also be noted that Lou KD2ITZ assisted with the graphics used in the presentation. I would like to thank Jay NE2Q, Rob AD2CT, and Lou KD2ITZ for an **EXCELLENT** production! I look forward to seeing more. Please visit the PCARA YouTube Channel for other superb talks and presentations.

PCARA and WECA received a mention in the November 2022 issue of **ARRL Club News** about our participation in the "Run Against Hunger 2022", with an extract of Malcolm NM9J's article in the November *PCARA Update* about the 42nd Annual Harry Chapin Memorial Run Against Hunger. You can find back issues of the *ARRL Club News* at <http://www.arrl.org/club-news>.

We made it to the **BIG TIME!** *Continued on page 2* ⇨

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The Annual PCARA **Holiday Dinner** will take place on Sunday December 4, 2022 at 5:00 p.m. at the Cortlandt Colonial Restaurant, 714 Old Albany Post Road, Cortlandt Manor, NY. Menu is in this month's edition of the *PCARA Update*, and the cost is \$50.00 (including tax and gratuity — alcoholic beverages not included.) **ALL ARE WELCOME!** If you are planning on attending, please contact Lou KD2ITZ at radiocassetta'at'gmail.com to let him know your headcount. Thank you.

Please mark your calendars with the following important upcoming dates for events:

- Saturday December 17, 2022 at 9:00 a.m.: **PCARA Breakfast** at the NEW Uncle Giuseppe's Marketplace in Yorktown Heights, NY.
- Wednesday December 21, 2022 at 7:00 p.m.: **PCARA VE Test Session** at the Putnam | Northern Westchester BOCES Tech Center — Classroom 119, 200 BOCES Drive, Yorktown Heights, NY.
- Sunday January 8, 2023 at 3:00 p.m.: **Annual PCARA Bring and Buy Auction** at the Town of Cortlandt CUE Room in the Cortlandt Town Center — start looking through those dusty treasures now!

TO ALL, I wish a **MOST JOYOUS HOLIDAY SEASON** and a **VERY HAPPY, HEALTHY, AND BLESSED NEW YEAR! MAY GOD BLESS!**

- 73 de Greg, KB2CQE

## PCARA Board

President:

Greg Appleyard, KB2CQE; kb2cqce 'at' arrl.net

Vice President:

Bob Tarsio, N2CBH; bob 'at' broadcast-devices.com

Secretary:

Lou Cassetta, KD2ITZ; radiocassetta 'at' gmail.com

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David Fredsall KD2EVI; joanndavidss88 'at' verizon.net

Director:

Mike Dvorozniak, W2IG

Vice President Emeritus: Joe Calabrese, WA2MCR.

## Net night

Peekskill/Cortlandt Amateur Radio Association holds a roundtable net on Tuesday evenings at 8:00 p.m. and a directed 'Old Goats' net on Thursday evenings at 8:00 p.m. Both events take place on the 146.67 MHz W2NYW repeater, offset -0.600, PL 156.7 Hz.

Join the roundtable to find out what members have been doing or join the Old Goats with net control Karl N2KZ for news and neighborly information.

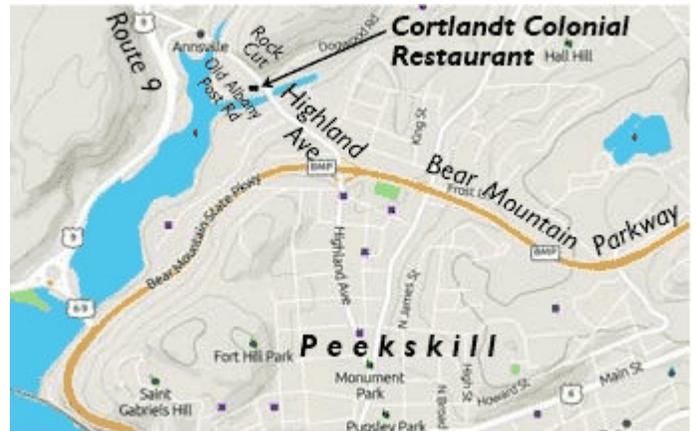
## Holiday Dinner

PCARA's 2022 Holiday Dinner will take place at the same location as previous years — the Cortlandt Colonial Manor Restaurant. The event begins at 5:00 p.m. on Sunday December 4<sup>th</sup>.



Cortlandt Colonial Manor Restaurant.

The restaurant is located at 714 Old Albany Post Road in Cortlandt Manor. Take the Bear Mountain Parkway to the Highland Avenue exit, then proceed north down Highland Avenue and across the bridge. Restaurant and parking lot are immediately on the left.



The dinner menu is as follows:

*Soup and Salad*  
*Soda, iced tea and soft drinks (unlimited)*  
 ✦✦✦✦ choice of: ✦✦✦✦  
*Prime Ribs of Beef*  
*Grilled New York Strip Steak*  
*Grilled Pork Chops*  
*Jumbo Shrimp with crabmeat stuffing*  
*Chicken Marsala*  
*Penne ala Vodka - traditional or w/grilled chicken*  
*Custom cake – Chocolate*

Cost will be approximately \$50.00 per head including service but *not including* alcoholic drinks. (Our Treasurer requests cash be brought to the event.) All are welcome — family participation is encouraged! Please let Lou KD2ITZ know if you will be attending by e-mailing your head-count to: radiocassetta'at'gmail.com.

# Adventures in DXing

- N2KZ

## Changing Times

Times are changing and so is the world of amateur radio. The world of old-school CW is shrinking like a wool blanket in hot water. Fewer and fewer brass keys are being exercised. Many new sounds surround us but they are wildly more complex than a scattering of monotone *dits* and *dahs*. The old neighborhoods are being redeveloped into the futuristic data slots of tomorrow. Let's take a look! Where are we now?

I have only been a ham for about 23 years, but I began shortwave listening way back in 1965 — 57 years ago. So much has changed. In my beginning, there was a flurry of Morse activity. Even then, the grand stalwart mode of all of amateur radio was CW. Years and years ago, I remember once seeing an antenna-laden mobile station in Nevada City, California. You could almost see the car body underneath the multitude of different imposing antennas. A big sticker on the bumper said it all: REAL HAMS KNOW CODE. I am afraid to say that no longer holds true!



A multitude of mobile antennas.

Take a snapshot of the new and modern electromagnetic world around you. Do you recognize these places? Here's what you will find today.

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## Top Band – 160 Meters

Time has been kind to 'top band.' Back in 1965, 160 meters offered only 25 kcs\* of part-time operation. Most of the original 160 meter band (1800 to 2000 kcs) had been reallocated for other urgent needs. Nearly all of the band was consumed by the relentless full duty cycle data grind known as LORAN: **LO**ng **RA**nge **N**avigation. This racket ruled 160 meters from 1942 until the beginning of 1981. What a relief it was when it was finally turned off! Now amateurs again hold the entire property exclusively as their own.

[\* Karl is waxing nostalgic for the days when frequencies were measured in cycles per second or c/s rather than hertz (Hz) -Ed.]

Today's top band CW is voluntarily concentrated into about 20 or so kilohertz from 1810 to about 1830 kHz. Theoretically, 1810 kHz is the QRP CW watering hole. The downtown of 160 meters CW is from about 1822 to 1828 kHz or so. Operators here are habitual almost to the point where you might think they are

locked via crystal control. Look for ace hams like W0FLS, Dave Raymond in Earlham, Iowa around 1828 and good old W1AW precisely on 1802.5 with trusty code practice serving double duty as a propagation beacon. Stay away from 1840 and 1843 kHz. This is where you will hear the never-ending groans of FT8!

Many old-timers enjoyed their first DX experience listening to AM broadcast radio. We learned how to bag new loggings during dawn and dusk using greyline propagation lifts. We also observed how the top of the AM band could carry signals like shortwave for great distances especially during periods of aurora activity or the wee hours of the night. When you become licensed and first audition all the amateur bands you'll quickly see how AM radio DX techniques are quite applicable to working 160 meters. Today, amateurs enjoy this prime medium wave allocation. It's just like being on the AM broadcast band. Get to know 160 meters. It is a wonderful place to be.

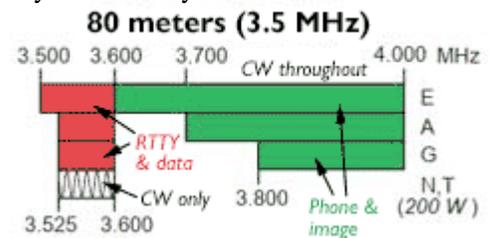


Charts show FCC frequency and mode allocations by license class (E A G T N).

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## Stop the Shrink! – 80 Meters

To me, 80 meter CW is a shrinking shame! My very first band has nearly faded away into oblivion. When I was finding my way as a beginner CW operator, you could find me nightly between 3700 to 3750 kcs\* now long ago reallocated to phone operations. Today, all CW activity has been compressed like forgotten socks in the back of a stuffed dresser drawer. Most of 80 meters has been invaded by choruses of FT8 and similar digital sirens and muses trying to lure you away from the ancient legacy CW hunting grounds we once knew. These days, don't expect to hear Morse being sent above about 3570 kHz. You will find FISTS CW Club members on 3558 and QRP CW on 3560 kHz. Best advice: Stay below 3550 kHz and avoid modern day 'progress' occupying all the frequencies above!



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## Quiet Corners

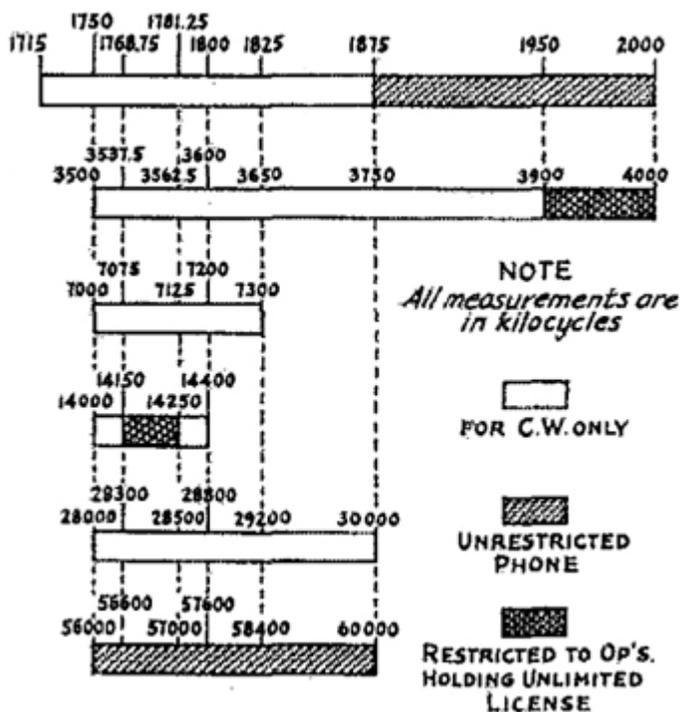
Most bands feature exclusive territory where only Extra Class operators can go. Earn Extra privileges and enjoy the relative solace of the first 25 kHz of 80, 40, 20 and 15 meters: 3500 - 3525, 7000 - 7025, 14000 - 14025 and 21000 - 21025 kHz. Here you will experience intense and maniacal DXers with fine fists producing extra-rapid CW sounding like caffeine induced woodpeckers. Get your speed way up and join the

*mêlée* - if you dare! These frequencies are the major league ballparks of CW. Tune in and visit them to see Morse at its finest! If you want to learn about the very best CW operators - the *crème de la crème* - visit the website of the First Class CW Operator's Club (FOC) at: <https://www.g4foc.org>.



## 40 Meters

You would never guess that, long ago, 40 meters was a band for exclusive use for CW operators! This original amateur radio band has quite a history. In the beginning, 7000 to 7300 kcs was filled with Morse code! After 1952, the flood gates were opened and amateur phone operations on 40 meters began. To the chagrin of many seasoned brass pounders, the FCC also began the authorization of Novice CW licensees crowding the bands further. The Novices inhabited 7100 to 7150 kcs, under 75 watts and crystal control. No VFOs! It was busy as a bee hive.

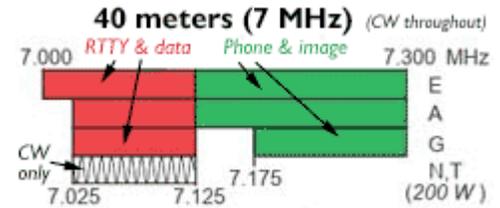


Band chart from 1932 shows the harmonic relationships of six amateur bands and how the 40 meter band was for CW only. [W8CU, Bliley Piezo-Electric Co.]

More invaders: for decades, the 40 meter amateur band was simply jammed with international shortwave broadcasters at night. If a 5 kc slot was open for half an hour at night somebody would fill it! Today, most shortwave broadcasters have cleared out of the amateur 40 meter band in North America now only using frequencies from 7300 and above. Some stragglers still appear as low as 7100 but the *mêlée* has subsided considerably. For instance, Radio New Zealand Pacific had been

using 7245 but recently has reverted to 7390 kHz.

CW operation on 40 meters is constantly being squished farther and farther down the dial. Not so long ago, the QRP CW watering hole was



7040. With FT8 and similar modes taking a stronghold on 7071 and surrounds, old-fashioned RTTY operations moved way down to 7040. Low power QRP CWers then moved to 7030, but that frequency was captured by an onslaught of overage from PSK31 and other digital modes centered on 7035 kHz. RTTY mavens are now known to use 7025 to 7050 especially during contests. These days, QRP CW is more likely seen around 7028 kHz. The little sliver between 7025 and 7028 has become sacred to all CW operators not holding a full Extra Class license!

In response to these trends, I built my recently installed NVIS (Near Vertical Incidence Skywave) 40 meter dipole cut longer than usual to favor the area between 7000 and 7030 kHz. This strategy also encourages the dipole to become resonant on 15 meters between 21000 and 21090 kHz — a nice added feature in design!

There is still some hope of using 7050 through 7060 as beginner CW territory especially 7058 — the calling frequency of the popular FISTS group and 7055 for the SKCC (Straight Key Century Club) crowd. It might be worth a try. Tune in and see!



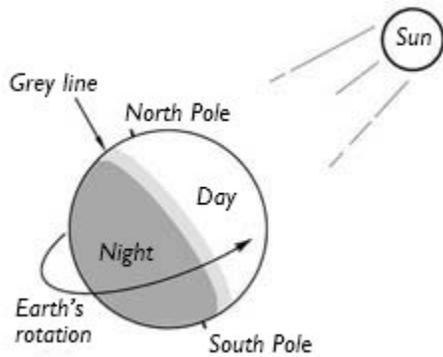
Beware! 7000 to 7025 kHz is a major league ballpark for CW. You will often find 30+ word per minute woodpeckers blasting somewhat intimidating fast speed code as they hold court over massive pile-ups of DXers. A recent trend is actually hearing relatively slow operators (around 20 words per minute or even slower) in the upper reaches of the Extra segment between about 7020 to 7025 kHz these days. They had to go somewhere!

## Advancing and Adjusting

Stating the obvious, the coming of automatic digital modes like FT8 has had a profound effect on nearly every amateur band. FT8 offers great ease in working the deepest depths of DXing without the maniacal pile-ups and aggravation we know so well. Sit back and relax while your computer does the work. It wouldn't surprise me if you could achieve DXCC (100 countries worked) in just one weekend on FT8!

Now that we are in the year 2022, my habits have changed dramatically. Out of necessity, you learn to adapt. Some of my very best on-the-air experiences are

now found around the magic hour of about 2:30 a.m. local time. At this wee hour, the bands are clear. Grey line enhancement is at a particularly optimum place: Europe is just waking up and the VK Aussies and



*Grey line propagation is the result of low MF and HF absorption in the region between day and night.*

Kiwi ZLs are just having dinner. Reception into both areas is enhanced for your pleasure. You will often hear faraway stations calling CQ NA for North America. What could be better? Everyone is anxious to work you! 7000 to 7025 can be quite a playground if you can afford to be awake at that hour!

### 30 Meters

If you need an oasis from the bustling crowds on other amateur bands, 30 meters is the place to park your camel (or at least your camelback key!) What are the ingredients of this Nirvana? Only General, Advanced and Extra Class operators are allowed. Power is limited to 200 watts. By gentleman's agreement, the 10100 to 10150 kHz 30 meter band is casually cut in half. 10100 to 10125 is for traditional CW. 10125 to 10150 belongs to all modern digital modes. Life is easy and predictable!

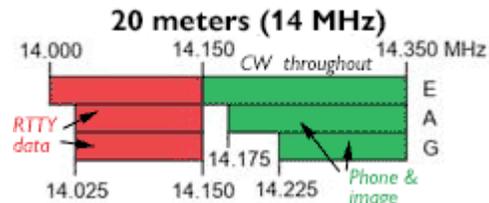
On 30 meters, you'll also find similar personalities to the crowd found on the channelized 60 meter band. Operators are more courteous, thoughtful and gentle in their approach on the air. From noon to dusk, a fine crowd of thoughtful stations usually appears from every nook and cranny of Europe and beyond. Low power means low clutter. 30 meters is always a place to enjoy and is an excellent environment for low power coders to flourish. I use a 5 watt Oak Hills Research OHR-100 to a dipole here regularly and can work almost everyone I can hear. 30 meters is a nice place to be!

October 28, 1982 was a big day for CW operators! It was the day 30 meters first opened! 10100 to 10109 and 10115 to 10150 kHz became the original 30 meter allocation. The in-between gap closed about two years later making 30 meters continuous from 10100 to 10150 kHz in 1985. It has been a fine CW haven since day one!

The other two WARC bands, 17 and 12 meters have their own followings. I have found that 17 meters (18068 to 18168 kHz) has a pretty avid CW following.

### 20 Meters

If you had to pick just one HF band, 20 meters would probably be a good choice. It is very active on nearly every mode. The antennas for the band are relatively short. Even a full half-wave dipole is only 33 feet long from end to end on 20 meters... possibly a good length from a window to a nearby tree.



Your 14 MHz transmissions can easily find their way all around the world even with tiny signals from QRP rigs. I have worked some fascinating places with about 250 milliwatts (just one quarter of one watt) on 20 meter CW using a Small Wonder Labs RockMite transceiver. Not bad for a rig that runs on AA batteries!

You will never find a moment of inactivity on 20 meters. Day and night, this frequency range is always ready to host communication from far and wide. From the eyes of this observer,

14060 kHz is the place to be. This is the most definitive QRP CW watering hole in all of amateur radio. Look here during the daytime for an endless parade of low wattage, milliwatt and even microwatt operators calling from a wide variety of places with all sorts of novel, simple and experimental antennas. Many stations are battery or solar powered.



*"The DXer's dream" [after HamRadio Jul 1970]*

You'll find all sorts of 'activations' on or around 14060, too. Look for SOTA (Summits On The Air) mountain-toppers, POTA (Parks,) IOTA (Islands,) COTA (Castles,) BOTA (Beaches,) and the list goes on! Nearby, the FISTS CW club members haunt 14058 and members of the SKCC (Straight Key Century Club) are found around 14050 kHz.



For even more fun, try listening to the slow-scan TV frequency of 14230 kHz. Using free software like the popular MMSSTV-YONIQ application, you can easily decode the digitally encoded pictures sent by other hams just by picking up their audio from a nearby ra-

dio. Try this link: <https://hamsoft.ca/pages/mmsstv-yoniq.php> for a free download. Keep in mind that this is a Windows only application.

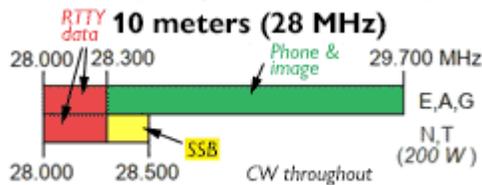
Sadly, Technicians do not have privileges on 20 meters. You have to upgrade to a General Class license or better as a requirement for entrance! It is worth the effort. You'll never have so much fun with so many people after you get in!

**Technicians Please Note!**

Don't just say "someday I'll try HF." You can go there today... if you use CW! All Technician licensees can operate CW with up to 200 watts on these allocations: 3525 to 3600, 7025 to 7125, 21025 to 21200 and 28000 to 28300 kHz. Learn a little Morse code and try these bands! You can even operate on upper sideband *phone* on 10 meters! from 28300 to 28500 kHz with up to 200 watts PEP. Have fun! Do it now!

**Give Me Ten!**

The amateur ten meter band is also a popular place to be! Just like many other bands, the first 25 or 30 kHz is embraced with CW. I find 28020 and 28030 kHz to be good places to send out your CQs to start.



Europe and trans-equatorial skip into South America are common catches. You

can work all over North America, too!

Tune very slowly between 28150 and 28300 kHz and see if you can hear one of the many, many beacon transmitters sending out their call signs and Maidenhead grids in Morse code over and over again. Miss the call sign? You'll get another chance when it repeats in a few seconds. Many of these beacons use minimal power and make great DX catches!

Ten's true zoo lives between 28300 and 28500 kHz, just loaded with upper sideband phone stations when the band is "open." This is the only place where Technician licensees can operate phone on HF. It is limitless in potential. I have easily worked Japan, Alaska, Australia and New Zealand on ten meters with very modest equipment. Just above this segment, 28500 to about 28650, amateurs with higher classes of license can work some very tasty skip to build your logbook quickly with entries you can be very proud of!

One more thing... There is even a taste of what the VHF and UHF bands are like on ten meters. Try listening to 10 meter FM! The simplex one-to-one frequency is 29600 kHz. 10 meter repeater output frequencies run from 29610 to 29690 kHz with 10 kHz spacing. If you have a scanner or a transceiver that includes FM mode, scan the 10 meter FM frequencies 29600 through 29700 kHz and see what you can hear. This

can be an easy indicator of activity on the ten meter band. If you hear FM stations coming in you'll know the band is open!

Antennas for ten meters are tiny. Dipoles are only about 16½ feet long. If you are driving in your car, many hams use factory-made Citizen's Band (CB) antennas. You may have to trim the driven antenna element a few inches to make it useful on ten meters but it is an easy adjustment.

**It's a Miracle**

As time goes by, I am sure you will find your own neighborhoods and favorite places to hang out. Everybody has their own habits and preferences and you will, too. Experiment! Be a good listener... and just have fun! Remember: mid-December is often filled with E-skip propagation on VHF and even UHF. Monitor 6 meters and 2 meters and listen for skip from between 500 and 2000 miles away. Try calling CQ on the 2 meter national simplex calling frequency: 146.520 MHz. 6 meter FM can be fun, too. Try the 6 meter FM simplex calling frequency on 52.525 MHz. The 6 meter USB calling frequency is 50.125 MHz. You never know what you might hear!



Every QSO is a miracle. Your signals might be heard hundreds or thousands of miles away. There is nothing between you and your corresponding ham except air! How does all this happen? Enjoy every minute. Don't forget: *Tell your friends* about your fun and accomplishments. The more amateurs on the air the better!

Happy holidays and happy new year! See you on the air! Please remember that the slow code event of the year happens on New Year's Eve and New Year's Day: The ARRL Straight Key Night. Many hams get on the air with their manual straight Morse code keys and (sometimes) legacy station gear from their pasts and

send code just like the good old days. Check out this site for more details: <http://www.arrl.org/straight-key-night>



Vintage gear for Straight Key Night — Heath HW-16 CW transceiver and HG-10B VFO, circa 1968.

73 es Happy Holidays! de N2KZ 'The Old Goat.'



# Trail camera

Did you ever wonder who or what has been corrodng your ground rods, chewing on your coaxial cables or raking up buried radial wires? A low-cost trail camera might help identify the guilty party.

On a recent Roundtable Net, Rob AD2CT reported that he had installed a trail camera in his yard — and immediately captured overnight pictures of a deer and an antlered buck. Rob supplied details of the camera — as well as several daytime and nighttime shots.



Nighttime (top) and daytime shots captured by Rob AD2CT's Trail Camera.

The equipment in use is a pair of Simmons Whitetail Classic 119502C 10 megapixel Trail Cameras, which are capable of recording single shots as



Simmons 10 megapixel Trail Camera with cover open to insert an SD card. [AD2CT pics]

well as 720p video when activated. The cameras run on eight AA batteries and save pictures plus video to an SD memory card, sized up to 32 GB. Images are recorded in color during daylight, with monochrome at night, using a built-in “low-glow” infra-red flash based on 23 LEDs. Picture-taking is triggered by a built-in PIR (passive infra-red) motion detector.

## WECA Extra Class

Westchester Emergency Communications Association will be holding a class for the FCC Amateur Extra license starting on Tuesday January 3rd 2023, continuing Tuesday evenings until March 7th. The class will take place in-person from 7:00 p.m. at the Westchester Fire Training Center at 4 Dana Road, Valhalla and for remote attendees via Zoom. All are welcome to attend the free class. The first step is to contact WECA Education Director Larrie Sutliff W2UL by e-mail to: [w2ul@weca.org](mailto:w2ul@weca.org) for registration and additional information.



Students are advised to obtain the following text books before the class begins. They are available from ARRL and from Amateur Radio dealers. Be sure to order the correct edition.

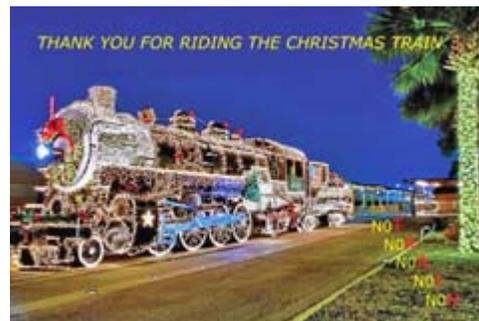
ARRL Extra Class License Manual - 12th Edition  
ARRL's Extra Class Q&A - 5th Edition

Further details of the Extra license class and upcoming General license class (March 14th – May 9th ) are available from WECA web site: <https://www.weca.org/>

## Holiday Train

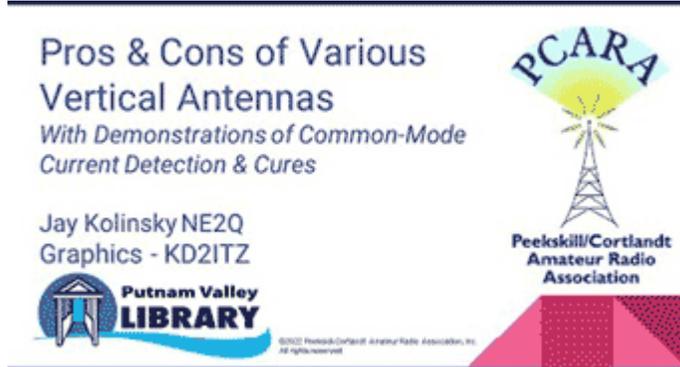
The Christmas Train Special Event will be on-air starting at midnight UTC December 23<sup>rd</sup> through December 25<sup>th</sup>. “Engineers” will be operating SSB phone on 80 through 10 meters including the WARC bands using the special event call signs: N0T, N0R, N0A, N0I, & N0N. The Christmas Train is organized by Randy K0RWB from Bates City, MO.

Armando KC2EES, Lou KD2ITZ, and Vincent KD2VAV will be on-air from Yorktown Heights using the call sign N0N. Be sure to call them and the other stations to exchange signal reports and holiday greetings!  
- Lou KD2ITZ



# Video channel

Rob AD2CT reports that the video recording of Jay, NE2Q's 'Vertical Antennas' presentation is now available on PCARA's YouTube Channel. The original presentation to PCARA members took place on September 10 at the Putnam Valley Library. Full title is "Pros & Cons of Various Vertical Antennas with demonstrations of common-mode current detection and cures."



In the video, Jay gives a live demonstration of what happens when there are common mode currents present on the outer conductor of a coaxial cable feeding a vertical antenna — and how to prevent their worst effects.

The Peekskill / Cortlandt Amateur Radio Association YouTube Channel can be found at:

<https://www.youtube.com/@peekskillcortlandtamateurr7670>. At the time of writing there are three video recordings available — with Jay's common-mode presentation having been viewed 132 times.

## New prefixes

No — this item is not reporting on radio prefixes for new *countries*, but on metric prefixes for the system of measurements known as SI Units (*Système International d'Unités*). Four new prefixes suggested by Dr. Richard Brown (U.K. National Physical Laboratory) and colleagues were subsequently confirmed by a vote of the General Conference on Weights and Measures in France on November 18, 2022.

In amateur radio we are familiar with a range of prefixes from tiny **pico** and **nano** (picofarads, nanometers,) to mighty **mega** and **giga** (megohms, gigahertz), while even larger **tera** can be found in terawatt-hours from a power station.

(Terabyte storage drives are common nowadays, but use of these prefixes for quantities of binary data can be confusing... does kilo mean  $10^3$  (1000) or  $2^{10}$  (1024)? It can depend on who is measuring and who is selling.)

In terms of powers of 10 the familiar prefixes represent — **pico** ( $10^{-12}$ ), **nano** ( $10^{-9}$ ), **mega** ( $10^6$ ), **giga**

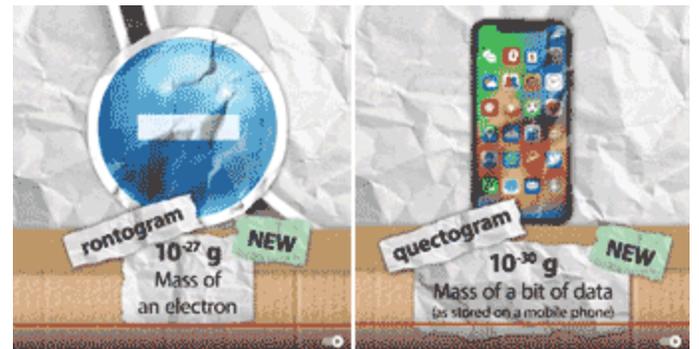
( $10^9$ ) and **tera** ( $10^{12}$ ). The prefixes for pico and nano are abbreviated to single

letter *lower-case* symbols **p** and **n** (for example pF, nm) while the larger prefixes are abbreviated to *upper case* **M**, **G** and **T** (MΩ, GHz, TWh)

If you need to describe smaller or larger units, the prefixes **femto** ( $10^{-15}$ ) and **atto** ( $10^{-18}$ ) were added in 1964 while **peta** ( $10^{15}$ ) and **exa** ( $10^{18}$ ) were added in 1975. Perhaps you are responsible for petabytes of data or you have a few femtoamps draining your power supply.

New prefixes **zetta** ( $10^{21}$ ), **yotta** ( $10^{24}$ ), **zepto** ( $10^{-21}$ ) and **yocto** ( $10^{-24}$ ) were added in 1991 for numbers with 21 or 24 zeros .

The latest additions in 2022 are **ronna** ( $10^{27}$ ) and **quetta** ( $10^{30}$ ) for very large numbers and **ronto** ( $10^{-27}$ ) and **qecto** ( $10^{-30}$ ) for very small ones.



Ronto and qecto are the new prefixes for  $10^{-27}$  and  $10^{-30}$  respectively. [Credit NPL]



Ronna and quetta are the new prefixes for  $10^{27}$  and  $10^{30}$  respectively. [Credit NPL]

The new prefixes are for numbers with 27 and 30 zeros respectively. **R** and **Q** were the last letters of the Latin/English alphabet not yet used for prefixes and units.

At the same General Conference on Weights and Measures a decision was made to abandon — on or before 2035 — the practice of adding 'leap seconds' to keep UTC in sync with astronomical time (UT1), derived from Earth's rotation.

- NM9J

# The price is right

## Signs of change

A few weeks ago, I was in local supermarket **ShopRite** when I noticed Ethernet cable being pulled from a box into the false ceiling above the freezer aisle.

On my next visit in early November, the Halloween merchandise was being moved out and something new was being moved in — technicians were busy installing electronic **price tags** throughout the store.



ShopRite on Rt. 6 in Cortlandt Manor.

I had seen **electronic shelf labels** (ESLs) in Kohl's and BestBuy, but this was the first time I had seen a system being installed in a local supermarket. On my next visit, the system was in full use throughout the store, with 1½" labels on small items, 2½" labels on shelves, all the way up to full size two-color 11½" placards on bins and cabinets.



Electronic shelf labels narrow and wide as seen in ShopRite, Cortlandt Manor.

The labels had to be using radio frequency technology — but this prompted several questions. How were the labels powered? What frequencies were they using? How were the price tags updated? How could they display two different colors (black and red)? Here is what I discovered.

## ShopRite shops smart

The electronic shelf label systems being installed in ShopRite stores are supplied by SOLUM America Inc. of Ridgefield Park, NJ. This South Korean company —



sometimes written as SoluM and sometimes pronounced Solu-M — was spun-off from

Samsung's electronic component company Samsung Electro-Mechanics in 2015.

Solum's latest electronic shelf label system named

“Newton” was introduced in 2020. Newton shelf labels have a 10-year battery life and an ultra-fast update speed compared with earlier products. They are sufficiently rugged to survive rough handling in stores and warehouses.

# Newton

Early shelf labels employed LCDs (liquid crystal displays) but this limits the characters that can be shown and LCD power consumption shortens battery life. Modern labels employ **e-ink** technology, also known as **electronic paper**, a technique that requires zero power consumption to maintain the display.

## Read the electronic paper

Electronic paper mimics the appearance of printed paper, showing letters and symbols on a plain background. Incident light is sufficient to view the display, no backlight is required and the image is visible over a wide viewing angle of 180°. The first major application was in Amazon's **Kindle** e-book reader of 2007 with its monochrome e-paper display. A modern example is the “**reMarkable 2**” next generation paper tablet, recommended by Dave

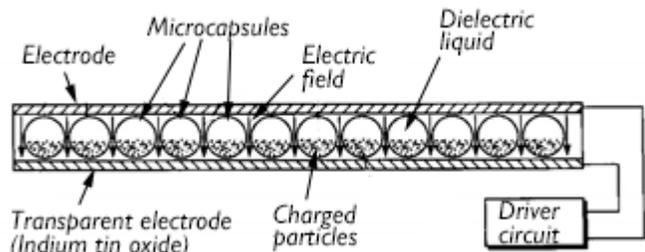
KF2BD. This device allows writing on a paper-like surface with a pen/stylus, and subsequent optical character recognition.



“reMarkable 2” tablet can be used to take notes and read documents.

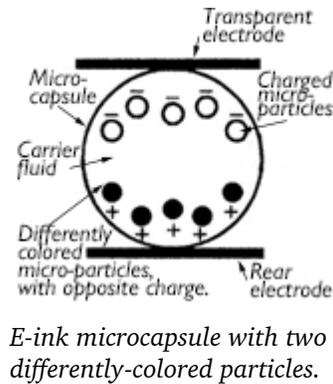
Electronic ink was invented by a group of MIT undergraduates in 1996. A layer of microcapsules

is arranged between electrodes. Each microcapsule contains a suspension of pigment particles in colored oil. Particles of (for example) negatively-charged titanium dioxide are colored white while the oil is colored by a black dye. Application of a positive electric charge to a transparent electrode over several microcapsules attracts the white particles inside, turning the pixel white. A negative charge repels the white particles to the other end of the microcapsule, turning the pixel black. (U.S. Patent 5,930,026 “Nonemissive Displays...”)

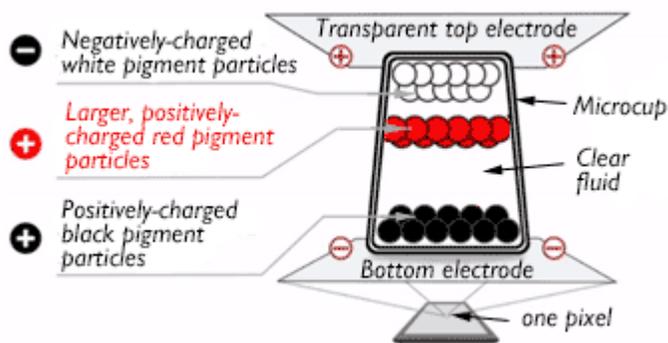


Early e-ink patent shows charged pigment particles suspended in colored oil, attracted to a transparent electrode.

This basic idea was developed further by MIT using particles of two different colors within the microcapsules. For example, white particles are negatively charged and black particles are positively charged. They are attracted and repelled to opposite sides of the microcapsule by appropriate electric fields. (See U.S. Patent 5,961,804. “Microencapsulated Electrophoretic Display”).



A further development is E Ink Corporation’s Spectra 3000 product designed specifically for electronic shelf labels. This employs sealed Microcups® rather than microcapsules, containing **three** different colored pigment particles. Current choices are black / white / red (BWR) or black / white / yellow (BWY) pigments. The color displayed is determined by the voltage level and time applied — a result of size and speed of movement of the pigment particles plus their level of charge. (See U.S. Patent 9,759,980 B, “Color Display Device”).



*Three-color e-ink display using colored pigment particles of different sizes and charge levels. [After E Ink Corp.]*

These displays are **bistable**: location of pigment particles is maintained even when the activating electric field is removed. This can be achieved by adding liquid crystals to the display fluid or by residual charge left on the microcapsule walls.

Since no current draw is needed to maintain the display, the label can be powered by a very small battery. Solum’s smallest 1.6" Newton display is powered by a single CR2450 lithium coin cell, mid-size labels up to 4.3" have two cells and the larger labels have four cells.



*Changing the two CR2450, 3 volt LiMnO<sub>2</sub> coin cells at the back of a mid-size label. [Solum]*



*A supermarket needs a large number of signs and labels.*

### Inside the label

A large supermarket requires 30,000 – 40,000 shelf labels. Solum’s Newton tags are available in sizes from 1.6" to 11.6" (display diagonal size). Their 10-year battery life is double the life of earlier tags, while incorporating a 7-color flashing LED and a pair of programmable press-buttons for external interaction. Tags can be updated quickly, as many as 3,000 in five minutes through a Newton Gateway. There is sufficient memory for seven pages of information to be displayed.

The Vietnam-manufactured shelf labels communicate in two ways. There is 2.4 GHz WiFi for communication with the Newton gateway for price updates. Near-field communication is also built-in for local activation using a hand-held device, or for customer interaction and mobile payment by tapping with a mobile phone. FeliCa RFID technology is powered by the external device using inductive coupling between the nearby coils at an RF frequency of 13.56 MHz. Solum provides an NFL beeper to wake up labels for updates, flip through multiple pages, and check status.

To save battery power, shelf labels are inactive most of the time, waking up every 3 - 6 seconds to check whether an update is being made available by the RF gateway. When a label is communicating with the gateway its own transmit power is only 3 mW at 2.4 GHz.

Standard labels are waterproof, dustproof and shock-resistant — necessary attributes for a supermarket where labels might be bumped into by carts, customers and cold, wet goods. A special range of Newton labels is available for use inside freezer cabinets. They have a blue thermometer mark on the bezel and can operate from 32°F to -13°F. These specialized labels only have a single e-ink color, with reduced battery life of 3 years.



*Shelf label for use inside a freezer case has blue mark, buttons and LED (right).*

## Gateway to success

Key to operation of Solum's shelf label system is "AIMS" the Advanced Information Management System developed by Solum for their ESL systems. Store personnel assign labels to specific products by scanning bar codes with a PDA. AIMS generates label images based on product information obtained from the store's IT system. AIMS then sends label images and pricing information to the corresponding Gateway, which will



*Newton Gateway looks like a WiFi router.*

transmit the data to each label requiring an update. The gateway looks very much like a WiFi router with four antennas, LED ID/status indicators and an

RJ-45 connector for 1 GHz connectivity plus Power-over-Ethernet.

The Newton Gateway has two-way communication capability with shelf labels over a radius of 30 meters (98 feet) using 98mW power output at 2.4 GHz. In ShopRite's installation, I counted four gateways installed just below the ceiling tiles. (No doubt this is why I had seen Ethernet cable being installed above the freezer aisle.)

Unlike standard 2.4 GHz WiFi devices which only have access to three non-overlapping 20 MHz channels within the range 2402-2480 MHz, the Newton Gateway claims to have 60 channels available, with a channel hopping capability to counter interference from other WiFi devices. Instead of standard WiFi encryption, the gateway makes use of a Solum-proprietary protocol with 128-bit AES encryption. The FCC Test Report suggests that 40 channels, 2 MHz wide are in use at 2.4 GHz. The Gateway has storage capacity for up to 50,000 labels.

## Brave New(ton) World

Electronic shelf labels are a natural fit for supermarkets, especially in these times of rising prices and hard-to-find personnel. Staff no longer need to spend

hours printing, separating and swapping hundreds or even thousands of paper tags as price and availability change with the seasons. Errors marking shelves are avoided and old labels no longer need to be disposed of. Specials and discounts can be offered with minimal effort. Flexible price adjustments can help sell perishable goods that would otherwise have to be disposed of at the end of the day.

Solum estimates that the average price of an electronic price tag is between \$6.00 and \$10.00. As price declines, their use is bound to increase.

From self-checkouts to electronic shelf labels, we can look forward to physical stores with fewer and fewer personnel. Perhaps future customers will have to re-stock the shelves themselves before they are allowed to buy anything!

## Think e-ink

On a **brighter** note, the low-cost electronic paper displays used in electronic shelf labels may also find a place in our own battery-powered equipment such as handi-talkies, portable HF transceivers, multimeters, antenna analyzers, clocks, watches and call sign badges. They are already in use for bus-stop time-tables, menu-boards and gas station price signs. They may well prove useful for applications needing a low-power display, legible from any angle using incident light — all the way up to bright sunlight.

- NM9J

## References

**Solum America:** <https://www.solumesl.com>

**Kindle Paperwhite:** <https://www.amazon.com/dp/B08B495319>

**reMarkable 2:** <https://remarkable.com>

**E Ink Corporation:** <https://www.eink.com>



*Displays based on electronic paper could work well with battery-powered mobile devices. [Simulation]*

# FCC Authorizations

On November 25 the FCC adopted new rules prohibiting communications equipment deemed to pose an unacceptable risk to national security from being authorized for importation or sale in the United States. The "Covered List" includes equipment produced by Huawei Technologies, ZTE Corporation, **Hytera Communications**, Hangzhou Hikvision Digital Technology and Dahua Technology. FCC Commissioner Brendan Carr stated that no new equipment from Dahua, Hikvision or Hytera will be approved unless the FCC is assured it will not be used for public safety, security of government facilities or other national security purposes.

# Ethan returns to the air - N2SO

You may recall that my grandson Ethan Grabowski had a few QSOs at our Field Day event a few years ago.



Charles N2SO's grandson Ethan makes a contact on 80 meter SSB under the supervision of Lovji N2CKD during PCARA Field Day 2017.

Although I couldn't get him going on Ham Radio, he now broadcasts worldwide every Wednesday evening at 7:00 p.m. EST on WFNM, Franklin and Marshall College. He plays music and talks about current events. He is a freshman and enjoys politics and government. He is also the Freshman Class President. See: <https://www.fandm.edu/magazine/magazine-issues/autumn-2013/autumn-2013-articles/2013/10/17/wfnm-89-1-fm>

- 73, Charles N2SO



Ethan returns to the microphone at WFNM, 89.1 MHz FM, the college radio station of Franklin & Marshall College, Lancaster PA. [Pic courtesy N2SO.]

# ARRL Club News

ARRL Club News is a monthly newsletter produced by the American Radio Relay League to showcase radio clubs' work in the community and how clubs advance amateur radio. It is distributed by e-mail and through the ARRL web site. Editor is Michael Walters W8ZY.

There was a surprise in the November 15, 2022 issue with a short piece describing PCARA and WECA's support for the 2022 Harry Chapin Memorial Run Against Hunger. An edited extract of the PCARA Update article from November 2022 pp 7-9 was included, along with a picture of Alan N2YGM and Kathleen KC2VCT operating from the Westchester County RACES vehicle.



## Run Against Hunger 2022

Malcolm Pritchard, N9MJ

The 42nd Annual Harry Chapin Memorial Run/Walk Against Hunger took place on Sunday, October 16. This was the eighth time that the Peekskill/Cortlandt Amateur Radio Association (PCARA) has been asked to provide communications support for the event. The first Run Against Hunger event was organized to commemorate singer/songwriter Harry Chapin, who died in a car accident in July 1981. In addition to music, Chapin dedicated his life to the cause of ending world hunger. This inspired citizens in Croton-on-Hudson in New York to create an annual race in his name to raise funds to fight



## BIPOLUSA.COM



### Final thoughts

The event went quite smoothly. The only unmanned post was in the early morning at the 5K run's stop #3. There might not have been quite so many runners as in pre-COVID events, but they completed the course without incident. Communication with net control using WECA's 147.060 repeater was dependable and uninterrupted this time. David Wright, K2WPM, offered the following memory of the event: "I was at Croton Dam East [with a] J pole on a tripod and handheld transceivers. [The] solar panel and antenna drew dozens of inquiries about ham radio. I should have thought to bring some ham radio brochures!"



ARRL Club News is published twelve times a year. The November 2022 issue is available at <http://www.arrl.org/club-news?issue=2022-11-15>. Back issues can be reached through: <http://www.arrl.org/club-news>. ARRL members may subscribe at no cost by editing their Member Data Page.

# Field Day Results 2022

## Recent years

Thanks to COVID-19, PCARA's 2020 Field Day entry was from individual Class D home stations who were allowed to work any other station then aggregate their scores under a single radio club name.

In 2021 with restrictions relaxed, PCARA returned to Walter Panas High School. A 3-element wire beam, a tower-mounted triband beam and plenty of overnight operators all contributed to PCARA's record score.

## This year

The year 2022 brought another change. Walter Panas High School had demolished its upper softball field and constructed a new multi-purpose field alongside the school. The new field was in use for graduation ceremonies on July 25 so PCARA accepted an alternative suggestion from Lakeland Central School District to move to **George Washington Elementary School** in Mohegan Lake. At the new site, antennas were pulled up between tall trees and a single 30 ft tent housed all three stations. Despite rising sunspots, HF conditions were poor and we encountered



Field Day 2022 at GW Elementary School.

problems with a collapsed beam plus 90°F weather — see PCARA Update for July 2022 for details. PCARA's 2022 Field Day entry in Class 2A resulted in 608 QSOs and a total score of 2234 points. These results were transmitted electronically to ARRL by Joe, WA2MCR.

Results from ARRL Field Day 2022 were published in the December issue of *QST*. PCARA's score is shown below alongside results from previous years.

### Peekskill/Cortlandt ARA, W2NYW, Class 2A

	2002	2003	2004	2005	2007	2008	2009	2011	2012	2021	2022
QSO pts:	718	733	968	853	1019	1109	694	879	968	1366	712
Power:	2 (<150W)										
Partcpts:	15	11	12	10	14	10	10	14	15	25	24
Tot score:	2,096	2,328	2,996	2,798	2,906	3,460	2,746	2,602	2,920	3662	2234

Like many of our neighbors, PCARA held a tradi-

tional club-portable Class A Field Day *and* aggregated its score with members' Class B and D stations who were operating separately from the main event. PCARA's aggregate score of 3,104 includes contributions from Charles N2SO (1D, 111 QSOs, 494 points) Mike N2HTT (1B, 23 QSOs, 290 points) and Todd N2MUZ (1D, 18 QSOs, 86 points). Thanks to all! Here is a listing of neighboring clubs and their aggregate scores.

Club	Aggreg. Score	Entries
Westchester EmCom Assn	8,488*	1
Yonkers ARC	4,038	2
Orange County (NY) ARC	3,946	5
Peekskill/Cortlandt ARA	3,104	4
Putnam Emergency ARL	2,768	2
QSY Society	1,196	2

\* (Non-aggregate)

Congratulations to WECA on their high score, coming entirely from their Category 4A entry.

Here are the **non-aggregated** results for top-scoring stations in the **Eastern New York (ENY)** Section of ARRL's Hudson Division:

#	Call	Score	Cat.	QSOs	Club
1	N2SF	8,488	4A	2,254	Westchester EmComm Assn
2	W2IR	8,364	6A	2,403	Broughton Memorial FD Gp
3	W2C	6,200	5A	1,402	Warren County (NY) RC
4	K2CT	5,060	3A	1,078	Albany ARA
5	N2LBR	5,050	2D	1,225	N2LBR Contest Team
6	W2YRC	3,964	3A	954	Yonkers ARC
7	K2DLL	2,908	3A	542	Saratoga County ARA
8	N2LL	2,860	5A	662	Overlook Mountain ARC
9	K2S	2,706	3A	561	Sullivan County ARES
10	KX2D	2,670	1A	500	Megamachine Repeater Gp.
11	K2PUT	2,408	3A	458	Putnam Em. ARL
12	WB2FUV	2,240	1Bbat	199	Hudson Valley Cont & DX
13	W2NYW	2,234	2A	608	Peekskill / Cortlandt ARA
14	W2EGB	1,666	3A.com	419	East Greenbush ARA
15	WD2K	1,212	3A	237	Rip Van Winkle ARS
16	W2HO	1,198	5A.com	149	Orange County (NY) ARC
17	NY2U	1,030	3A	90	Troy ARA

Unfortunately, by press-time ARRL had **not** released the full database of Field Day 2022 results, so we cannot publish PCARA's position relative to all of ENY, or in the whole Hudson Division or in Category 2A nationwide. The only position we **can** publish is PCARA's 13<sup>th</sup> place in ENY section, where PCARA was the *only* entry for Category 2A. We do know from *QST* that 4,929 entries were submitted, with 29,679 participants in all.

PCARA's standing in 2022 is not quite as good as our record result of 2021 — but that might be explained by the poor HF conditions, the oppressive heat and having to adapt to a new location. Onward and upward in 2023!  
- NM9J

# Peekskill / Cortlandt Amateur Radio Association

**Mail:** PCARA, PO Box 146, Crompond, NY 10517

**E-Mail:** mail 'at' pcara.org

**Web site:** <http://www.pcara.org>

**PCARA on Facebook:** <https://www.facebook.com/pcararadio>

**YouTube Channel:** <https://www.youtube.com/@peekskillcortlandtamateur7670>

**PCARA Update Editor:** Malcolm Pritchard, NM9J

E-mail: NM9J 'at' arrl.net

*Newsletter contributions are always very welcome!*

Archive: <http://nm9j.com/pcara/newslett.htm>

## PCARA Information

PCARA is a **Non-Profit Community Service**

**Organization.** PCARA meetings take place every month (apart from July/August break). See <http://www.pcara.org> for current details.

## PCARA Repeaters

**W2NYW:** 146.67 MHz -0.6, PL 156.7Hz

**KB2CQE:** 449.925MHz -5.0, PL 179.9Hz

**N2CBH:** 448.725MHz -5.0, PL 107.2Hz

## PCARA Calendar

Masks and Social Distancing may be required.

**Sun Dec 4:** PCARA Holiday Dinner, 5:00 p.m., Cortlandt Colonial Restaurant, 714 Old Albany Post Rd, Cortlandt Manor.

**Sat Dec 17:** PCARA Breakfast, 9:00 a.m., Uncle Giuseppe's, 327 Downing Dr. Yorktown Heights, NY.

**Wed Dec 21:** PCARA V.E. Test Session, 7:00 p.m., BOCES room 119 (Microcomputer Tech Classroom), see below.

**Sun Jan 8 2023:** PCARA Bring & Buy Auction, 3:00 p.m., Cortlandt Town Center CUE Room.

## Hamfests

Check with organizers before leaving.

**Sat Jan 7 2023:** Ham Radio University, third year as a virtual event with registration links for forums. See: <https://hamradiouniversity.org/>

## VE Test Sessions

Check with the contact before leaving.

**Dec 3, 10, 17, 24, 31:** Westchester ARC, 19 Hunts Bridge Rd, Yonkers NY. 11:00 a.m. Must contact VE, ac2t'at'arrl.net.

**Dec 3, 10, 17, 24, 31:** NYC-Westchester ARC, 43 Hart Ave, Yonkers NY. 12:00 noon. Must contact VE, k2ltm'at'aol.com.

**Dec 8:** WECA, Westch Cnty Fire Trg Center, 4 Dana Rd Valhalla NY. 7:00 p.m. Must contact VE, robert.casino'at'verizon.net

**Dec 21:** PCARA, 7:00 p.m., Putnam | Northern Westchester BOCES, Tech Center, 200 BOCES Drive, Yorktown Heights, Room 119. 7:00 p.m. Must contact VE. Mike W2IG, w2igg'at'yahoo.com.



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