



PCARA Update



Volume 24, Issue 12 Peekskill/Cortlandt Amateur Radio Association Inc. December 2023

Step right up!

We ended the month with a bit of evangelical Amateur Radio fervor on the evening of Thursday October 26, 2023 at “Meet the Teacher Night” at the Putnam | Northern Westchester BOCES Tech Center in Yorktown Heights, NY. Pastor Lou KD2ITZ was busy handing out PCARA pamphlets and details of scholarships available for licensed radio amateurs, to anyone within arm’s reach. Let’s see what sprouts from the seeds that were sown.

The November PCARA **Membership Meeting** was held on Saturday November 4, 2023 at 4:30 p.m. at the Putnam Valley Free Library in Putnam Valley, NY. The unusual start time was due to a Defensive Driving Class being given earlier in the day. The library is quite a popular venue. Among the highlights of the meeting was the election of three Board members (Directors/Officers). Greg KB2CQE, Lou KD2ITZ, and Mike W2IG were re-elected unopposed to positions of President, Secretary, and Director respectively for two year terms. During the meeting a moment of silence was held for Ed K2OHK (SK).

A PCARA **VE. Test Session** was held on the evening of Monday November 13, 2023 at the Putnam | Northern Westchester BOCES Tech Center in Yorktown Heights, NY. Two candidates were in attendance that resulted in one new Technician and one upgrade to General. Congratulations! We keep turning ‘em out!

On Saturday November 18, 2023 at 9:00 a.m., another famous **PCARA Breakfast** was held at Uncle



PCARA was handing out information on amateur radio and scholarships to parents at BOCES Tech Center’s “Meet the Teacher” night on October 26.

Giuseppe’s Marketplace in Yorktown Heights, NY. Over a dozen members were in attendance and we took up several tables. As always, it was most enjoyable and the time flew! Thank you to all who attended.

Please mark your calendars with these upcoming events:

- Sunday December 3, 2023 at 5:00 pm: **Annual PCARA Holiday Dinner** at the Cortlandt Colonial Restaurant in Cortlandt Manor, NY. Menu and costs are published in this month’s edition of the *Update*. Please RSVP with your headcount to Malcolm NM9J at nm9j@at’arrl.net.
- Monday December 11, 2023 at 7:00 pm: **PCARA VE Test Session** (ARRL) at the Putnam | Northern Westchester BOCES Tech Center. Candidates must contact Mike W2IG using w2igg@yahoo.com. Please spread the word. *Continued on page 2* ⇨



Members returned indoors to Uncle Giuseppe’s Marketplace for the November 18 breakfast.

Contents

Step right up! - KB2CQE	1
PEARL repeaters	2
Holiday Dinner.....	2
Adventures in DXing - N2KZ	3
A sail down memory lane - N2MUZ	7
Shelf of history - NM9J	8
Field Day Results 2023.....	11
More LiFePO ₄ - NM9J.....	12
VE Test Session	13

- Saturday December 16, 2023 at 9:00 am: **PCARA Breakfast** at Uncle Giuseppe's Marketplace in Yorktown Heights, NY. Bring along your Holiday Cheer!

Keep your eyes open in early January 2024 for the **Annual PCARA Bring and Buy Auction**. Start getting your treasures ready for sale.

I want to wish each of you and your families, a Most Joyous Holiday Season and a Happy, Healthy, and Blessed New Year! On to 2024!

- 73 de Greg, KB2CQE

PCARA Board

President:

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

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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.

PEARL repeaters

Our neighbors at Putnam Emergency and Amateur Repeater League recently announced a new DMR repeater, located — like their existing 145.130 MHz FM repeater — near Carmel, NY.

PEARL's new repeater operates in the 430-440 MHz section of the 70 cm band and is connected to the Bronx-TRBO/NY-DMR C-Bridge. Brief details of the full-time talkgroups from the NY DMR web site are as follows (see: <http://k2hr.com/Metro%20DMR.html>):

Carmel, NY K2PUT 438.525 -5.0 MHz Color Code 12 Time Slot

- #1 Group Call TG 444 NY Metro System Wide - FT
- #2 Talk Group 2 Local - FT

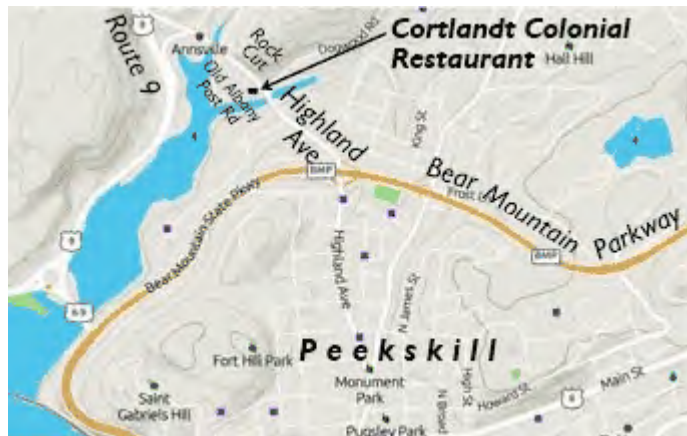
Holiday Dinner

PCARA's 2023 Holiday Dinner has once again been arranged for the same location as in previous years — the Cortlandt Colonial Manor Restaurant. The event begins at 5:00 p.m. on Sunday December 3rd.



Entrance to the Cortlandt Colonial 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. The 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 the Editor know if you will be attending by e-mailing your head-count to: nm9j'at'arrl.net

Adventures in DXing

- N2KZ

Skillful Amateur Radio

Are you successful in life? What have you accomplished and achieved? Look in a dictionary:

Achievement: *A result gained by effort.*

In the world of amateur radio, it often requires lots and lots of effort! Great things are often measured by great big numbers. How big are *your* numbers?

When you are chasing big numbers — the heat is always on! One really harsh reality: Unless your passion and dedication are simply unbridled, there probably is someone who has bigger numbers than you! Graze the listings for any contest or award you might chase and look at the enormous goals that can be attained! How do *you* reach these heights?

The major leagues of amateur radio are filled with incredible feats from super strong efforts. My favorite is the powerhouse known as **PJ2T** — The Caribbean Contesting Consortium, calling from the island of Curaçao in the Netherlands Antilles off the northern coast of Venezuela — <http://www.pj2t.org>.



Location of Curaçao off northern coast of Venezuela. [Base map, public domain, CIA World Factbook.]

CW or SSB, this multi-operator – multi-transmitter contest club is a constant leader during the biggest contests known to amateur radio. Their effort during the 2023 ARRL International DX Phone Contest totaled 11,507,886 points! CQ Worldwide CW Contest 2023? 26,702,235 points! Whoa!

Taking care of business at PJ2T, Geoff Howard, PJ2DX, enjoys the greatest DX life on Earth. How many stations do you know that offer this array of power? Start with tall towers fitted with multiple long-boom monoband Yagis for 15 and 20 meters, a magnificent 40 meter Yagi up 104 feet and a 10-15-20 meter tri-band array high on a nearby hilltop. Get out of the way when their monoband stack for 10 meters fires up! For



Antennas at PJ2T include stacked monobanders on 10 meters, long-boom monoband Yagis on 15 and 20 meters, and a 40 meter Yagi. [Photos by permission of Geoff W0CG, PJ2T.]

enhanced reception: wire beams, Beverage antennas and a four-square array create enhanced ears to accurately acknowledge callers worldwide.

The PJ2T facility is not to be believed! Four completely fitted operator positions employ the N1MM Plus logging system. You'll find Elecraft K3 transceivers and Ameritron AL-1200 amplifiers typically used for their reliability and their resistance to extreme heat and humidity — and overall excellence.



Station manager Geoff Howard at station #1 console.

The Caribbean Contesting Consortium includes about 30 seasoned contesters hard at work on and off the air. Every week they constantly progress to improve the station. One amazing feat: surrounded by the ocean, the tall towers were painstakingly weatherproofed with a heavy layer of epoxy paint and re-assembled. All repairs and



Base of the 80 foot "US/JA" tower with epoxy paint to protect against corrosive sea air.

improvements are performed by the CCC staff on site. Salt air corrosion will attack anything electronic, yet the CCC staff has learned how to negate the rot.

“We’ve posted quite a few World #1 wins in ARRL DX, CQWW, and WPX contests, as well as in 10 meter and 160 events. Our members are overwhelmingly CW types, but our contest wins are evenly distributed across both phone and CW. The statisticians tell us that PJ2T has been the most-logged call sign in all of ham radio for the past 21 years.” (from the QRZ.com entry for PJ2T — used with permission.)

It is not unusual to hear stories about powerful stations earning a DXCC or even a VUCC during one weekend contest. Brute power and antenna force can produce reliable remarkable results. Do these sorts of results and accolades only belong to leviathan contest stations?



PJ2T QSL card received by Karl for a 10 meter contact in 2002.

Be inspired! Don’t fret! Never let the impressive accomplishments of others discourage you. On the contrary, learn from their activities and strategies. Pick your next goal and then start work and go after it! You can do great things but you must try and try harder. You can become a remarkable station with big numbers, too.

Different Approaches

What do you do if you are simply not a contesteer? Maybe you don’t have a megalith, full legal power station on an isolated island far out to sea. Accomplishment and joy comes in many flavors. Personal operating skill and experience can be just as powerful as a big linear amplifier and a substantial antenna above your head. Remember: When it comes to your station, you are always the hero! Did you increase your score by 20% compared to last year? Start smiling! Success and happiness can be yours.

My motto: *Know what you are doing and do it really well!*

Six meters is a great place to learn extraordinary DXing skills. Seasoned operators who love this band may stop everything to pull out a CW signal in a USB

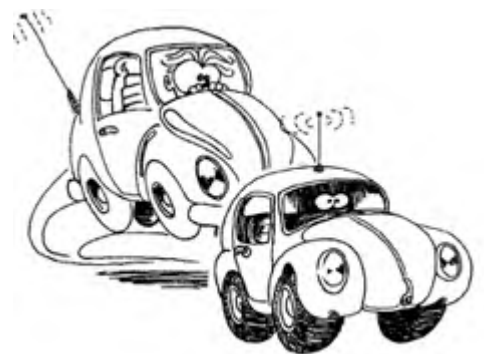
pile-up. We are all looking for miracles! Our common thread? We all need more Maidenhead grid squares in our logbooks. It is an exciting band filled with an enthusiastic crowd of superb operators. Six meters truly is a magic band!

I operate QRP CW (and sometimes USB) between 50.090 and 50.150 MHz. If you try and try and try to break through to an exotic SSB pile-up catch, try this: Offset your transmitter about 700 cycles up from the USB DX signal and send your callsign in CW. Don’t give up! Many a six meter op will go to the ends of the world to work someone who is that desperate to touch base with them. I worked the United Nations’ station 4U1UN while they were on USB with about five watts of CW into a folded dipole tacked up in my attic! It could happen to you!

Enthusiasm works well on HF, too. I made an amazing catch with John VK4BZ, in Brisbane, Australia. The 20 meter band was just hitting dusk grey-line in Queensland. We tried for about 20 minutes before we finally broke through as the band shifted in our favor. You could hear the cheering from almost 10,000 miles away. Two very modest stations touched base just because we both tried hard. Bravo!

Another VHF trick is to listen carefully if the target of a pile-up decides to change frequency. My recent long distance tropo catch to North Carolina was bagged by following a station and then pleading for a contact. The best thing you can hear is “Hey, I’m going to switch to 146.55 because I can’t hear anyone.” I switched quickly and nailed an amazing logging. I was in the clear and Roger, W4MW heard me!

Tailgating is another classic QRP trick. Listen very carefully to a QSO in progress and copy the names and call signs of the folks in session. Pick the one you would most like to work. When their QSO ends and you hear the signature “dit dit” saying



Tailgating or tail-ending is a classic trick of DXers.

“It’s all done” send your target’s call sign with a passion and end with their name and PSE. Many ops will reply just to find out who is calling! How do they know my name?

Every ham likes a quality QSO especially when contests are not in progress. You can create a memorable chat by quick and clever research. Have QRZ.com ready on a nearby computer when you initiate a call. Quickly read the bio of your catch and see what you have in common. What are their hobbies? What is their

background? Have you been to their area? Do you share equipment types? You can meet a lot of amazing people this way. It is a lot more satisfying than endless quick name-QTH-599 and bye QSOs!

Don't be shy! Learn from hams you meet on the air. Some of my best operating tips and techniques have come from legacy amateurs I have worked who share my dedication to Morse CW. When you ask new acquaintances about 'what was it like?' or 'how do you do it?' they are often willing to share a steamer trunk of experiences and ideas that will enrich you forever!

Another terrific attraction can be yours by operating in a unique location. This is the calling card of the very popular Summits On The Air (<https://www.sota.org.uk>) and Parks On The Air (<https://parksontheair.com>) operating groups. You can fill your logbook every time you get on the air!

Local heroes of SOTA and POTA, PCARA's Verle Johnson, W2VJ and QSY Society's Mark Chitjian, WA2NYY are both great evangelists of outdoor operating. Verle



PCARA's Verle W2VJ operating from POTA K-2048, Donald J. Trump State Park.

likes to activate his portable station at Donald J. Trump State Park — Indian Hill Section, in Putnam Valley.

Mark enjoys a good picnic bench at Shelter #2 parking lot — James Baird State Park up in Pleasant Valley. Mark always brings along his fine Elecraft KX3 portable transceiver with a built-in keyer.



QSY Society's Mark WA2NYY (left) and John WA2SDD at James Baird State Park, POTA K-2084 near Poughkeepsie. Transceiver is a KX3 running 10 watts to a mobile Hustler 20m resonator on a 56" mast. [Pic courtesy WA2NYY.]

These are great demonstrations of what can be done with simple equipment and a good battery. Watch our newsletters and Facebook pages for future dates and join in!

A great QSO is even better if you are calling from the top of a picturesque mountain to fill your headphones. Memorable DX calls will be aimed at you! Don't forget to advertise your intentions even if you are at sea level. If you are sitting in an unusual Maidenhead grid or state county — other people want to know. Add a special event callsign for additional attention.

Not Dead Yet!

Don't fall into a very common bad habit. Never listen to anyone who says '*the band is dead!*' You could break through on an unexpected propagation mode like aurora, multiple-hop skip, crazy ducting or some other miracle going on in the upper atmosphere. If you are losing hope for your signals, try looking yourself up on a DX spotting site like the famous Reverse Beacon Network. After you send CQ awhile and receive no replies, go to: <https://reversebeacon.net> and pop your call sign into the 'Spotted DX' field then hit <ENTER>. RBN will instantly report where your signal is being heard!

For more fun, look on-line for a very distant Software Defined Radio. Call up the SDR with your computer and see if your signals are being picked up far away. This is a great trick for experimenting with different antennas. You can listen to your own signals reach into a specific target area in real-time. Discover which antenna works best.

Learn about both horizontal and vertical polarities and different take-off angles just by listening to them. Experience the qualities of Near-Vertical Incidence Skywave wires. Three or even two element wire Yagis can make a world of difference. (PCARA has had wonderful results with a 40 meter wire Yagi on Field Days.) Just start with the Kiwi SDR Map at: <http://kiwisdr.com/public/> and listen to yourself.

Band of Goals

Become a student of your favorite band. Spend some time to observe a waterfall display day and night and especially on unlikely hours. See where other people call, then follow their lead. I love working DX overnight where I often get the comment "It's about time someone from North America showed up!" Learn where the watering hole frequencies are and the habits of operators around the clock. A couple of my favorites are 1810 through 1820 kHz CW on 160 meters and the famous 50.098 MHz CW on six. Again, good research can make your day. If a net meets every day in India, show up 15 minutes before they start and call your CQ. You might just be heard!

Learn about propagation prediction sites. For VHF

/UHF please enjoy William Hepburn's DX Info Centre tropospheric ducting forecast (<https://www.dxinfocentre.com/tropo.html>) and NOAA's Space Weather Prediction Center (<https://www.swpc.noaa.gov/>) These sites can be your first indicators of activity you won't want to miss. Get to know them and visit them frequently!

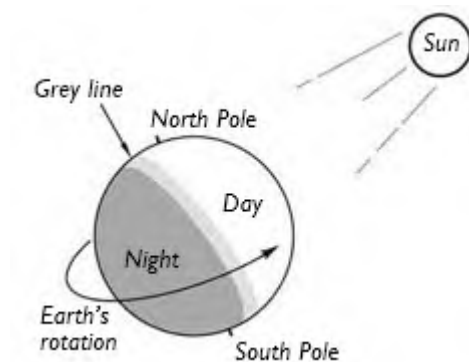
Develop your own set of propagation prompts to meet your needs. Keep an eye on the NOAA weather radio broadcasts heard between 162.400 to 162.550 MHz. Cruise the usually open NOAA channels for stations arriving from far away. Each weather station constantly identifies its location giving you a good idea of current VHF propagation. Similar results can be found on the FM broadcast band. Listen to the usually unused frequencies and search for interesting DX that might be sneaking in. Also be a good town crier. When bands open up, call and message your friends, especially in far-off lands. They might hear you!

HF propagation beacons can be found if you know where to look for them. I use aviation VOLMET weather report stations as an instant indicator of MUF and LUF. [VOLMET derived from the French: 'vol' (flight) and 'météo' (weather)] Often used is the always-present 'Shannon VOLMET' synthesized lady's voice from Ireland on 3413, 5505, 8957 and 13264 kHz USB. Gander (Newfoundland) Radio is on 20 and 50 minutes after the hour on 3485, 6604, 10051, and 13270 kHz USB. Other VOLMET stations are available from all over the world. A full guide can be found at: <https://www.dxinfocentre.com/volmet.htm>.

Those who enjoy the low bands should learn the characteristics of Grey line DX by listening to the top end of AM radio broadcasts at dawn and dusk. You will quickly discover exactly when to expect exotic stations to fade in and out. Follow similar propagation when you are on the 160, 80, 75 and 60 meter bands. 60 meters can be simply amazing if you carefully monitor the top two channels on USB: 5.3715 and 5.4035 MHz.

Individual and Creative

Look for new and interesting places to drop your signals. As a QRP CW maven, I sometimes drop into places most people don't go. A prime example is the wide open spaces above and below FT8's sound of whining cats on 7071, 7074, 7078 kHz. Try CW on:



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

7065 to 7069 and 7083 to 7100 kHz. Be careful not to interfere with other digital modes! People looking at their waterfall displays will see your signal and instantly say 'What is that?'

Also make use of attracting attention where American hams can't go with phone. Go cross-mode! On 40 meters, fully-licensed American hams can employ LSB from 7125 to 7300 kHz. Canadians have extra room using LSB on 7040 to 7300 kHz. Similarly, on 20 meters it's the same story: American USB on 14150 to 14350 kHz but Canadians can fly from 14112 to 14350 kHz. Don't be shy! If you hear exotic phone DX, remember to offset 700 hertz so they can hear your CW signal and give them a call. It may seem unorthodox but it works!

Tiny offsets can make a difference, too. If you are in a pile-up and everyone is reaching for a DX catch on top of each other at 700Hz up from center, try sending at 850Hz. The pitch offset might catch their ears. If you are straining to pull out a weak CW signal, never forget to try both USB CW and LSB CW settings for the clearest reception. Also, get to know your transceiver's filter sets well. They can produce miracles unlike any legacy rig you owned as a kid!

Especially useful on the low bands (if your gear is capable) try transmitting on one antenna and listening on another. You might want to transmit with an inverted-L on 160 meters but listen on a terminated Beverage antenna. You may hear DX never before available to your ears that the inverted-L could never grasp.

Your surrounding terrain can create miraculous signal filters especially with VHF/UHF. If you want to attenuate a specific direction, climb a mountain and find a place where huge pieces of glacial rock will block signals in that direction. Try different locations at Bear Mountain or Mount Beacon to experience this effect.

Now, if you master all these skills and tricks — **and** — you had a 100 foot tower with stacked 20 meter long Yagis and full legal power linears... where would you be? It is what dreams are made of! Improve your skills and learn all about your radio environment. Added fun and satisfaction are guaranteed. Make it your top New Year's resolution!

Please remember to welcome in the new year by participating in ARRL's *Straight Key Night*. Operators worldwide will be firing up vintage gear and dusting off their straight keys to operate CW just like they did when they were Novices back when. It is a unique opportunity to try CW. Everyone will be sending at very slow speeds. Try it!... if only to say 'I was on CW!' Details: <http://www.arrl.org/straight-key-night>.

Have a happy holiday season and New Year 2024! 73 es dit dit de N2KZ 'The Old Goat'.



A sail down memory lane - N2MUZ

Maritime memories

We're among friends here, right? Whew. Good. So I won't try to rationalize yet another irrational purchase, but rather explain why...

Here's my story. I'd always been interested in radios, starting from crystal radio kits as a kid, to seeing my friend's dad's ham shack in the 1960s, filled with big tube gear surrounded by the ozone it created, the shack walls adorned top to bottom with colorful QSL cards from around the world, to finally getting my own CB radio in the 1970s and "talking skip". Long distance radio amazed (and still amazes) me that a piece of copper wire and simple radio can talk around the world.

Triangle island

I then had a big dry spell away from radios until the late 1980s, when I crewed on a sailboat racing to Bermuda, and got to see and use Marine SSB in action. During the race to Bermuda and the return trip back home, we listened to morning and evening High Seas weather reports and printed FAX, easily talked with the US Coast Guard while sailing through a tropical storm

low (reporting the real time weather back to them — the weather reporter!) and made phone calls home at \$5.00 per minute via AT&T High Seas Operator — all while hundreds of miles at sea, using a very simple marine SSB that used only the wire backstay as an antenna!



Map shows location of Bermuda, 640 miles from the U.S. Coast, plus sites of AT&T High Seas Service HF transmitters WOO and WOM. [Base map: CIA.]

low (reporting the real time weather back to them — the weather reporter!) and made phone calls home at \$5.00 per minute via AT&T High Seas Operator — all while hundreds of miles at sea, using a very simple marine SSB that used only the wire backstay as an antenna! My amazement was rekindled and I decided to get my ham license, which I succeeded in doing in the early '90s. This hobby (compulsion?) has led to years of fun, lots of friends, and many, many fun irrational purchases.

Long circle path

This year I kind of completed that circle when I bought the SSB radio that got me hooked on ham radio. After this year's successful long sailing passage,

with daily SSB chats amongst the fleet and successful mid-sea QSOs with several Hams from PCARA that lifted my spirits, and perhaps one-too-many rum punches once ashore, with access to Internet and eBay, I found myself hitting the "Buy It Now" button for an Icom IC-M700, which arrived yesterday. My wife just shook her head, saying "how many of those things do you have now?", with me pretending I didn't hear the question, and just kept unwrapping my vintage treasure.

Marine SSB radios today need to have DSC (Digital Selective Calling) capabilities in order to make emergency calls, relegating the IC-M700 without this function to the deep discount bin of marine radios. And a perfect buying opportunity as a Ham radio!



Icom's \$2,800 IC-M803 MF/HF marine transceiver has Digital Selective Calling built-in. [Credit: Icom]

Keep it simple

These radios are simple to operate, with minimal controls, consisting of knobs for volume and clarifier and switches for noise blanker and squelch. The receiver seems pretty tight. This setup works just fine for most all operating conditions.

The M700 radio is "channelized" with three groups of sixteen channels and no VFO. But the good news is it's extremely easy to reprogram these channels to the ham bands. And this commercial grade radio is designed to put out 150+ watts with continuous duty cycle, for applications such as PACTOR, Weather Faxes, etc.



Icom IC-M700 150 watt SSB transceiver recently acquired by Todd N2MUZ covered marine bands from 1.6 MHz to 22.9999 MHz. [Pic credit: Todd, N2MUZ]

So, if you know the frequencies you want to work — and desire a very simple to use, high-power SSB utility radio — for \$200 the Icom IC-M700 may be something to consider. Even if it's 30 years later.

- 73 de Todd, N2MUZ

Shelf of history

I was tidying up in the basement and came across a cluttered shelf covered in plastic bags and old pill bottles. Clearing off the top layer, I realized there were several items of interest underneath.



This cluttered shelf in the basement contained several items from past decades of electronic technology.

The main item from a radio point of view was an imitation leather case, with a portable radio inside. I cleaned off the dust, extracted the radio and was reminded of a period from my earlier days of amateur radio.

Let me take you back to the 1970s, when I was still located at the family home in Southport, on the coast of northwest England. I was active on SSB on the HF bands from 160 – 10 meters while on VHF I could operate AM and SSB on both the 2 meter band and the U.K. 4 meter band.



A portable radio from the 1970s was hidden on the shelf.

Flashback to four

I have written about the **4 meter band** in *PCARA Update* before. In the September 2013 issue, I explained how expansion of post-war TV broadcasting in the U.K. used frequencies in the 50 – 67 MHz region, and radio amateurs had to give up their 56 MHz (5 meter) allocation. The Radio Society of Great Britain argued that loss of the amateurs' only low-VHF allocation should be compensated for and in 1956 a narrow band of 70.2-70.4 MHz was allocated for amateur use — a wavelength of 4.3 meters.

The allocation was only available in the U.K. and a few U.K.-dependent countries, so there was little incentive for amateur radio manufacturers to make equipment for this new band. As a result, there was a great deal of home-brewing and adaptation of ex-military and ex-private mobile radio equipment for the amateur 70 MHz band.

My VW Beetle 1200 from the 1970s was equipped for 2 meters, 4 meters and 70 cm. With the arrival of FM repeaters in my part of the world around 1976-1977, mobile operation on 2 meters and 70 cm shifted from AM and SSB over to FM. But on 4 meters, there were no repeaters at the time, so AM was still the dominant mode.

RadCom radio

I remember leafing through one of the UK monthly amateur radio magazines and seeing an advertisement for low-band (= 4 meters) FM portable transceivers made by Ultra Electronics. I persuaded my friend Harold G3LWK (SK) that we should purchase a pair, split the cost and see what the range was like using FM.

When the sets arrived, they were each housed in a rugged, steel case, with telescopic antenna. The rechargeable battery and speaker-microphone were both missing. The sets were three-channel, crystal-controlled, but with no crystals included. I ordered transmit and receive crystals for the 4 meter 'mobile calling channel' of 70.26 MHz and waited for them to be delivered.



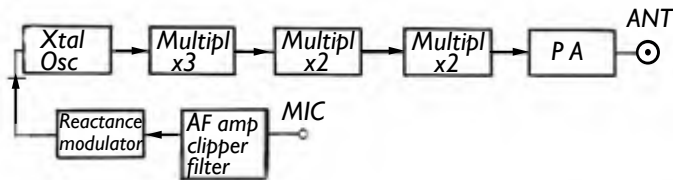
Ultra Electronics low-band FM transceiver had (L to R) mic connector, three channel switch, miniature coaxial antenna socket, telescopic antenna and Off/Volume/Mute-off rotary switch.

In the days before digital synthesizers, commercial VHF and UHF transceivers of the 1950s - 1970s had their frequency controlled by quartz crystals. Each channel required one crystal for the transmit frequency and one crystal for the receive frequency. Those crystals would not be on the actual transmit or receive local oscillator frequency — instead they would be in the



Crystal sockets and trimmer capacitors inside the low-band radio. Crystals for 6746.66 and 5855 kHz had been fitted.

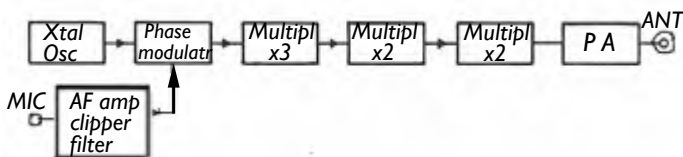
typical range of 4 to 20 MHz. There would be a crystal-controlled oscillator on the fundamental frequency followed by a chain of multiplier stages to reach the desired final frequency. Each stage would be either a tripler ($\times 3$) or doubler ($\times 2$), with output frequency tuned to three-times or two-times the input frequency.



FM transmitter with crystal oscillator on fundamental frequency followed by a tripler and two doublers for total $\times 12$ output. Modulation is applied to the oscillator stage.

Commercial FM transmitters did not employ direct modulation of the oscillator frequency — that would have made the amount of deviation dependent on the quality of the quartz crystal, and on how far it had been ‘padded’ with a series or parallel capacitor to pull it onto frequency. Instead, the continuous wave from the oscillator output was subjected to *phase modulation*, a process which was more reproducible.

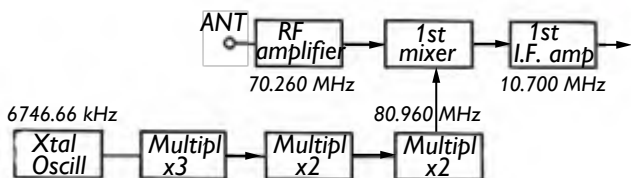
In order to achieve sufficient deviation at the final output frequency, it was necessary to have a high multiplication factor. For example, in the Ultra Electronics transceiver, the transmit crystal was on 5855 kHz, multiplying this by 12 produces the desired transmit frequency of 70.260 MHz. Phase modulation of the fundamental 5855 kHz signal might produce a deviation of only ± 0.5 kHz. When the signal is multiplied by 12, the deviation would be increased to ± 6 kHz.



Commercial FM transmitter would use phase modulation of a stage **after** the crystal oscillator. If the crystal was on 5855 kHz, output frequency ($\times 12$) is 70.260 MHz.

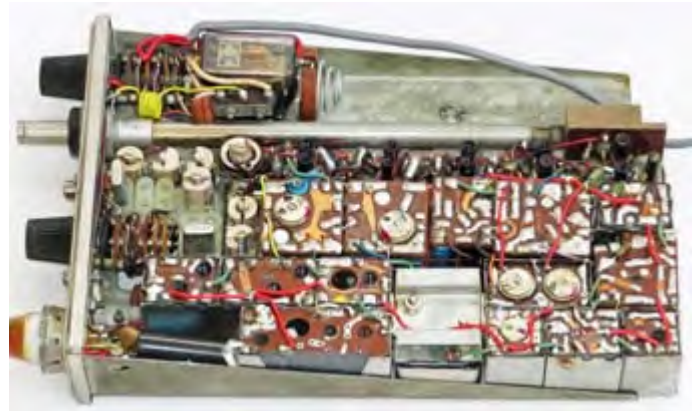
Receive local oscillator

The receive crystal was on a frequency of 6746.66 kHz. When this was also multiplied by 12, the first local oscillator frequency is 80.960 MHz. The local oscillator signal would be applied to the first mixer, where it would combine with an incoming radio frequency signal on 70.260 MHz, to produce a first I.F. frequency of $80.960 - 70.260 = 10.700$ MHz.



Receiver front-end shows crystal oscillator, followed by multiplier stages to provide first local oscillator signal.

Examination of the inner workings of the Ultra handi-talkie allow identification of the transmitter RF strip and the receiver. There is an RF amplifier with what appears to be an AFZ12 transistor, followed by a transistor mixer, feeding into a crystal filter — presumably the main selectivity on 10.700 MHz.



View inside the Ultra Electronics low-band FM transceiver. Shielded receiver modules are nearest the camera. Silver square, center, is the crystal filter on 10.700 MHz.

The rechargeable battery was specified as 15V positive ground. On my own set, I ran a cable out of the set for an external power supply. Press-to-talk speaker-microphones for both sets were fabricated using ‘oval’ fist microphones, with a curly telephone cord and a microphone plug that I cast myself using Araldite® epoxy resin. I remember that I tuned up both radios, then handed one over to Harold, G3LWK. With only 1 watt or so RF output, range was not enormous, but they allowed working between our respective homes, roughly 3 miles apart.

What is still interesting is the improvement in VHF portable radio techniques compared with 50+ years ago. I found a rubber stamp mark on the chassis which reads ‘UEL 69’, suggesting the sets had been originally manufactured by Ultra Electronics Limited in 1969.



Mark on zinc-plated steel chassis ‘UEL 69’.

The use of positive ground and the (Mullard) AFZ12 RF amplifier transistor suggests that the radio was based on germanium pnp transistor technology — no surprise there, but silicon npn transistors with better temperature characteristics and improved high frequency performance were becoming available in the late 1960s.

Construction was unusual in that the receiver was based on ten modules each in its own metal-shielded can, followed by four non-shielded modules. No doubt this was intended to keep the high-gain limiter stages on 10.7 MHz and 455 kHz stable... but it made servicing very difficult. It must have added greatly to manufacturing costs as modules and their inter-stage wiring with Teflon™-insulated wire had to be hand-soldered.

All transmitter and receiver circuitry depended on individual transistors... there were no integrated circuits in use. ICs such as the the Texas Instruments SN76660 and Siemens TBA120 would not appear until around 1973, originally intended to provide a high-gain limiting amplifier and phase quadrature detector for wideband intercarrier FM sound in television I.F. strips. Those same techniques could also be applied to narrow-band FM reception... something that radio amateurs were soon taking advantage of.

One item that is easily seen near the telescopic antenna is the transmit/receive relay which switches the antenna over from receiver input to transmitter output. Nowadays, this function would be accomplished with PIN diodes, but suitable devices were unavailable in 1969 — so extra current was drained from the battery to pull-in the relay. Alongside the relay is a mechanical switch that transfers output from the miniature coaxial connector to the telescopic antenna when fully extended.



Transmit/Receive relay is mounted behind the Off/Volume/Mute-off rotary switch. Mechanical switch below the relay transfers RF output from coaxial connector to the telescopic rod antenna when this antenna is fully extended.

A final point to note is **weight**. This supposedly portable radio, in its steel case with heavily-screened separate stages weighs-in at around 2 pounds! It would have been even heavier with a rechargeable battery installed. The steel case was the wrong shape and size to be hand-held, so the usual arrangement was to carry the radio in a leather case with a substantial shoulder strap. I was lucky enough to have a family member with a Singer Sewing Machine who could run up a couple of cases in artificial leather, using open-weave speaker fabric for the pouch that held the combined speaker-microphone.

A few years later, I had a brand new Kenwood TR-2300 2 meter FM transceiver of similar size and weight (2.6 lb) to the Ultra, with frequency synthesizer rather than crystal control, providing 80 × 25 kHz channels in the U.K. 144-146 MHz band.

Compare this with a modern



Kenwood TR-2300



Yaesu FT-70D dual-band handi-talkie.

three amateur bands, 4 meters, 2 meters and 70 cm.

There were several other items on the “Shelf of History” — a JVC stereo cassette deck, a Polaroid Spectra AF instant camera, a WH Smith Multiband Receiver Model 56 and a Prometheus ProModem 300 / 1200 baud dial-up modem. They all played a part in previous radio adventures, but are of limited use today.

dual-band HT such as the Yaesu FT-70D which weighs just 9 oz, covers all frequencies on both 2 meters *and* 440 MHz, and runs all day on a lightweight lithium ion battery.

Nowadays, U.K. radio amateurs can purchase a Wouxun KG-Q336 handi-talkie, capable of operation on



Wouxun KG-Q336 HT covers 66-88, 136-174 and 400-480 MHz.



Four more items from the ‘Shelf of History’. A JVC stereo cassette deck with Dolby noise reduction, a Polaroid Spectra instant color camera with film pack, a WH Smith Multiband receiver covering LW, MW, Marine Band (1.6-4.4 MHz) and two SW bands – and a Prometheus ProModem 1200 dial-up modem, vintage 1984.

- NM9J

Field Day Results 2023

Recent years

ARRL reported that Field Day 2023 had more participants returning to the “field” compared to the number of Class D/Class E home stations of previous years.

In 2021, with COVID-19 restrictions relaxed, PCARA had returned to Walter Panas High School. A 3-element wire beam for 40 meters and tower-mounted triband beam contributed to the record score. Unfortunately 2021 was our last year at Walter Panas as the upper softball field was demolished to make way for a new multi-purpose field alongside the school. This field was in use for graduation ceremonies during Field Day 2022 — so, with the cooperation of Lakeland Central School District, we moved to George Washington Elementary School in Mohegan Lake. The grounds behind the school building were the site for our 40 meter wire beam, triband HF beam, G5RV and 6 meter Yagi.

This year

The weather forecast for Field Day weekend 2023 featured rain and thunderstorms on Saturday June 24. As a result of safety fears for the lightweight shelter and tilt-over

tower, a last-minute decision was made to transfer operation from the rear field to the covered entrance in front of



GW Elementary School covered entrance .

George Washington Elementary School, with wire antennas supported by nearby trees and flag pole.

There is a full report on Field Day 2023 in *PCARA Update* for July 2023. Despite dreadful weather with pauses for lightning storms on Saturday, PCARA's Class 2A entry resulted in 589 QSOs (including plenty of FT8 digital contacts) and a total score of 2,810 points.

These results were transmitted to ARRL by Joe WA2MCR. Overall results were published by ARRL in November, as part of December 2023 *QST*. PCARA's score is shown below following previous years' results.

Peekskill/Cortlandt ARA, W2NYW, Class 2A

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

	2013 (1A)	2014	2016	2017	2018	2019	2021	2022
QSO pts:	775	722	816	813	731	829	1366	712
Power:	2 (<150W)							
Participats:	14	16	19	22	22	29	25	24
Tot scor:	2040	2460	3018	2734	2886	2764	3662	2234

	2023
QSO points:	940
Power:	100W
Participants:	27
Total score:	2810

PCARA held a traditional club-portable Class A Field Day, with the opportunity for members who preferred to operate from home (Class D and Class E) to have their scores aggregated with the main club entry. Charles N2SO (Class 1D — Home Station Commercial Power) made 103 QSOs and 462 points. When this was aggregated with PCARA's 2A entry, the total was 3,272 points. Thank you Charles! Here is a listing of neighboring clubs with their own aggregate scores.

Club	Aggregate Score	Entries
Westch EmComm Assn	11,288	3
Yonkers ARC*	5,111	1*
Orange County (NY) ARC	4,877	5
Peekskill/Cortlandt ARA	3,272	2
Putnam Emergency ARL	1,802	2
QSY Society*	1,316	1*

*(Not an aggregate score)

Congratulations once again to WECA on their high score, coming mostly from their Category 4A entry.

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

#	Call	Score	Cat.	QSOs	Club
1	N2SF	9,988	4A	2,377	Westchester EmComm Assn
2	K2AE	7,993	6A	1,763	Broughton Memorial FD Gp
3	W2C	6,938	4A	1,676	Warren County (NY) RC
4	K2CT	5,871	5A	1,186	Albany ARA
5	W2YRC	5,111	4A	943	Yonkers ARC
6	K2DLL	4,507	3A	838	Saratoga Co ARA
7	N2LBR	4,444	2D	1080	(Sue, Schenectady)
8	N2LL	4,080	6A	981	Overlook Mtn ARC
9	AA2BJ	4052	1D	1115	(Brian, Merrick)
10	W2NYW	2,810	2A	589	Peekskill / Cortlandt ARA
11	KE2X	2,680	2B2	638	(John, Monroe)
12	W2HO	2,469	5A	335	Orange County (NY) ARC
13	WR2I	2,458	1E	502	(Marc, Nyack)
14	N2MTG	1,968	1E	909	Hudson Valley Contesters

Just before newsletter press time, ARRL released the full database of Field Day results – so we can report that PCARA was in 10th place out of 58 entries in ENY section, 26th out of 167 in the entire Hudson Division and 590th out of 4,555 total entries from the USA and Canada. PCARA was once again the *only* entry in Category 2A in ENY Section. (QSY Society, K2QS, in 18th position, was in Category “2A-Commercial”, meaning two HF stations running from commercial power.)

- NM9J

More LiFePO₄

Crossing the Rivian

One of my daily walks takes me up a nearby hill, around a loop and down the far side. It pays to keep eyes and ears open as delivery vans and school buses fly past, accompanied by the sound of engines starting, accelerating and stopping while parcels are delivered and school-children are dropped off.

A few weeks ago, I had a surprise when a dark blue Amazon delivery van was stopped in the street. The engine was off, and I was expecting the roar of an internal combustion engine as the driver returned and pulled away. Instead, there was **no sound** at all — this particular truck was completely quiet. The rear of the truck was marked by a large wrap-around LED rear light and the name “Rivian”.

Rivian is an electric vehicle manufacturer headquartered in Irvine, California with a manufacturing facility in Normal, Illinois — previously owned by Mitsubishi. Vehicle test facilities are located in Plymouth, MI and Wittmann, AZ. The company was founded in 2009 by CEO and Rensselaer/MIT graduate Robert (RJ) Scaringe. The company name was changed to Rivian in 2011, from **Indian River** in Florida, a lagoon near Melbourne FL where RJ Scaringe grew up.



Rivian's CEO RJ Scaringe. [Credit: Richard Truesdell, CC BY-SA-4.0, cropped]

Rivian began work on a sporty coupe electric vehicle, but soon moved on to electric-powered SUVs, with the R1T pickup and R1S SUV being introduced at the



Rivian R1T luxury pickup truck went on sale in 2021. [Credit: Kevauto, CC BY-SA-4.0]

LA Auto Show in November 2018. Delivery of the R1T began in October 2021. In 2019 Amazon announced a \$700 million investment in Rivian and placed an order for 100,000 electric vans specifically designed for the company. Known as the Rivian EDV (Electric Delivery Van), prototypes were initially tested in California in 2021. The first production vehicle, an EDV-700 with 660 cubic feet capacity was delivered at the end of 2021. Roll-out by Amazon began in mid-2022 and the company now has over 10,000 electric delivery vans on the road.

The first EDV-700s had a dual-motor front-wheel drive, but this was changed to a single-motor due to semiconductor supply chain problems. The battery, lo-

cated under the van floor, started out as a lithium nickel cobalt oxide type — but with the change to a single-motor, Rivian also changed the battery chem-



Rivian EDV-500 electric delivery van for Amazon. [Credit: Jay8g CC BY-SA-4.0, cropped.]

istry to lithium iron phosphate. RJ Scaringe said the change to lithium iron phosphate would give similar range capabilities, specified as 150 miles for Amazon's vans. With Amazon's usage pattern, only 20-40% of battery capacity is used each day, allowing slow recharging overnight. The R1T pickup and R1S SUV have much greater range — over 260 miles with lithium iron phosphate.

Reasons for electric vehicles to switch from lithium cobalt oxide to lithium iron phosphate were explained in the September 2023 *PCARA Update* (“Lithium-ion update”, pp14-16). ‘Lithium iron phosphate does not contain expensive, rare elements mined by children in conflict zones, and LFP batteries do not suffer from the inherent thermal runaway problems of lithium cobalt oxide.’

For a YouTube video on Amazon's latest electric van see: https://youtu.be/gGrKVpYj_y4

You've got a friend in Mitra

Every year the American Chemical Society's *C&E News* picks out 10 Start-Ups to watch. One of the new companies described in November 2023 was Mitra Future Technologies Inc., known as **Mitra Chem**. (Mitra is Hindi for ‘friend’)

Mitra Chem was founded in 2021 by Tesla veteran and current CEO **Vivas Kumar**. Cofounders were Chirranjeevi Gopal from Toyota Research and William Chueh of Stanford University. The silicon valley company intends to shorten the timeline for developing battery cathode materials by over 90%. Their first project was to shift lithium-ion batteries away from nickel and cobalt — which are facing supply shortages and high prices — toward less-expensive cathodes containing **iron**.



Mitra Chem CEO Vivas Kumar. [Credit MITRA.]

Lithium iron phosphate batteries are currently dominated by Chinese manufacturers and raw material suppliers. Mitra Chem is hoping to reduce this dependency for western nations as it is expensive to ship heavy, bulk materials across the world, especially for

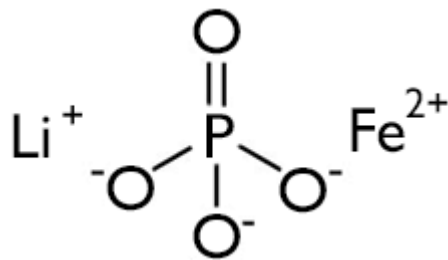
lower-cost electric vehicles.

In 2022 Mitra Chem announced that it had begun shipments of commercial-grade lithium iron phosphate materials from its 15,000 sq ft



Powder form of lithium iron phosphate is grey or black.

Mountain View CA facility to a “tier 1 battery cell manufacturer” for qualification. Performance exceeded standard material from China and the product had



Chemical structure of lithium iron phosphate. During charging, lithium ions (Li⁺) move out of the cathode toward the anode, while electrons (e⁻) flow out over the external circuit, leaving behind Fe³⁺PO₄³⁻.

been developed in only four months through machine-learning algorithms developed by Mitra’s cofounders.

In August 2023, General Motors announced that it was leading a \$60 million investment round in the Mountain

View startup to accelerate GM’s commercialization of affordable electric vehicles. The two companies would develop iron-based cathode materials such as **lithium manganese iron phosphate** (LMFP) for use in GM’s Ultium Platform, a combination of modular battery designs and drive units.

According to the press release, “Mitra Chem’s R&D facility can simulate, synthesize and test thousands of cathode designs monthly, ranging in size from grams to kilograms. These processes drive significantly shortened learning cycles, enabling shorter time-to-market for new battery cell formulas.” Mitra Chem’s techniques for automated optimization of cathode materials are detailed in U.S. Patent Application US 2023/0261188.

Replacement of some of the iron in a lithium iron phosphate battery by manganese can improve energy density by 15% to 20%, without affecting cost and safety. This higher energy density for LiMn_xFe_(1-x)PO₄ is because the cell’s operating voltage is increased to 3.7 V, compared to LFP’s 3.2 V.

Lithium manganese iron phosphate is not a new material — China’s largest electric vehicle manufacturer BYD said in 2014 that it was developing LMFP batteries. Several Chinese manufacturers have since announced commercial production starting in 2023-2025. But the dominant position of China may be hollowed out by provisions of the USA Inflation Reduction Act of 2022. U.S. Taxpayers may be eligible for a Federal Tax credit of up to \$7,500 towards a new, clean vehicle.

This credit is dependent on the vehicle’s MSRP, its final assembly location, **battery component and/or critical minerals sourcing**, and the buyer’s modified adjusted gross income.

Mitra Chem is working on a ‘breakthrough’ material coded “LMX” to follow LFP (industry standard) and LMFP (differentiator). There is no indication about what the material might be, though the patent application hints at other “polyanion” cathodes. (One possibility might be use of chromium.)

- NM9J

VE Test Session

PCARA held a Volunteer Examiner Test Session on Monday evening, November 13 at BOCES Tech Center in Yorktown Heights. There were two candidates and four VEs.

Maria Genovesi of Amenia, NY was successful in the Element 2 examination and qualified for Technician. Her new license and call sign KE2CGB were granted by FCC on November 23, 2023.

Robert WA2ZOR of Valhalla, NY passed Element 3, upgrading from Technician to General. His upgrade was granted by FCC on November 22. Congratulations to both candidates.

The November 13 Test Session was held under the auspices of ARRL-VEC, with Mike W2IG as VE Team Liaison. The other volunteer examiners were Lou KD2ITZ, Rob AD2CT and NM9J.



PCARA’s November 13 VE Test Session took place at BOCES Tech Center in Yorktown Heights.

PCARA’s next VE. Test Session is scheduled for Monday December 11, 7:00 p.m., also in Room 235 at BOCES Tech Center in Yorktown Heights. Candidates must contact Mike W2IG using w2igg‘at’yahoo.com.

Peekskill / Cortlandt Amateur Radio Association

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

E-Mail: mail 'at' pcara.org

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

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

PCARA Update Editor: Malcolm Pritchard, NM9J

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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

Sun Dec 3: PCARA Holiday Dinner, 5:00 p.m., Cortlandt Colonial Restaurant, 714 Old Albany Post Rd, Cortlandt Manor. (See page 2.)

Mon Dec 11: PCARA VE. Test Session, 7:00 p.m., BOCES room 235 (Microcomputer Tech Classroom), see below.

Sat Dec 16: PCARA Breakfast, 9:00 a.m., Uncle Giuseppe's, 327 Downing Dr. Yorktown Heights, NY.

To be announced: January 2024, PCARA Bring & Buy Auction.

Hamfests

Check with organizers before leaving.

Sat Jan 6 2023: Ham Radio University, back to an in-person event. LIU-POST, Hillwood Commons Student Center, 720 Northern Boulevard, Brookville, NY. See: <https://hamradiouniversity.org/>

VE Test Sessions

Check with the contact before leaving.

Dec 2, 9, 16, 23, 30: Westchester ARC, 19 Hunts Bridge Rd, Yonkers NY. 11:00 a.m. Must contact VE, ac2f'at'arrl.net.

Dec 11: PCARA, 7:00 p.m., Putnam | Northern Westchester BOCES, Tech Center, 200 BOCES Drive, Yorktown Heights, Room 235. 7:00 p.m. Must contact VE. Mike W2IG, w2igg'at'yahoo.com.

Dec 14: WECA, Westch Cnty Fire Trg Center, 4 Dana Rd Valhalla NY. 7:00 p.m. Must contact VE, N2gdy'at'weca.org.



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